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Draft Transmission Guideline

Technical Supplement for Landscape and Visual Impact Assessment

November 2023

Acknowledgement of Country

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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Draft Transmission Guideline: Technical Supplement – Landscape and Visual Impact Assessment

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Glossary of Terms

Dwelling	A dwelling has the same meaning as the *Standard Instrument - Local Environmental Plan (*a room or suite of rooms occupied or used as a separate domicile) as well as where it meets the criteria outlined in **Section 1.3.**
Landscape	A holistic area comprised of its various parts including landform, vegetation, buildings, villages, towns, cities and infrastructure.
Magnitude	The apparent size of a transmission infrastructure project in the landscape or when viewed from a given viewpoint.
Preferred study corridor	The early area being considered by a proponent and most likely to be presented in a scoping report
Private receiver	A privately owned or used viewpoint type identified in **Table 3**.
Proponent	The proponent of a state significant infrastructure (SSI) activity or modification seeking approval
Public viewpoint	A publicly owned or used viewpoint type identified in **Table 3**.
Rural dwelling	Any dwelling located 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).
Sensitivity	The capacity of a landscape or viewpoint to absorb the impacts from a proposed land use change and/or built form.
Transmission infrastructure	Works, infrastructure and buildings for the purpose of transmitting electricity that are SSI and/or critical SSI activities.
Urban dwelling	Any dwelling in a residential zoned area (R1, R2, R3 and R4) or rural village (RU5).
View	The sight of a landscape or scene.
Visual impact	The impact on views from private and public places. It is determined by considering the visual magnitude sensitivity.

1 Introduction

This technical supplement provides additional guidance for proponents, consent authorities and the community using the Transmission Guideline to understand the process and requirements for assessing visual and landscape character impacts of major transmission infrastructure in NSW.

1.1 Purpose

This technical supplement provides a detailed description of the landscape character and visual impact assessment process.

It ensures that all proposals for transmission infrastructure are accompanied by an assessment that is proportionate to the scale and impacts of the infrastructure, is easy to understand and considers community views and values of the surrounding landscape.

The technical supplement identifies information that must be provided in a landscape character and visual impact assessment and includes assessment tools and requirements that must be used to produce consistent and comparable results.

The technical supplement also aims to:

- facilitate good route selection and design of transmission infrastructure projects early in the planning process
- guide the relevant identification, mitigation, and a management of significant impacts on the surrounding landscape and viewpoints from the private and public realm
- recognise that changes to our landscapes will be necessary to facilitate the transition to renewable energy, and balance the need for this change with the need to protect unique and high-quality landscapes
- strengthen the landscape and visual impact assessment process to ensure consistent decision making and to reduce delays in the assessment process
- encourage the appropriate development of transmission infrastructure in NSW.

1.2 Application of the technical supplement

This guideline does not apply to the augmentation of existing transmission corridors or development immediately adjacent to existing transmission lines. If a transmission project includes infrastructure

both next to and away from existing transmission corridors, the guidelines will only apply to the areas away from existing corridors.

However, applicants and consent authorities are encouraged to consider the broad objectives and principles in this guideline when preparing, assessing and determining applications for projects, or parts of projects, that are next to existing transmission corridors.

Any landscape or visual impact assessment for projects of this nature should recognise the impact of existing transmission lines and consider the extent to which new transmission lines would incrementally increase the visual impacts.

For the avoidance of doubt, applicants are not required to apply the setbacks (see **Figure 2**) to infrastructure next to an existing transmission corridor.

1.3 General requirements

The proponent must prepare a detailed landscape and visual impact assessment as part of an environmental impact statement (EIS).

The assessment must include a full description of the proposed transmission infrastructure design and use maps to show the location of the project in relation to public viewpoints, private receivers and surrounding landscapes identified for analysis.

It must include details of:

- the most recent and highest resolution satellite imagery, aerial photography and available orthophotos at a scale of 1:25,000 (where used the proponent should provide the date the imagery was captured)
- topographic mapping, zoning and other land use information available on the NSW Planning Portal or SEED
- Google Earth™ or a similar mapping service and the most recent vegetation mapping, particularly vegetation information that gives an idea of the structure and height of vegetative cover.

The proponent must engage with the community, including the indigenous community, as early as possible and throughout the preparation of the assessment to verify the outcomes and to consult on any measures proposed to mitigate impacts.

Importantly, the assessment process should be undertaken alongside the design and siting of a transmission infrastructure project so the design can be effectively informed by the community's input.

The assessment must be informed by field visits to establish and ground truth important inputs into the assessment process including the scenic quality and sensitivity of the area. These site visits can include visiting private property where access is granted or public areas surrounding the project.

Professional assessment skills

Professional assessment skills are critical to an effective landscape character and visual impact assessment. The proponent is expected to engage relevant professionals (for example, landscape architects, architects, environmental planners, geographers, or other visual assessment specialists) with demonstrated experience and capabilities. Experts should follow the guidance in this document to perform an effective and consistent assessment for transmission infrastructure.

1.4 Approach to assessment

The technical supplement differentiates between:

- landscape character impact assessment (the assessment of the potential impact on an area's cumulative built, natural, and cultural character or sense of place), and
- visual impact (the assessment of the potential impact on views).

The two assessments should be clear and discrete as it is likely the design response and mitigation measures to address landscape character impact will be different to those for visual impact.

Landscape character assessment

This is the process for determining the overall impact of a project on an area's character and sense of place including what people think and feel about it and how society values it.

Visual impact assessment

This is the process for determining the day-to-day visual effects of a project on people's views (what people see at a place, when they are there) from the private and public domain.

In both cases, the likely impacts of a transmission infrastructure project can only be determined by understanding the sensitivity of an area or view to change and the magnitude of the proposed infrastructure in that area or view.

This technical supplement recognises that visual amenity should be afforded some protections and provides a range of tools to achieve this outcome. However, it also recognises the fundamental principle that landowners do not have a proprietary right or ownership of a view[1] and a visible transmission tower or ancillary infrastructure does not necessarily constitute a visual impact.

Sensitivity

Sensitivity refers to how sensitive the landscape or view is to the proposed change. For example, a pristine natural environment is likely to be more sensitive to change than an industrial area. A view from a residence is also likely to be more sensitive to change than from a local road where views are more intermittent and less frequent.

[1] *Tenacity Consulting v Warringah Council* (2004) NSWLEC 140 and *Victoria Park Racing & Recreation Grounds Co Ltd v Taylor* [1937] HCA 45

Magnitude

Magnitude refers to the physical scale of the transmission infrastructure and is influenced by a range of factors including:

- the apparent size of transmission infrastructure decreases significantly as the distance from the viewer increases
- the apparent size of transmission infrastructure increases with the physical scale and dimensions of a transmission tower and the number of towers that would be visible, although these factors are considerably less discernible as distance from the viewer increases.

Dwellings

In assessing the visual impacts on dwellings, the assessment must focus only on views from the dwelling and not from the property boundary or other parts of the property. Furthermore, the assessment should consider the potential worst-case views that have the greatest potential to impact on the residential amenity. Residential amenity encompasses the overall quality, experience and nature of views and outlooks available to occupants of a dwelling and its immediate surrounds including pool areas and gardens.

For the purpose of this document, a dwelling has the same meaning as the *Standard Instrument - Local Environmental Plan* (Standard Instrument) *(*a room or suite of rooms occupied or used as a separate domicile) and also includes any of the following:

- dwellings that have development consent, but have yet to commence or complete construction
- proposed dwellings that are subject to a development application that has been lodged prior to an application for the transmission proposal[2] but is yet to be determined.

For the avoidance of doubt, a dwelling does not include:

- moveable dwellings as defined in the Standard Instrument including tents, caravans, or other portable devices used for human habitation
- any dwelling that been built illegally (as confirmed by the relevant council)
- a derelict dwelling (that is officially declared by the relevant council).

Easement affected receivers

If a private landholding would host the proposed transmission infrastructure, and therefore be affected by an easement, then private receivers on that land do not need to be assessed in accordance with this document. That is because the affected landholder will be eligible for compensation under the *Land Acquisition (Just Terms Compensation) Act 1991*.

These receivers should be identified as “easement affected” in the scoping report and EIS, where known, including on any relevant maps.

[2] See Section 5.15 and 5.16 of the Environmental Planning and Assessment Act

2 Landscape character assessment

The EIS must include an assessment of how the infrastructure will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape and its distinctive character. Landscape character assessment can help the community, proponents and consent authorities understand the sensitivities of a landscape and to determine the overall impact of the infrastructure on an area's character and sense of place.

This process is distinctly different from visual impact assessment which is solely focused on individual views. Consequently, landscape character assessment can help to understand the cumulative effect of transmission infrastructure on a much broader area.

The key tasks to be undertaken in assessing landscape character impacts are described below.

The level of assessment should be appropriate for the context in which the infrastructure is proposed and should be proportionate to the likely impacts, including cumulative impacts, of the infrastructure.

The proponent is encouraged to consult with the department in scoping its project to determine the level of detail that may be required in the landscape character assessment.

The study area for the landscape character assessment should generally be approximately 5 km from the proposed infrastructure's project study corridor. However, the character of landscapes can vary significantly, and justification may be provided for analysing a smaller area.

2.1 Baseline analysis

Proponents must undertake a baseline study to establish the existing landscape character of the area and its sensitivity. This should be based on desktop analysis and field visits and should provide a descriptive and illustrative analysis of the qualities of the place, what makes it valued and any challenges that could arise in relation to the proposed infrastructure.

It is important that proponents engage with the community (including the indigenous community), local council and potentially affected landowners as early as possible to identify and establish the importance of particular landscape values and characteristics. Gauging these values can provide a firm basis for siting and designing transmission infrastructure that seeks to avoid or minimise impacts.

In undertaking consultation, proponents must adopt the approaches and objectives outlined in the NSW Government's Undertaking Engagement Guidelines for State Significant Projects.

The baseline analysis should identify and describe the elements that make up the landscape in the study area, including:

- physical influences (such as geology, soils, landform, natural drainage and water bodies)
- ecological characteristics and land cover of an area (such as whether it is forested, wetland, scrub, grass etc.) and the quality and type of vegetation cover
- the influence of human activity, including land use and management and the character of any settlements and buildings
- key landscape features or attributes of the landscape associated with high visual interest or quality that stand out visually in the landscape, including natural features (such as a distinctive mountain peak or hilltop), cultural or agricultural features
- the aesthetic and perceptual aspects of the landscape, particularly emphasising those that are key characteristics contributing to the distinctive character of the landscape (such as its scale, complexity, openness, tranquillity or wildness)
- aspects of the landscape that have important aboriginal cultural heritage value with the exception of artefacts and tangible values that would be assessed in detail as part of an Aboriginal Cultural Heritage Assessment), including why they are valuable to the community
- the overall character of the landscape in the study area, including any distinctive landscape character types or areas that can be identified (see further guidance below)
- the condition of the landscape, including the condition of elements or features such as buildings or vegetation
- the planning designations of an area relating to landscape character, including sensitive land use designations, zonings and heritage listings
- the location of any proposed, operational or approved transmission infrastructure within a regional and local context, including projects which may have the potential to create direct or indirect cumulative impacts with the project.

Proponents should use a combination of descriptive text and photographs to assign scenic quality values and provide a visual profile in the region, including what types of landscape features are typical, less common, rare or unusual and outstanding. The outcomes of this baseline analysis should be used to inform the visual impact assessment of assessable viewpoints.

Proponents are encouraged to utilise existing scenic quality mapping that has been published by the relevant local council or by the NSW Government when undertaking the baseline analysis.

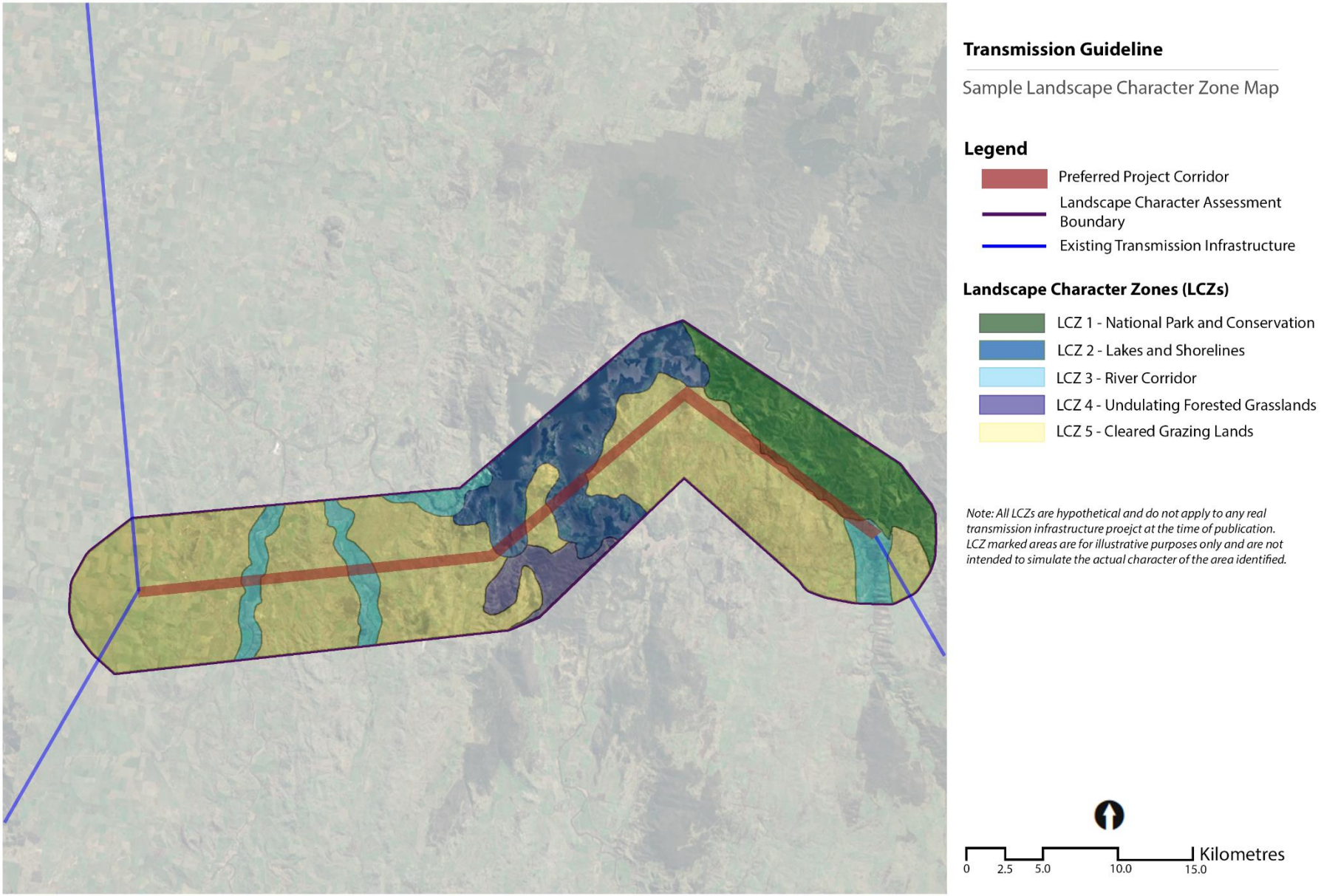


Figure 1. Example landscape character zone map for a transmission infrastructure project

2.2 Identify landscape character zones

If the landscape includes distinct areas that have different qualities, the study area should be broken down into different character zones (see **Figure 1**).

Landscape character zones should divide the landscape based on common distinguishing visual characteristics including landforms and major land cover patterns. These patterns are formed by combinations of vegetation, water bodies, landforms and land use, from which the key landscape features can also be identified.

Dividing the landscape into zones will make the assessment of likely impacts (as described further below) simpler, easier to understand and more accurate.

Sources to use in identifying and establishing the type of regional landscape character zones include:

- Learmonth, Nancy and Andrew (1971) Regional Landscape of Australia: Form, Function and Change, Angus and Robertson Publishers, Sydney
- Mitchell, Peter (2022) Descriptions for NSW (Mitchell) Landscapes Version 2, NSW National Parks and Wildlife Service
- Tudor, C. (2019) An approach to landscape sensitivity assessment – to inform spatial planning and land management. Natural England: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/817928/landscape-sensitivity-assessment-2019.pdf
- Australia's bioregional framework as delineated via the Interim Biogeographic Regionalisation for Australia (IBRA): https://www.dcceew.gov.au/environment/land/nrs/science/ibra/australias-bioregions-maps
- eSPADE Spatial viewer for soil landscape mapping, NSW Environment, Energy and Science: https://www.environment.nsw.gov.au/eSpade2WebApp

2.3 Assess the landscape character impact

Proponents should determine the impact of the transmission infrastructure on each landscape character zone by evaluating the sensitivity of the landscape and the magnitude of the project's effects in that area.

The sensitivity and magnitude should be assigned a rating (low, moderate or high) that can be used to determine the overall landscape character impact on any given zone. Rationale for the ratings must be provided as part of the assessment.

Proponents should consider the following matters when analysing and rating the magnitude of the project:

- size and scale including:

    - the extent of existing landscape elements that may be lost and the contribution of that element to the character of the landscape
    - the extent to which the infrastructure becomes a minor or major element in the landscape and its dominance in the visual catchment
    - the extent to which the infrastructure changes the key characteristics of the landscape, which are critical to its distinctive character including the removal of vegetation in corridors along prominent landscape features such as ridgelines.
- geographical area – the area of the landscape over which the effects will be experienced, having regard to the nature and scale of the project's effects. This could vary from the immediate setting of the site to larger scales where the project may influence several landscape character zones.

The sensitivity of the landscape character type should be rated based on the inherent capability of the area to absorb changes from the project.

Where impacts are expected to be high, the assessment should propose measures to avoid or mitigate these impacts including re-siting and re-sizing elements of the transmission infrastructure where possible. Any significant residual impacts on the landscape remaining after mitigation should then be summarised as the final step in the process.

An example landscape character assessment is provided in Appendix A.

3 Visual impact assessment framework

Applications for a transmission infrastructure project must be accompanied by a visual impact assessment that considers the likely impacts of the transmission infrastructure on public viewpoints and private receivers. This section sets out a framework, including a range of principles and tools, to inform the assessment.

The method for determining the visual impact of 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. Consequently, the visual assessment framework is broken into two key parts – a setback to prevent towers from being located close to sensitive receivers and an assessment process for all other public viewpoints and private receivers. A separate process is also set out for the assessment of dwelling entitlements. These are prescribed in detail throughout this section.

3.1 Setbacks

Transmission towers close to sensitive receivers including dwellings, historic homesteads, tourist accommodation, places of worship, town centres and central business districts, can be visually dominating despite the scenic quality or importance of the view. For example, a single 80 m transmission tower will generally have a dominant appearance if located 370 m of a rural dwelling and is completely visible.

Figure 2 prescribes setback distances for transmission towers that are likely to have a dominant appearance. The setbacks also scale depending on the height of the towers being proposed and whether the sensitive receiver is rural or urban in nature (see **Table 1**). This is because rural areas are typically more sensitive to transmission infrastructure compared to urban areas, where it is a more common part of the overall urban fabric.

A sensitive receiver will trigger a high visual impact if it is located within the relevant setback distance provided in **Figure 2** and would be fully visible (this is equivalent to 12 degrees of vertical field of view for rural sensitive receivers and 16 degrees for urban sensitive receivers).

If a sensitive receiver is within the relevant setback distance but would occupy less than 12 degrees for a rural sensitive receiver or 16 degrees for an urban sensitive receiver (due to vegetation, topography or other mitigating factors) it is exempt from the setback. In these cases, a visual impact assessment must be undertaken in accordance with the process outlined in **Section 3.2**. In all

other circumstances, receivers should be assessed against the high impact performance criteria in **Table 9** which generally require the impact to be avoided. Consequently, proponents should generally avoid siting transmission towers within the setbacks unless there would be significant mitigating factors.

Table 1. Classification of rural and urban sensitive receivers for setbacks

Rural sensitive receiver	Urban sensitive receiver
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) Urban sensitive receivers with rural outlooks Historic rural homesteads/ residences on the national, state or local heritage list in rural areas Tourist and visitor accommodation and places of worship (such as bed and breakfasts, motels, hotels)	Dwellings in residential areas and rural villages (land zoned R1, R2, R3, R4 and RU5) Residences on the national, state or local heritage list in urban areas Town centres and central business districts

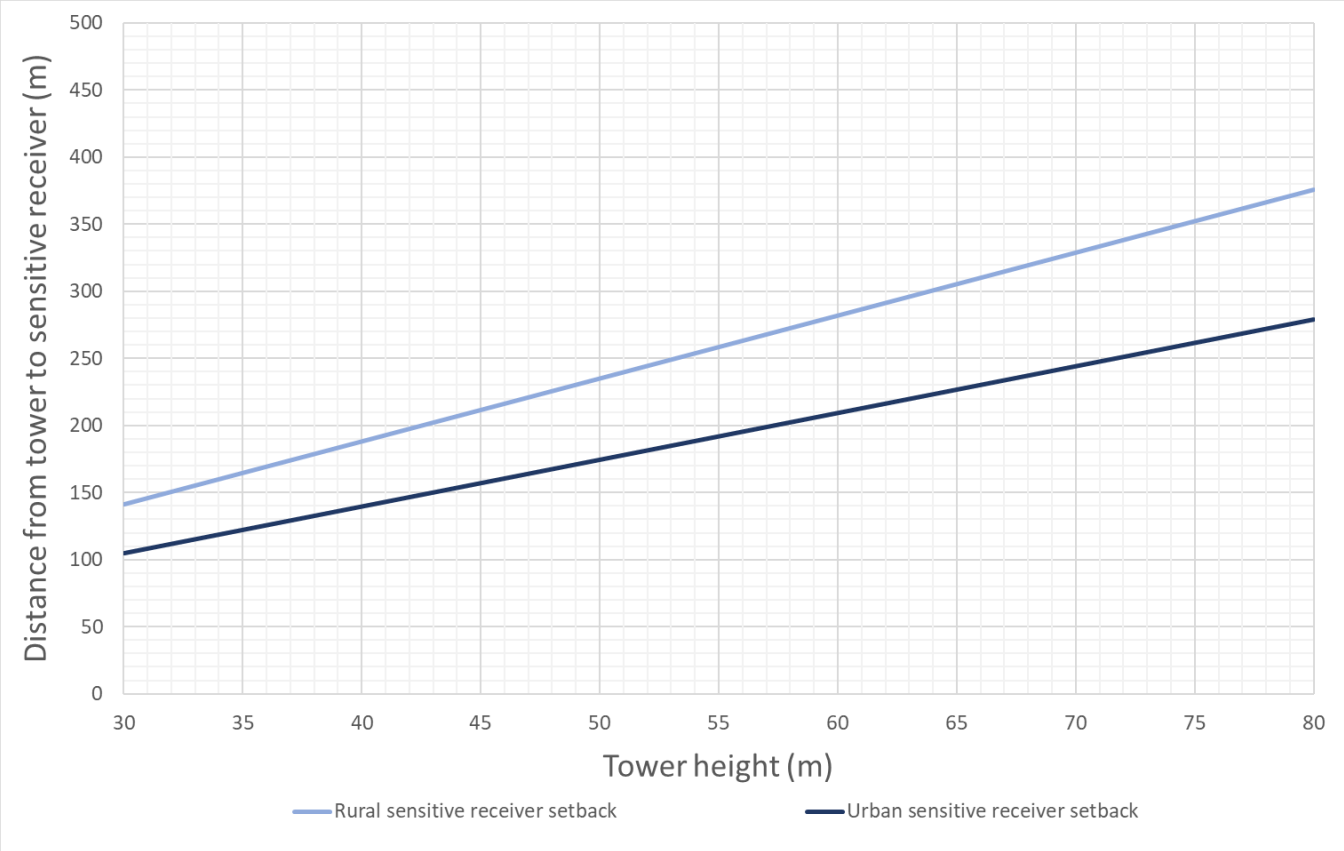


Figure 2. Setback from sensitive rural and urban receivers

Figure 3 provides approximate setback distances to sensitive receivers based on the heights of typical tower designs.

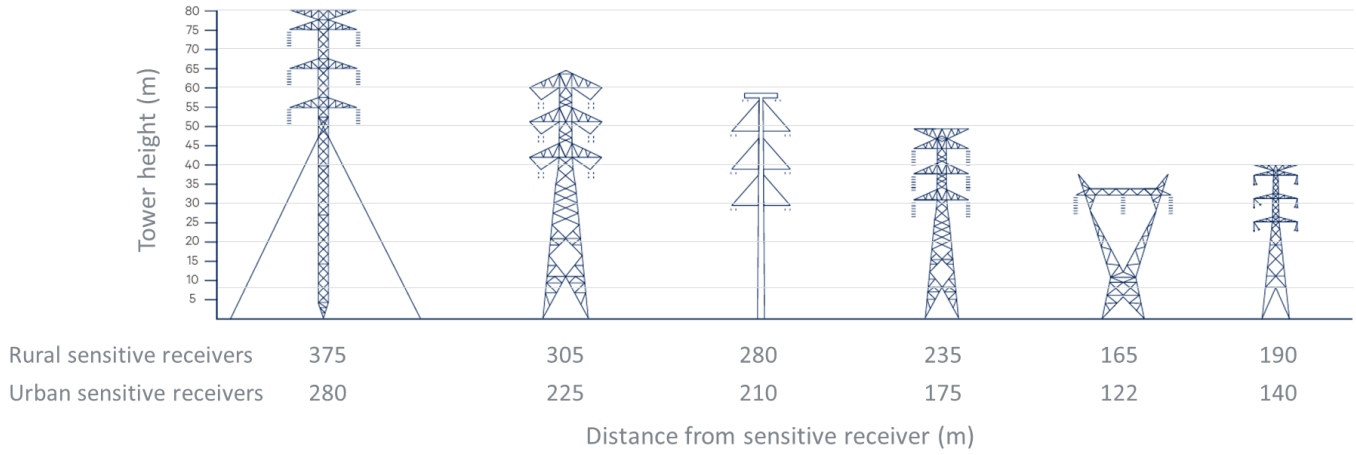


Figure 3. Dominant towers near rural and urban sensitive receivers

3.2 Visual impact assessment process

Proponents must undertake a visual impact assessment for all other public viewpoints and private receivers in accordance with best practice and by considering visual magnitude and visual sensitivity. This assessment must be undertaken in accordance with the process outlined in **Figure 4** and described below. The level of assessment should be proportionate to the likely impacts of the development which is described in detail in **Section 3.3.**

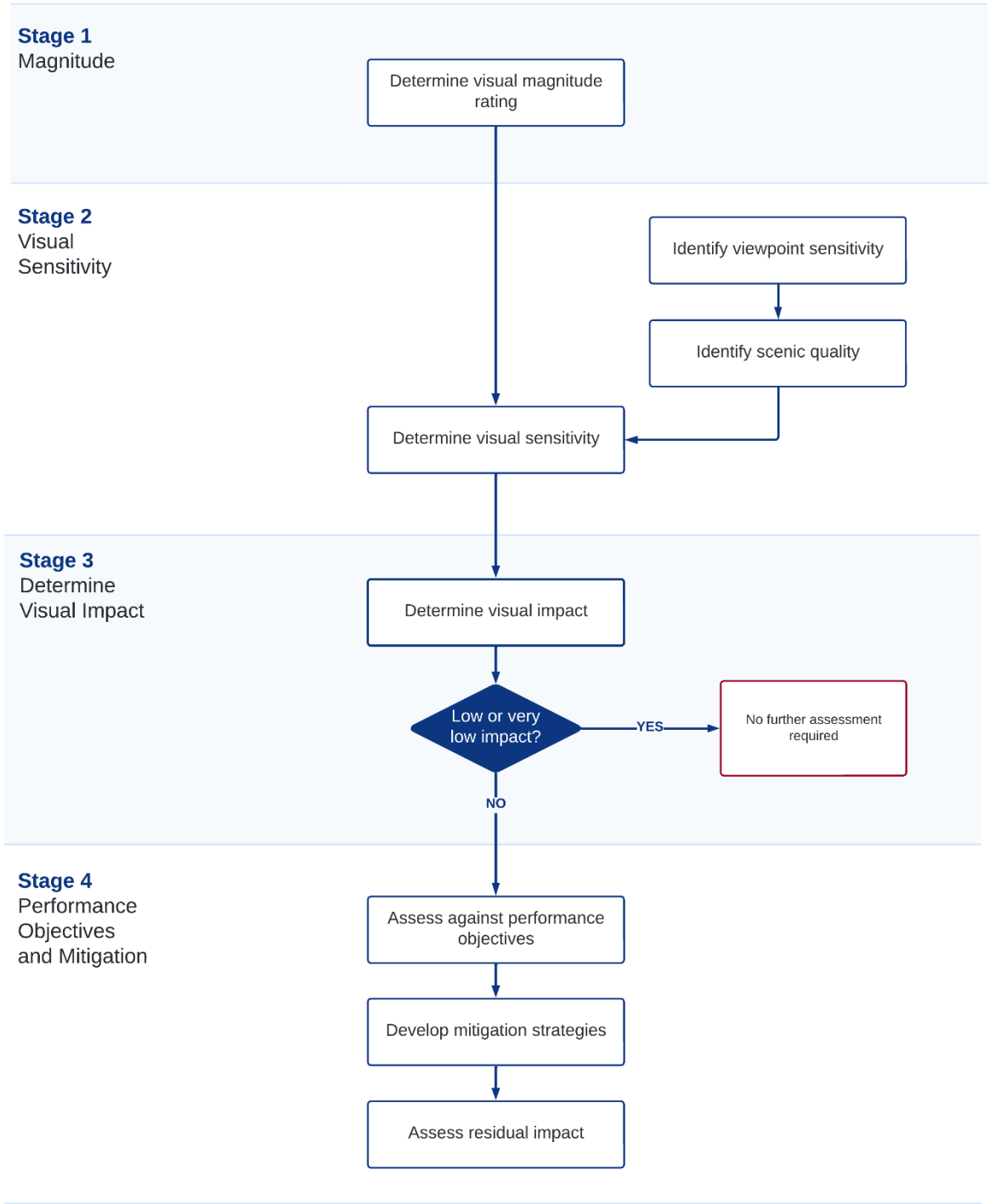


Figure 4. Visual impact assessment process

Visual magnitude

The visual magnitude of a project is its apparent size within the viewshed and is a key factor in determining the overall visual impact. The typical design of transmission infrastructure is relatively standard. Assumptions have been made and incorporated into the following methodology to improve the efficiency and consistency of determining the visual magnitude of these projects. For example, almost all transmission infrastructure projects are comprised of similar infrastructure that exhibits common characteristics including colour, texture, and contrast with the rural and urban landscapes in which they are typically located.

Visual magnitude methodology

Visual magnitude should be determined by analysing the volume of the field of view that a project would occupy. This can be determined by splitting a view into a grid comprising cells 1 degree high and 10 degree wide (see **Figure 5**) and essentially counting the number of cells that would be occupied by a project.

Figure 5. Determining visual magnitude

The total number of cells can then be compared to the visual magnitude thresholds in **Table 2** to determine the visual magnitude rating. The visual magnitude is classified into one of five ratings (very high, high, moderate, low and very low) and provides an indication of the apparent size of the transmission infrastructure from each public viewpoint or private receiver. Examples of each magnitude rating are provided in **Appendix B**.

This method is designed to weight vertical changes in magnitude more than horizontal changes. This reflects best practice understanding of visual impacts, including the concept that vertical changes to the field of view are perceived to be much greater or more impactful than horizontal changes.

For example, 10 m high development that is 100 m wide is likely to have less impact on a viewpoint than if it were 10 m wide and 100 m high this is particularly the case in low-lying regional and pastoral areas where landscapes do not commonly contain natural and built features that occupy large portions of the vertical field of view.

Table 2. Visual magnitude thresholds

Total number of occupied cells	Visual magnitude rating
1 – 7	Very low
8 - 15	Low
16 -26	Moderate
27 - 37	High
38+	Very High

There are several ways that magnitude can be calculated for different purposes with varying levels of accuracy. These include:

- a practical approach that can be used on location to visualise likely outcomes in real world settings (see rule of thumb in **Figure 6** below)
- conservative desktop estimates that can be calculated by measuring the worst-case horizontal field of view and determining an indicative vertical field of view using basic trigonometry
- detailed analysis that can be undertaken using 3D visualisations of the proposed development including basic 3D models (wireframes) and photomontages which can account for influencing factors including topography and vegetation screening.

The method used, including the process for counting occupied cells, should depend on the use case and be proportionate to the likely impact at each location (see **Section 4.2**).

Rule of thumb for measuring magnitude

It is possible to roughly measure the field of view that objects occupy in landscapes and our day-to-day lives using nothing more than your hand and fingers. This can provide a practical approach for visualising how the magnitude ratings would appear, and how they might compare to other features in the landscape.

To measure a part of your field of view, first hold your hand at arm's length and close one eye. Make a fist with the back of your hand facing upwards. The width of your fist is approximately 10 degrees, or once cell wide. The height of your little finger is approximately 1 degree, or the equivalent of one cell, high.

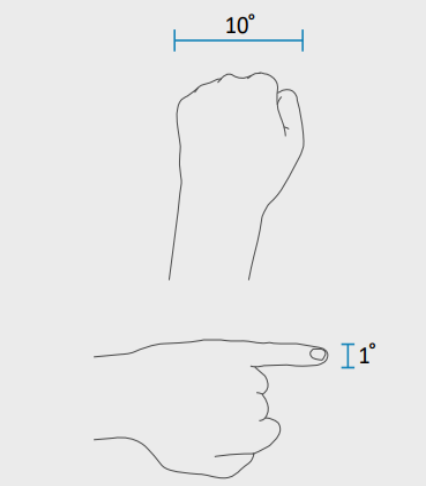


Figure 6. Rule of thumb examples for measuring magnitude

Since the magnitude of transmission towers decreases over distance, there is a point at which they become inconsequential to the overall visual impact and difficult to discern against the background. Similarly, whilst transmission towers can still be viewed beyond some distances, these do not necessarily constitute a visual impact. Consequently, any transmission tower that would be less than 3 degrees in vertical field of view should not be counted when calculating magnitude.

Visual sensitivity

Visual sensitivity refers to the quality of the existing view and how sensitive the view is to the proposed change. In some cases, visual sensitivity is also related to the direction of the view and where it can be viewed from (such as resident's living room). The visual sensitivity is determined by identifying the sensitivity of each viewpoint and categorising the scenic quality of the area in view.

Viewpoint sensitivity

Viewpoint sensitivity relates to the relative importance of viewpoints and the value that the community or visitors may place on landscapes viewed from public use areas, public travel ways and private receivers such as dwellings.

The proponent must classify the sensitivity of each viewpoint into one of four sensitivity ratings (very low, low, moderate, high) considering the examples in **Table 3**, the baseline landscape study, and consultation with the community and individual landholders. While **Table 3** is a good guide, it is not determinative, and the other inputs must be considered in arriving at the final rating.

The view from a dwelling should be categorised according to its importance. Primary views are considered more important than secondary views (see **Table 4** for guidance and the Land and Environment Court planning principle related to views[3]). The proponent must identify how each of the residential viewpoints has been classified in the EIS.

Scenic quality

Scenic quality refers to the relative scenic, cultural or aesthetic value of the landscape within the viewshed based on the presence or absence of key landscape features known to be associated with community perceptions of low, moderate or high scenic quality. It is typically a complex process undertaken by experts in visual impact assessment and must take community values into consideration.

The baseline analysis and landscape character assessment should be used to inform the classification of scenic quality values, including aerial photos, topographic maps and any relevant information from field visits.

The suggested scenic quality classification criteria in **Table 5** can be used as a guide, however, the EIS should consider whether a combination of landscape features influences the overall scenic quality of the setting as well as any community values.

In other words, the presence of just one, or even two high quality features (such as a visually prominent stream) may not be sufficient justification for the landscape to considered of high quality. On the other hand, the presence of one highly valued feature (such as a world heritage area) may be significant in and of itself irrespective of other features.

Table 6 provides a visual reference to assist proponents, the community and consent authorities in understanding how scenic quality values may present across the different categories.

[3] Tenacity Consulting v Warringah Council [2004] NSWLEC140 at 25-29

Table 3. Viewpoint sensitivity levels and examples

Viewpoint type	Very low viewpoint sensitivity	Low viewpoint sensitivity	Moderate viewpoint sensitivity	High viewpoint sensitivity
Private receiver	N/A	Secondary view from dwelling rural area (zoned RU1, RU2, RU3, RU4 and RU6), large lot residential areas (zoned R5) and in environmental or conservation areas (zoned C2, C3 and C4) Primary views from dwellings in residential and rural villages (land zoned R1, R2, R3, R4 and RU5)	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) Tourist and visitor accommodation (such as bed and breakfasts, motels, hotels) and places of worship	Historic rural homesteads / residences on the national, state or local heritage list
Public viewpoint	State highways, freeways and classified main roads	Tourist roads and scenic drives[4] Significant entry ways to regional towns and cities Cemeteries, memorial parks Publicly accessible green and open spaces including picnic areas, parks, public recreation areas, lookouts Town centres and central business districts	Tourist uses in tourist areas (zoned SP3)	N/A

Table 4. Primary and secondary viewpoints from dwellings

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

[4] Tourist road locations are available on the Transport for NSW (TfNSW) OpenData platform.

Table 5. Frame of reference for scenic quality values

Viewpoint type	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	Steep, hilly and undulating ranges that are not visually dominant Board 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 or grazing lands	Predominantly open forest or woodland combined with some natural openings in patterns that offer some visual relief Vegetative stands in a range of size, form, colour, texture and spacing including human influenced vegetation (e.g. vineyards, plantation forests and orchards)	Strongly defined natural patterns with combinations of native forest, naturally appearing openings, streamside vegetation and/or scattered exotics Distinctive stands of vegetation that may create unusual forms, colours or textures in comparison to surrounding vegetation
Waterbodies	Absence of natural waterbody Farm dams, irrigation canals or stormwater infrastructure	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 / cultural	Places of worship, cemeteries/memorial parks, private open spaces	Local heritage sites Distinguishable entry ways to a regional city identified in the Transport and Infrastructure SEPP	Cultural important sites, world heritage areas, national parks/reserves Commonwealth 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	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

Table 6. Visual reference for scenic quality values

Viewpoint type	Low scenic quality	Moderate scenic quality	High scenic quality
Landform			
Vegetation			
Waterbodies			
Social / cultural			
Human presence			

Visual Sensitivity

Once the viewpoint sensitivity and scenic quality are determined, these can be combined using the visual sensitivity matrix in **Table 7** to determine the overall visual sensitivity of each assessable viewpoint.

Table 7. Visual sensitivity matrix

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

Visual impact

The overall visual impact rating of all other viewpoints must be determined for each assessable viewpoint by combining the visual magnitude and visual sensitivity using the matrix in **Table 8**.

Examples of difference visual impacts are provided in **Appendix C**.

Table 8. Visual impact matrix

	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

Performance objectives and mitigation

Performance objectives

Proponents must address the relevant performance objective for each assessable viewpoint and the level of impact identified (see Table 9).

Table 9. Visual performance objectives

High visual impact	This level of impact should be avoided unless the proponent can justify that: • 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 • the proposed mitigation measures would effectively mitigate the impact and would not result in a significant obstruction of views.
Moderate visual impact	**Road viewpoints** 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 or rail authority. **All other viewpoints and receivers** 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. There is no expectation this mitigation should eliminate the view of the development entirely but must reduce the impact to an acceptable level and not create unacceptable visual impacts to other receivers.
Low and very low visual impact	No mitigation required

Avoidance and mitigation

Several different avoidance and mitigation options may be considered as potential methods of minimising visual impacts.

Re-siting

Transmission towers and other project infrastructure such as substations could be re-sited to locations where they will have less visual impact. This should be the first measure proponents should consider where it is technically feasible and does not exacerbate visual amenity impacts for other receivers.

Vegetation screening and landscaping plans

Vegetation screening, or the planting of trees and shrubs, may be a useful option to visually screen transmission infrastructure or other potential visual impacts (such as night lighting). On-site screening, such as perimeter planting, should be considered in the first instance. If this unlikely to be effective, screening can be considered at affected public viewpoints and private receivers.

However, there are several limitations to the use of vegetation screening that must be considered. Vegetation screening can obstruct views of the landscape resulting in further impacts to particular views. Vegetation screening can also take many years to establish and during drought or other unfavourable conditions may not achieve optimal growth or have the desired screening effect.

Given these considerations, vegetation screening should not result in significant impacts on the amenity of private receivers (such as the obstruction of scenic views) and should be designed in consultation with the affected landowner.

Proponents should select appropriate plant species that are suited to the environmental conditions (for example, drought-tolerant native species if relevant) and if possible, of suitable maturity to provide maximum screening effectiveness in the shortest possible time. A mix of vegetation of various heights should be employed to ensure the most effective screening coverage. Vegetation should be planted as soon as possible to reduce the time that impacts would be unmitigated.

At-receiver mitigation

As an alternative to other mitigation options, the proponent may consider the use of at-source treatments at an affected public viewpoints and private receivers in consultation with the landowner. These options could include other structural or built features (for example a shed) that could be constructed to screen views. Any agreed mitigation must be subject to an impact agreement.

Residual impact assessment

Proponents should also assess the visual impact that would remain after the adoption of mitigation measures to determine whether the overall visual magnitude rating of the infrastructure would decrease.

3.3 Dwelling Entitlements

In addition to public viewpoints and sensitive receivers, the relevant consent authority is obligated to consider visual impacts on welling entitlements[5,6] . A dwelling entitlement refers to any parcel of land for which a development application could be made for a dwelling. Environmental planning instruments dictate whether a dwelling entitlement exists. Relevant criteria include the zoning of the land and minimum lot sizes.

[5] Section 4.15 of the *Environmental Planning and Assessment Act 1979*

[6] See, for instance, *King & anor v Minister for Planning; Parkesbourne-Mummel landscape Guardians; Gullen Range Wind Farm Pty Limited v Minister for Planning* [2010] NSWLEC 1102

Whilst impacts to dwelling entitlements must be considered, their uncertain nature including where and when a dwelling may be constructed, if at all, make the application of the visual assessment tools challenging.

Consequently, the visual impact assessment of a dwelling entitlement should be qualitative in nature and instead focus on whether the proposed development would unduly impact on the ability for a landowner to act on a dwelling entitlement.

The assessment should:

- be confined to dwelling entitlements located within the relevant setbacks as it is likely that any future dwelling outside this area could be located to avoid significant impacts
- consider the ability for a future dwelling to be designed, sited and oriented to avoid or reduce the potential for a significant impact to the visual amenity from the project, and
- consider the mitigating effects of existing topography and vegetation.

4 Level of Assessment

Proponents are required to undertake an assessment that is proportionate to the likely impacts on each viewpoint and receiver. This section identifies the level of assessment required in the Scoping Report and in the Environmental Impact Statement.

4.1 Scoping Report

The scoping stage presents an opportunity for proponents to select sites, designs and layouts to avoid and mitigate significant visual impacts. Consequently, the proponent should have regard to the visual impact assessment process and tools in scoping and designing a project.

The scoping report must include a visual impact analysis that identifies public viewpoints and private receivers that will require further assessment in the EIS. Proponents should also use this process to identify where consultation with potentially affected landowners and the local community should be focused.

As part of this process, proponents must undertake a mapping exercise that is informed by the following steps. Further guidance on the contents and form of a scoping report can be found in the department's State Significant Infrastructure Guidelines – Preparing a Scoping Report.

Study Area

The first step of the scoping stage is for the proponent to identify a visual study area. The extent of the study area can be determined using the maximum height of the proposed transmission towers and the distances set out in **Figure 7**.

As an example, the minimum extent of the study area for 80 m towers is 1.5 km from the preferred study corridor.

Viewshed mapping

Once the study area has been defined, the proponent must undertake viewshed mapping to identify areas from which the project could be visible. This process will be used to eliminate the need to assess viewpoints within the study area that do not have a line of sight to the preferred study corridor.

Viewshed mapping should be based on the maximum height of the proposed transmission towers (or more specific heights across the corridor where these are known), use geographic information systems (GIS) to account for topography and must not account for other intervening factors, including built structures and vegetation screening.

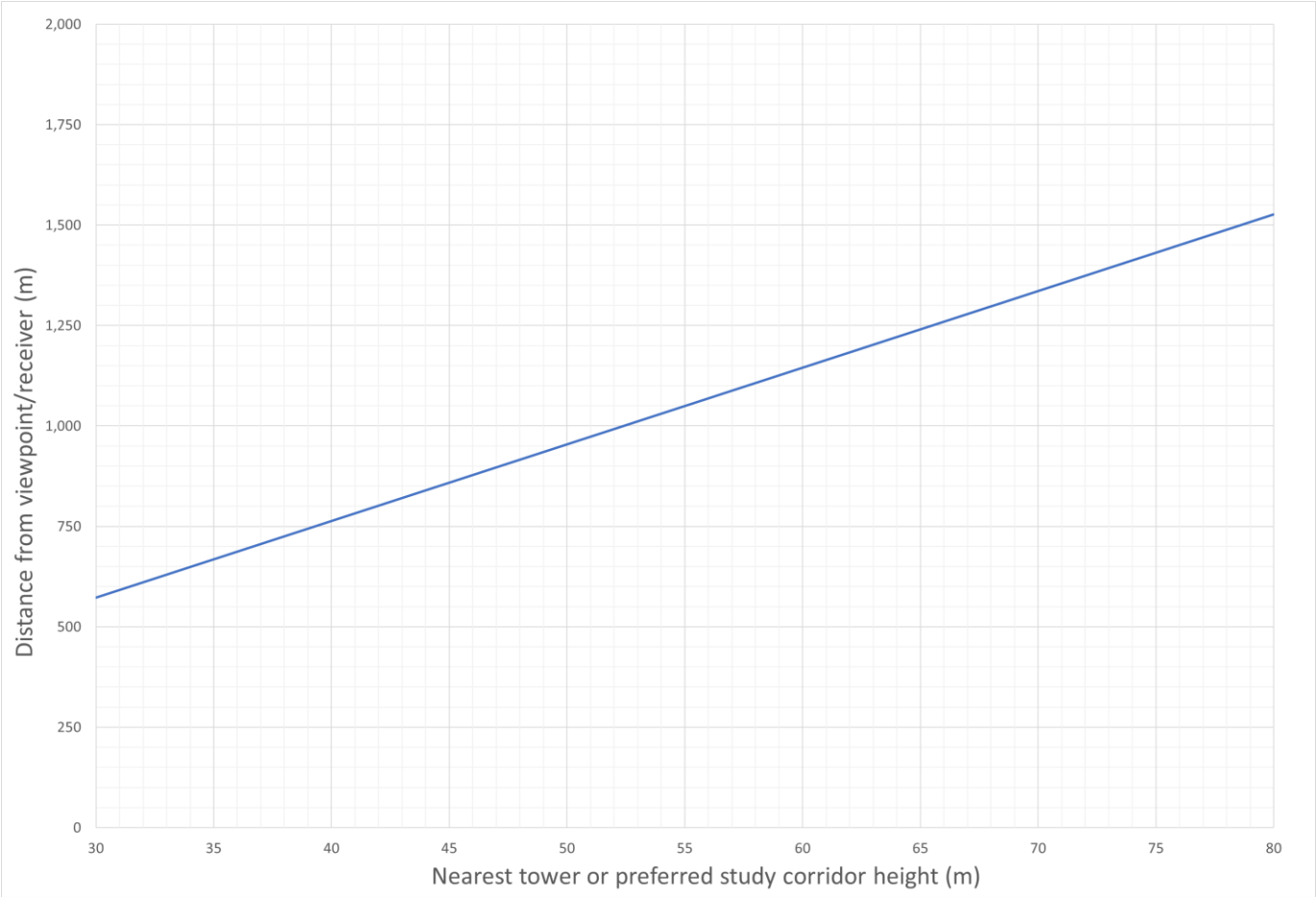


Figure 7. Extent of the scoping study area

Identification of potentially affected viewpoints and receivers

The last step is to identify public viewpoints and private receivers that would have line of sight to the project and are located within the study area. Table 3 should be used to help identify potential viewpoints, however, the precise category of each viewpoint does not need to be identified at this stage. Additional viewpoints should be considered if ancillary infrastructure, such as substations, have the potential to cause impacts. All viewpoints should be labelled for identification purposes and remain consistent through the assessment process.

Scoping map

The results of the scoping analysis should be presented on a map (see Figure 8) and included in the scoping report. The map should identify:

- proposed or indicative transmission tower locations
- the study area for public viewpoints and private receivers
- the results of the viewshed analysis
- the relevant setback areas calculated in accordance with Figure 2
- the location of public viewpoints and private receivers (including whether they are easement affected).

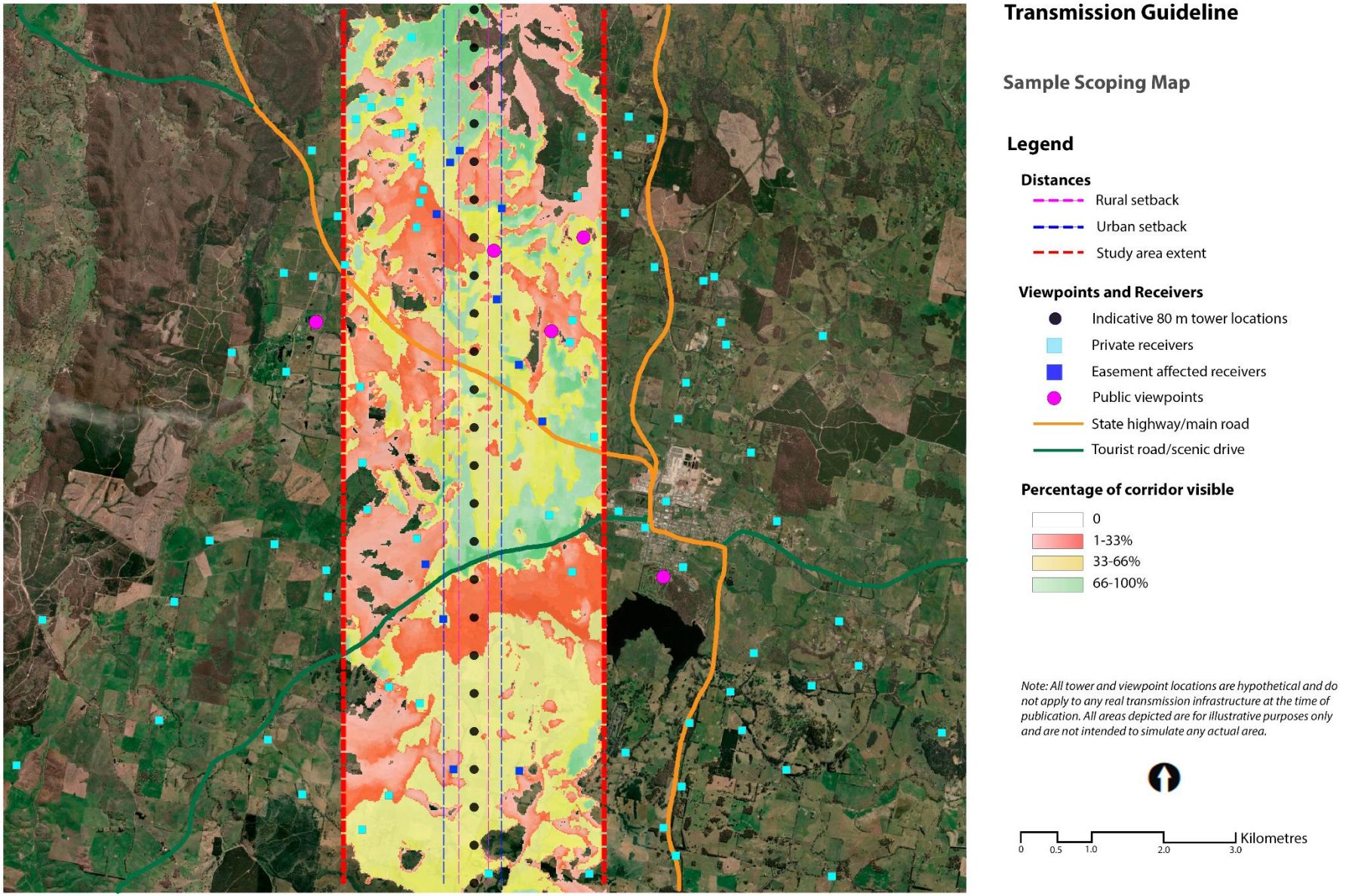


Figure 8. Sample scoping map

4.2 Environmental Impact Statement

General requirements

All public viewpoints and private receivers identified in the scoping report need to be assessed in some level in the EIS. A full visual impact assessment does not need to be completed where existing features completely obstruct the view of the project. In such cases, the proponent must provide evidence that intervening topography, screening, or structures would eliminate any impact.

Representative receivers and viewpoints

Given the large and linear nature of transmission infrastructure, representative viewpoints should be selected and assessed in lieu of multiple dwellings. This is an appropriate form of assessment when dwellings exhibit similar characteristics (e.g. distance from and angle to the proposed infrastructure, and scenic quality), are clustered close together or when a view is representative, or represents a worst case than views located nearby or further away

The types of private receivers that can be assessed by representative views include:

- rural residential areas
- rural villages
- urban residential.

When utilising representative viewpoints, the proponent must:

- clearly identify the number and location of dwellings that are the subject of the selected representative viewpoint
- carefully assess the topography and vegetation of the selected viewpoint area to identify the most sensitive viewpoint with the highest visibility of a proposed transmission tower (i.e. worst case) location in the selected areas as the representative viewpoint.

Representative viewpoints should only be used for views from the public domain along public roads.

Setback assessment

If a sensitive receiver is located within the relevant setback (and not easement affected), a photomontage should be prepared in accordance with the requirements in **Appendix D**. A photomontage is a composite image generated by overlaying a panoramic photograph with a computer-generated model of the proposed infrastructure (see examples in **Appendix C**).

When produced consistently, panoramic photomontages provide highly effective means of assisting stakeholders and consent authorities in appreciated the scale and scope of a proposed transmission infrastructure's visual presence in context with the landform, land uses and existing vegetation.

It may not be possible to prepare photomontages in all scenarios (e.g. a landowner does not grant consent for photographs to be taken from privately owned land). Proponents should use best endeavours to gain access to private land and to prepare photomontages, however, alternative tools

can be used in lieu of a photomontage in these circumstances (see Appendix D). The photomontage should be used to either:

- demonstrate that the sensitive receiver is eligible for an exemption from the setback (i.e. any transmission tower would not occupy more than 12 or 16 degrees vertically for rural sensitive receivers and urban sensitive receivers, respectively), or
- support the proponent's justification for a high visual impact having regard to the performance objectives in Table 9.

If the private receiver is eligible for an exemption from the setback, then a visual impact assessment should also be undertaken in accordance with the following section and the visual assessment process described in Section 3.2.

Proportionate visual impact assessment

A visual impact assessment must be undertaken for all individual or representative public viewpoints and private receivers identified in the scoping report (in accordance with the process outlined in Section 3.2) unless:

- the view would not have a line of sight to the project and evidence can be provided that mitigating factors would eliminate any impact from the project
- the impact can be assessed by a representative public viewpoint private receiver
- a private receiver is located within the setback and would not be eligible for an exemption.

The level of assessment required should be proportionate to the likely impacts. Proponents can begin by carrying out a simple assessment based on desktop data and high-level assumptions. Further assessment should then be undertaken if impacts are likely to be moderate or higher. This process is summarised in Figure 9 and described below. The assessment should also be prepared in accordance with the requirements and examples in Appendix E.

Simple assessment

Conduct a basic assessment using worst-case assumptions about the likely magnitude and visual sensitivity. Proceed to undertake an intermediate assessment if impacts could be moderate or higher.

Intermediate assessment

Produce wireframes to more accurately determine the magnitude rating. Proceed to undertake a detailed assessment if impacts continue to be moderate or higher.

Detailed assessment

Prepare photomontages and undertake field visits to accurately assess scenic quality and determine the effectiveness of existing or proposed screening.

Figure 9 - Proportionate visual impact assessment

Simple Assessment

The simple assessment provides a relatively streamlined methodology to eliminate the need to undertake detailed assessment of public viewpoints and private receivers that are likely to experience low and very low impacts. The simple assessment can generally be undertaken at a desktop level using the methods described below.

If the simple assessment indicates that a moderate or high impact is likely, then the proponent must proceed to undertake an intermediate assessment. The outcomes of the simple assessment must be presented in the EIS for each viewpoint and receiver (or representative location) (see Appendix E), unless an intermediate or detailed assessment is undertaken.

Determining visual sensitivity

At this stage, the characterisation of viewpoint sensitivity and scenic quality can be informed by conservative assumptions. For example, it could be assumed that all view from rural dwellings are primary views to avoid extensive field work or site visits. This information can later be refined as part of an intermediate or detailed assessment if moderate or high impacts could be expected. Scenic quality can also be derived using desktop analysis. However, it should be supported by information and site visits that have been undertaken to inform the landscape character assessment (see Section 2).

Calculating potential magnitude

The simple assessment can rely on a theoretical calculation of the likely magnitude using the height of the proposed transmission towers. Given the linear nature of transmission infrastructure, the potential magnitude is relatively predictable. It can be based on a worst-case scenario that assumes

a transmission tower would be located at the closet point of the project corridor and the alignment would be perpendicular to the viewer. This potential magnitude also ignores mitigating factors including topography, vegetation and buildings.

To calculate the potential magnitude:

- determine the worst-case vertical field of view from the viewpoints using trigonometry, or **Figure 10** to determine a conservative number of vertical cells that could be occupied
- cross reference the calculated vertical field of view with the potential magnitude thresholds in **Table 10**.

$$vertical\ field\ of\ view\ (degrees) = \tan^{-1}\left(\frac{height\ of\ tower\ (m)}{distance\ to\ nearest\ tower/corridor\ (m)}\right)$$

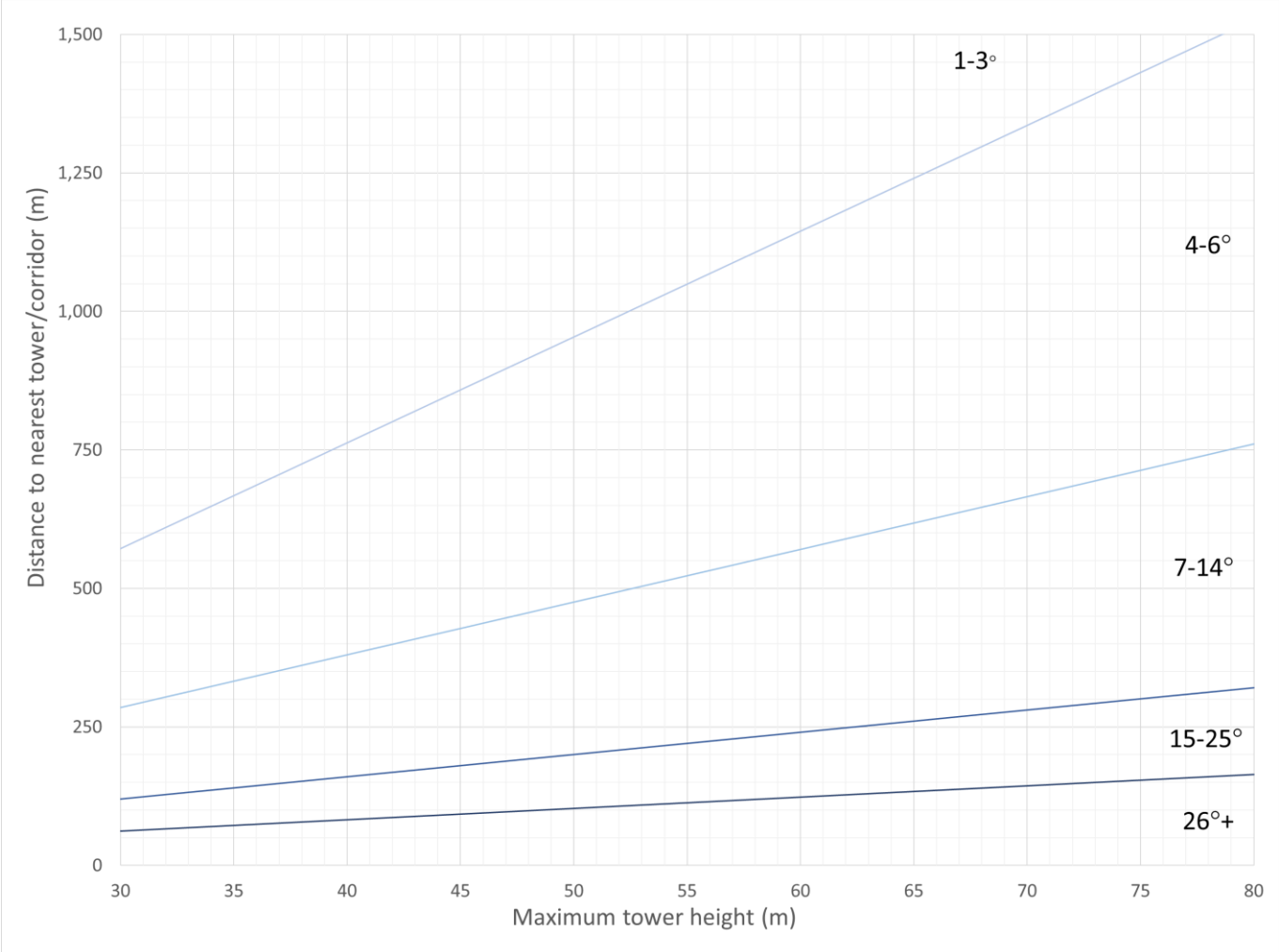


Figure 10. Conservative vertical field of view

Table 10. Potential magnitude thresholds

Vertical field of view of nearest tower/corridor	Potential magnitude
1-3°	Very low magnitude
4-6°	Low magnitude
7-14°	Moderate magnitude
15-25°	High magnitude
26°+	Very high magnitude

Intermediate assessment

The intermediate assessment provides an opportunity to determine the visual magnitude of a proposal more accurately. This involves the use of 3D modelling which can account for many of the factors that influence magnitude including intervening topography, the different distances at which transmission towers will be visible, and spacing between individual and clusters of transmission towers.

If the intermediate assessment indicates that a moderate or high impact continues to be likely, then the proponent must proceed to undertake a detailed assessment. The outcomes of the intermediate assessment must be presented in the EIS for each public viewpoint and private receiver (or representative location) unless a detailed assessment is undertaken.

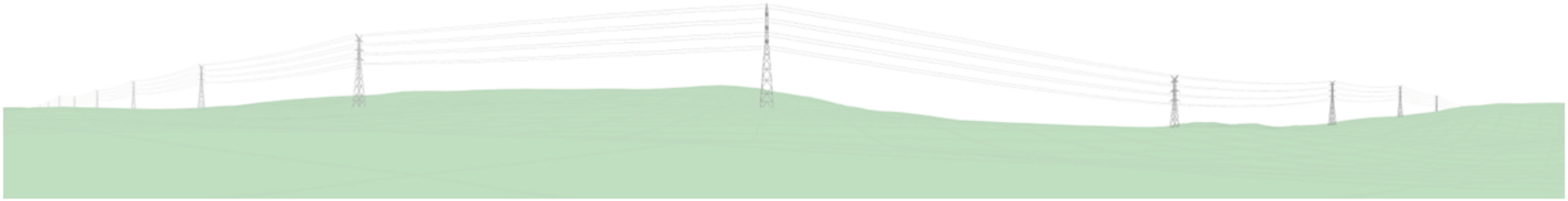
Calculating magnitude

Building on top of the assessment outputs from the simple assessment, proponents can replace the calculation of the potential magnitude with the use of a Visual Magnitude Grid tool to achieve a more certain calculation of a project's bulk and scale relative to a view.

The tool is a transparent grid that, when overlayed with an accurate 3D representation of a proposed project, can ensure a consistent method for understanding the visual magnitude of a project. The process is summarised in **Figure 11** and described in further detail below.

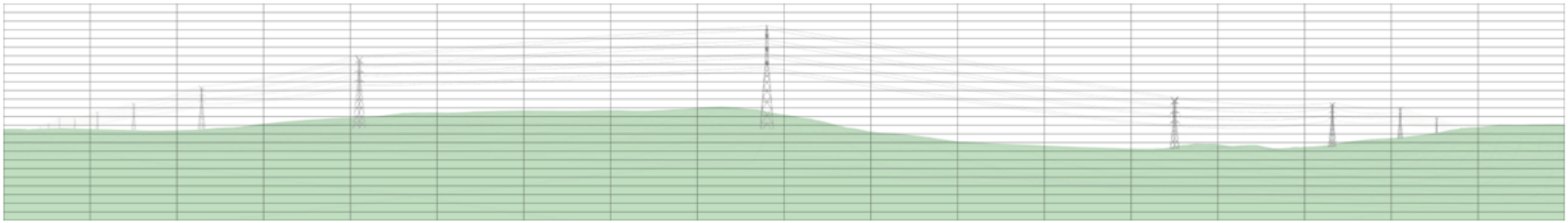
1

Develop 3D model/wireframe of project using a digital terrain model



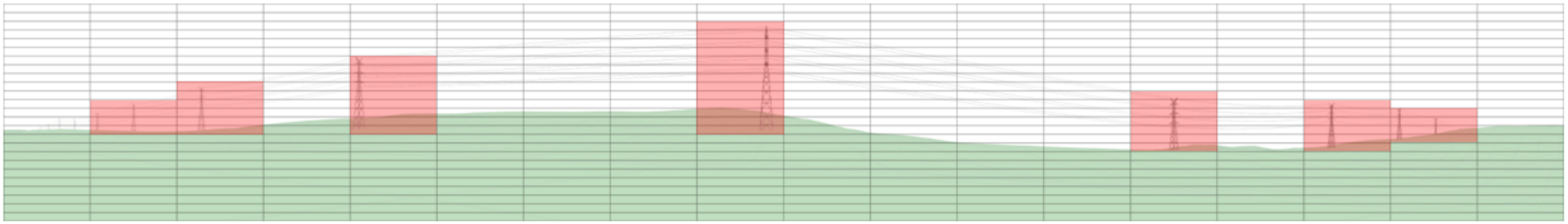
2

Overlay visual magnitude grid tool



3

Identify occupied cells using guiding principles



4

Determine magnitude rating

Magnitude Rating	Very Low	Low	Moderate	High	Very High
No. Cells	1-7	8-15	16-26	27-37	38+

Figure 11. Steps to determine visual magnitude for an intermediate assessment

To calculate visual magnitude for an intermediate assessment:

1. produce a 3D model (such as a wireframe or wireline model) that:
   - comprises 180 degrees of horizontal field of view and
   - is generated using a bare earth digital terrain model
   - includes proposed transmission towers at their proposed heights, known or likely locations
2. overlay the Visual Magnitude Grid Tool on the wireframe image
3. identify and count the number of grid cells that the project would occupy
4. determine the magnitude rating based on the number of cells and the thresholds in **Table 2**.

When overlaying the grid, it should be scaled (so the aspect ratio remains unchanged) to ensure that the width matches the wireframe. The grid is available in various file formats on the Department's website.

Once scaled appropriately, the visual magnitude grid tool should be moved incrementally to accurately cover the number of cells that would be occupied by the project and to reduce partly occupied cells. In particular, the grid should be positioned to avoid vertical grid lines aligning with transmission towers, as far as is practicable.

Once the grid has been applied to the wireframe, the proponent must identify the number of cells that are occupied by transmission towers. The full vertical extent of all visible towers within the field of view must be accounted for unless they are outside of the study area (i.e. 3 degrees or less). Cells that only contain transmission lines are considered unoccupied.

Examples of occupied and unoccupied cells are provided in **Figure 12**.

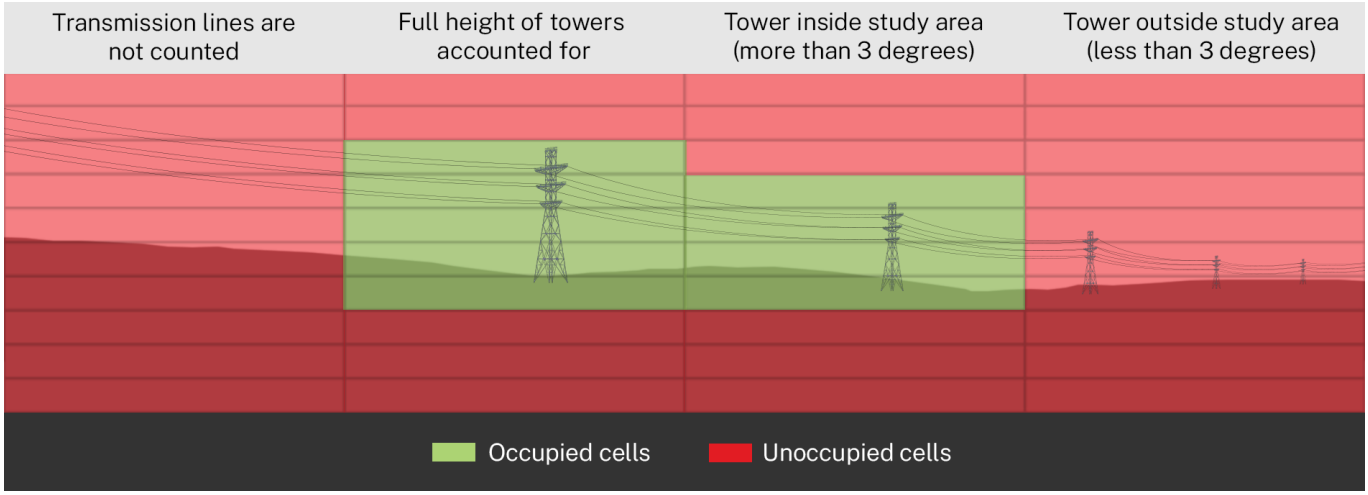


Figure 12. Visual reference for identifying occupied cells

Detailed assessment

The detailed assessment provides an opportunity to refine the magnitude and visual sensitivity inputs using panoramic photomontages and field visits. Photomontages can be used to refine the visual magnitude, by considering the mitigating effects of existing vegetation, and scenic quality by considering very specific attributes of individual views.

Consequently, if a detailed assessment is required, it should be supported by a panoramic photomontage that is prepared in accordance with **Appendix D**. Notwithstanding, it may not be

possible to prepare montages in all scenarios. For example, a landowner may not grant consent for photographs to be taken from privately owned land. Proponents should use best endeavours to prepare photomontages, however, alternative tools can be used in lieu of a photomontage in these circumstances (see Appendix D).

While photomontages are highly effective visual communication tools, they can underrepresent the view when compressed on a small page. For this reason, the assessment of each viewpoint must also include a full-size 50 mm image of the area of the photomontage with the highest magnitude that more appropriately represents the view of the development from the human eye.

Refining visual sensitivity

As part of a detailed assessment, proponents should refine elements of visual sensitivity through field visits. These should be used to verify information about scenic quality, having regard to specific features within the view from each public viewpoint and private receiver, and viewpoint sensitivity, particularly whether views from dwellings are classified as primary or secondary (see Table 4).

Refining visual magnitude

Building on top of the assessment outputs from an intermediate assessment, proponents can refine the calculation of magnitude to account for the mitigating factors of existing vegetations or other screening.

To refine the magnitude:

1. capture a panoramic photograph from the viewpoint that comprises 180 degrees of horizontal field of view towards a project.
2. superimpose a 3D rendered model and the magnitude grid tool on the panoramic photograph.
3. verify whether any elements of the project would be obstructed by existing vegetation or built elements.
4. recalculate the magnitude rating based on the number of cells occupied and the thresholds in Table 2.

Existing screening should be considered effective, and a cell is not occupied if:

- existing vegetation would substantially screen (to the point where transmission towers are barely discernible through vegetation) elements of the project such that any residual view would be very intermittent
- any existing screening would effectively mitigate the view of the project such that moving the viewpoint a few metres in any direction would not significantly change the amount of screening provided
- the vegetation referred to above is not temporary, seasonal or identified as a common weed.

Examples of effective and ineffective vegetation screening are provided in **Figure 13**.

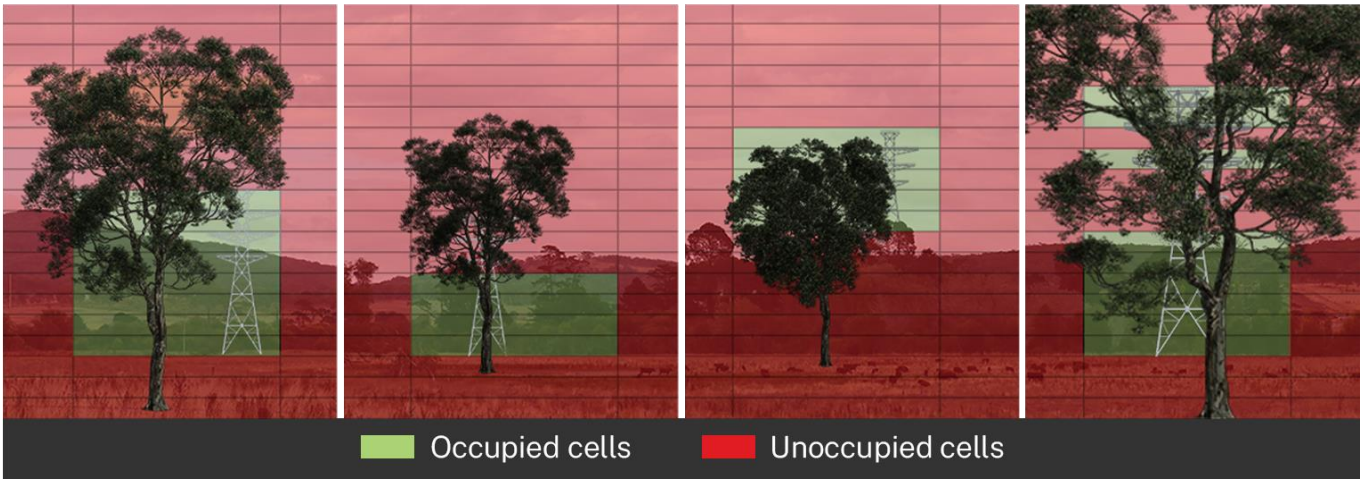


Figure 13. Visual reference for considering existing vegetation screening

Assessment against performance objectives

If after the above analysis, the visual impact is moderate or higher, the impact must be assessed in accordance with the performance objectives provided in **Table 9**.

If screening is proposed to mitigate an impact, a photomontage must be prepared to visualise the effectiveness of the vegetation (see **Figure 14**). This should be presented with and without an overlay of the Visual Magnitude Grid Tool.

Where screening is proposed, the EIS must also include:

- evidence that any landscaping would be consistent with the general native vegetation profile of the local area and can be supported by local landform, geology and soil type
- evidence that the proposed planting can achieve the mitigation outcomes within a reasonable timeframe, and
- details of consultation with affected landowners, including evidence of how any feedback has been addressed.

Figure 14. Photomontage with mitigation

Appendix A – Example landscape character assessment

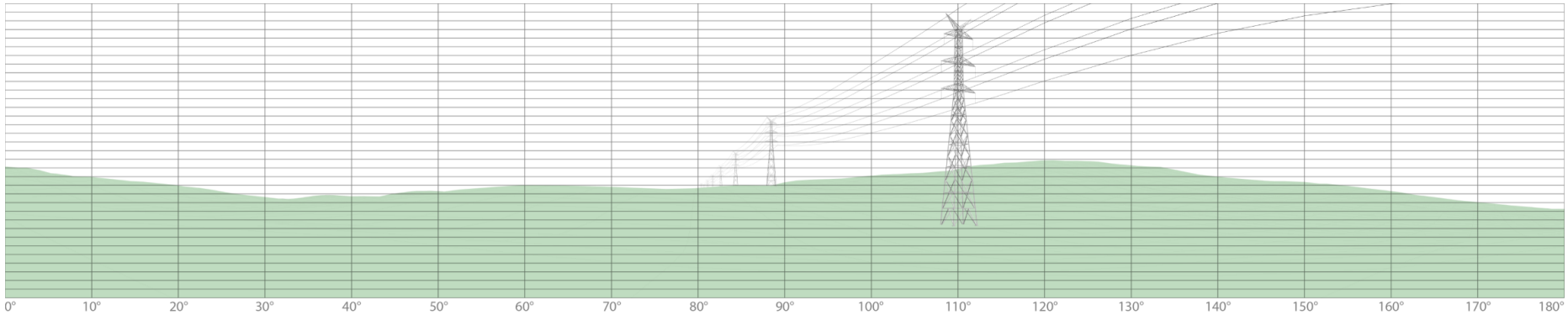
Landscape character zone	Sensitivity	Magnitude	Landscape character impact
LCZ1 Cleared grazing lands	**Low** • The landscape has been highly modified from its natural state to support grazing. • Human modifications are clearly evident through widespread clearance of native vegetation and the presence of roadways, dwellings, ancillary agricultural buildings and domestic scale electricity infrastructure. As such, it is considered to have some capacity to absorb the type of change envisaged by the proposed transmission infrastructure. • No specific planning controls attribute special value to this landscape. • The landscape elements that contribute to its quality will remain unchanged.	**Low** • Some elements of the project, predominantly ancillary infrastructure such as substations are proposed within this LCZ. • The proposed project infrastructure in this LCZ will have a minor evident change in landscape characteristics in close range. However, the extent of this change is considered minor in relation to the extent and use of this LCZ. • The transmission infrastructure would not disrupt any key landscape features.	**Low**
LCZ2 Undulating forested grassland	**Moderate** • This LCZ is generally vegetated and relatively unmodified particularly on hills and alongside natural watercourses. • It consists of conservation areas and is characterised	**Moderate** • When viewed from afar, the project is expected to complete visually with the landform and associated vegetation. Its position on the hills will disrupt the	**Moderate**

Landscape character zone	Sensitivity	Magnitude	Landscape character impact
	by forested hills that are a distinct landscape feature. • Some clearing and lightly modified landscapes are present on the plains of the LCZ including some large lot residential uses. • Some existing high voltage transmission line transect across part of the LCZ.	skyline of this prominent landscape feature. • When viewed from within the LCZ, views toward the project are expected to occupy a small portion of the horizontal and vertical fields of view, often through the gaps of existing vegetation and topography. This will minimise their ability to indirectly impact upon the character of this LCZ.	

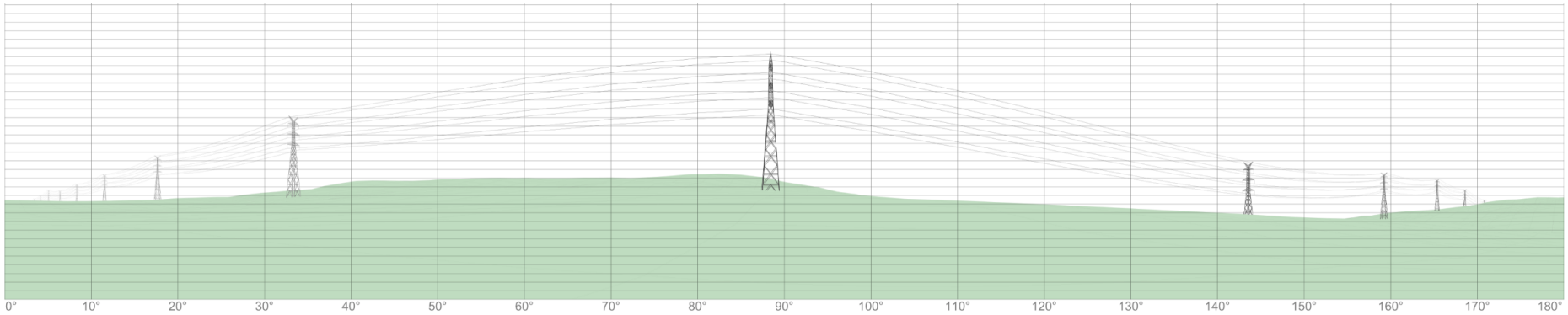
Appendix B – Visual magnitude examples

The following examples depicts the magnitude of transmission infrastructure approximately 80 m high transmission towers. These are highly conservative examples that do not consider intervening vegetation or other mitigating factors.

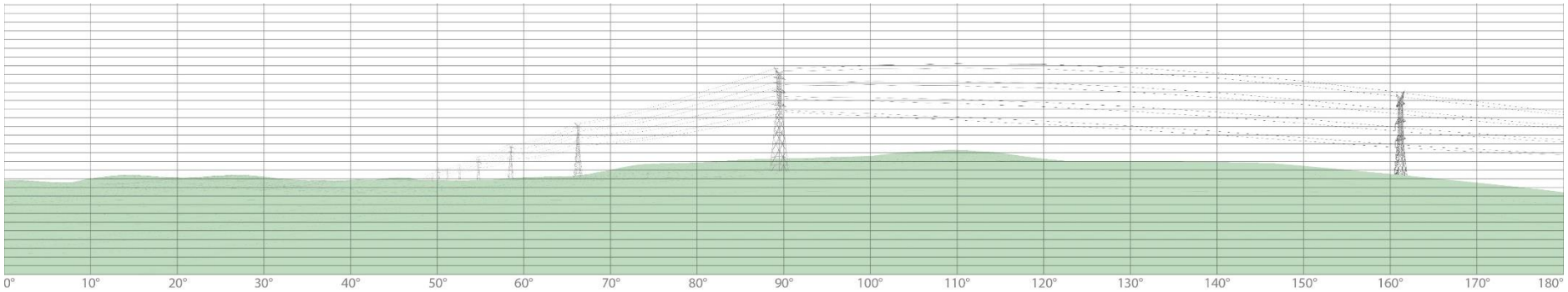
0 - 500m from project



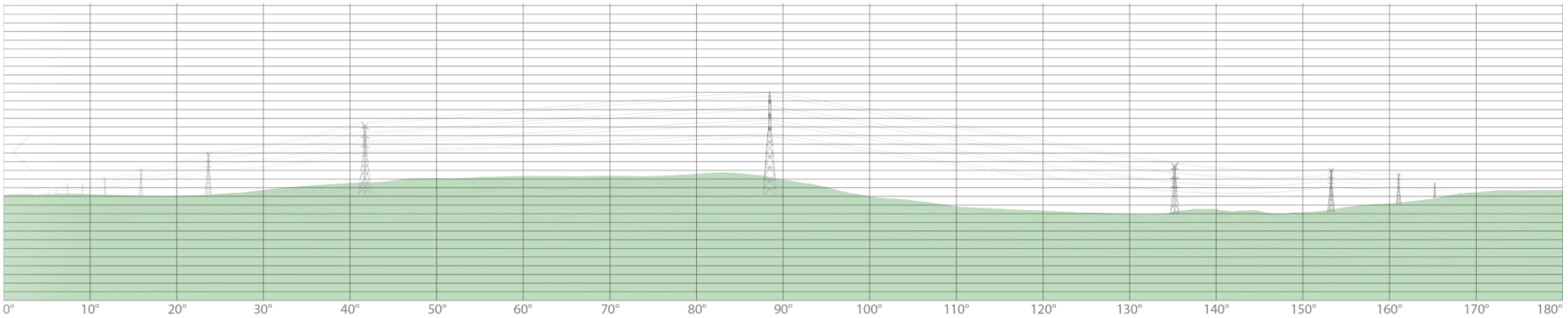
Very high magnitude



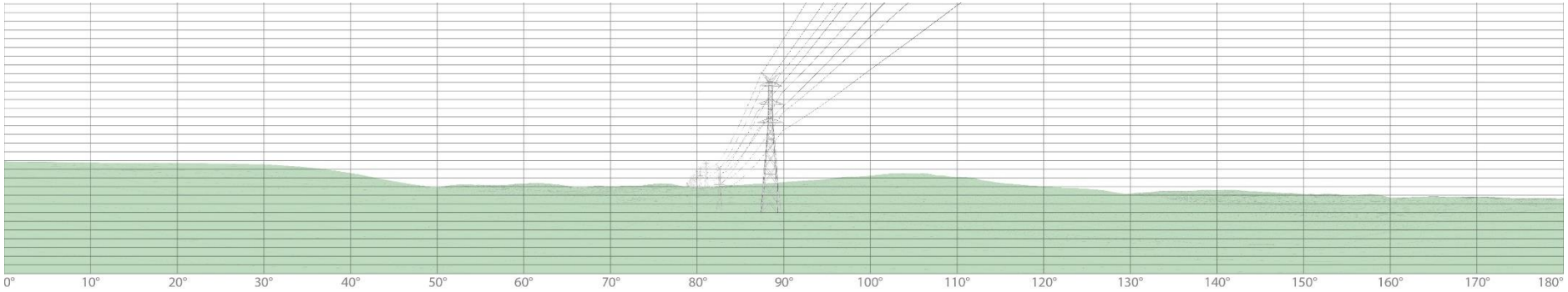
Very high magnitude



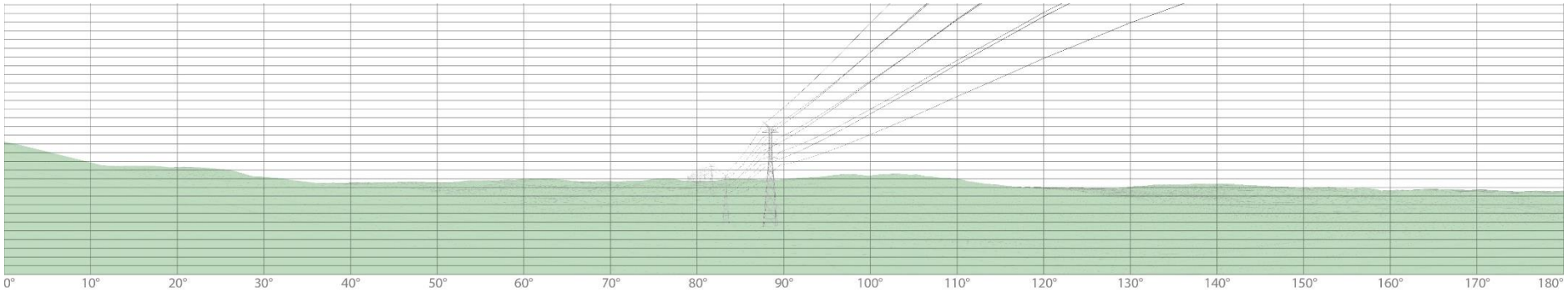
Very high magnitude



Very high magnitude

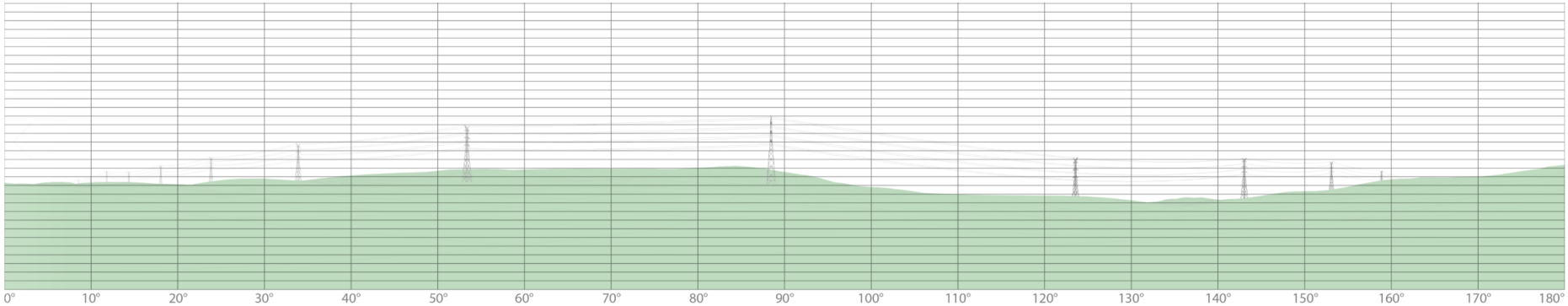


Moderate magnitude

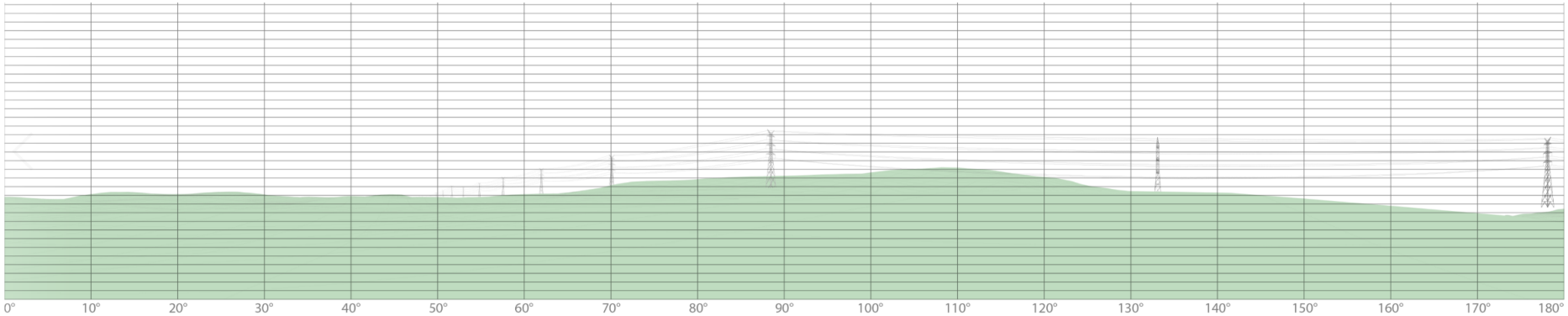


Low magnitude

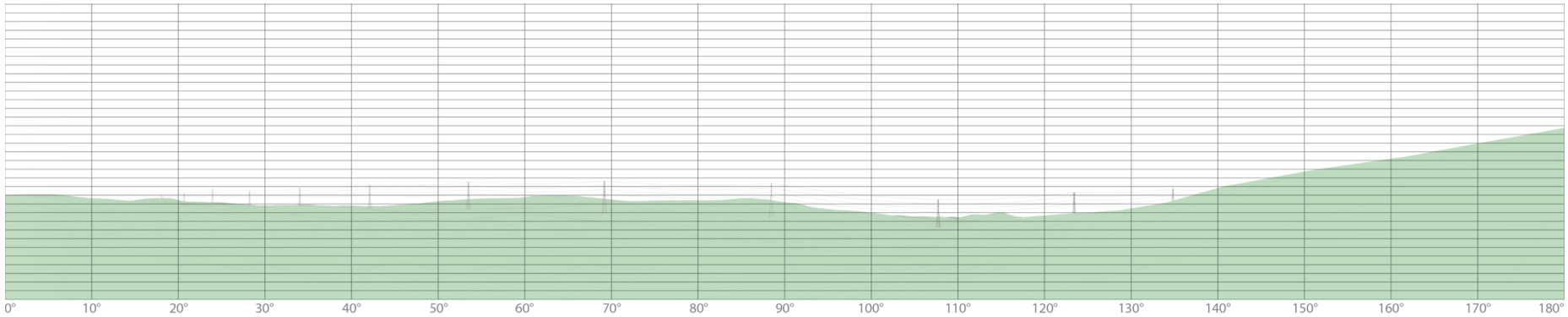
500 - 1,500m from project



Very high magnitude

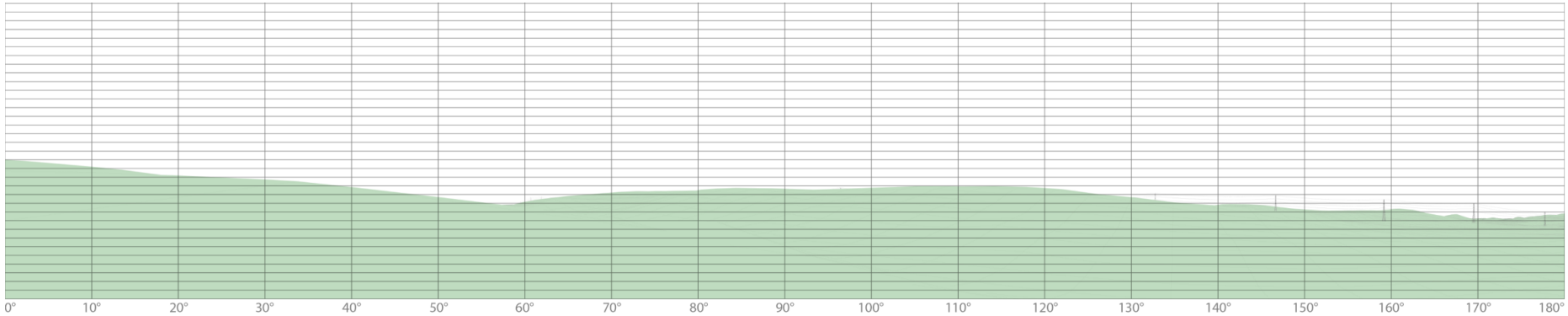


High magnitude

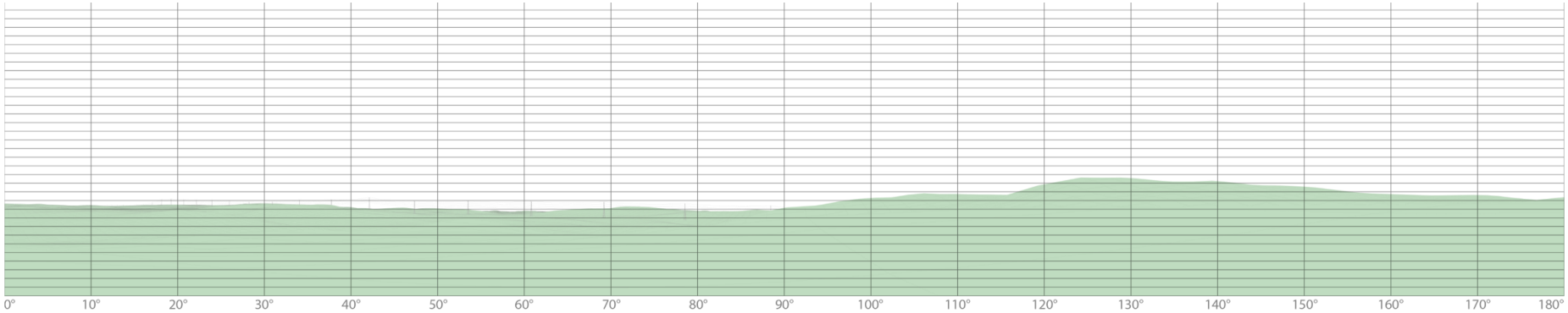


Moderate magnitude

1,500 - 3,000m from project



Very low magnitude and outside of study area identified at scoping stage



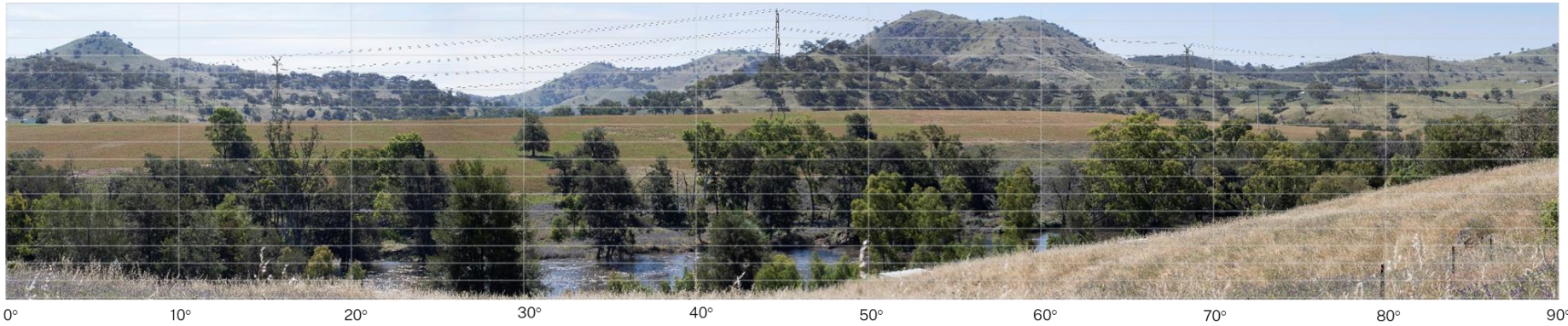
Very low magnitude and outside of study area identified at scoping stage

Appendix C – Visual impact examples

Private receivers

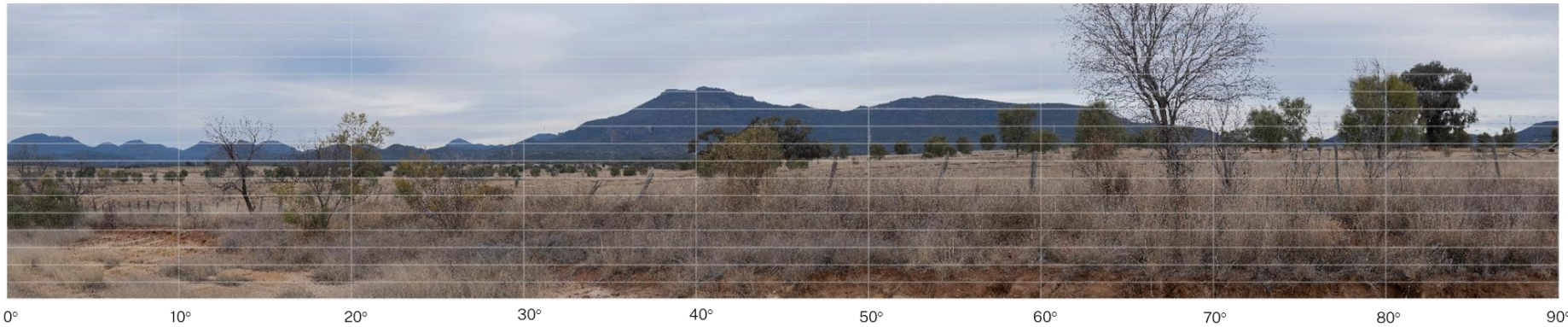
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
193 m	Rural dwelling primary view	Moderate	High	High	24	Moderate	High (within setback)

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
520 m	Rural dwelling primary view	Moderate	Low	Moderate	29	High	Moderate



Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
630 m	Rural dwelling primary view	Moderate	Moderate	Moderate	23	Moderate	Moderate

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
263 m	Urban dwelling primary view	Low	Low	Low	21	Moderate	Low



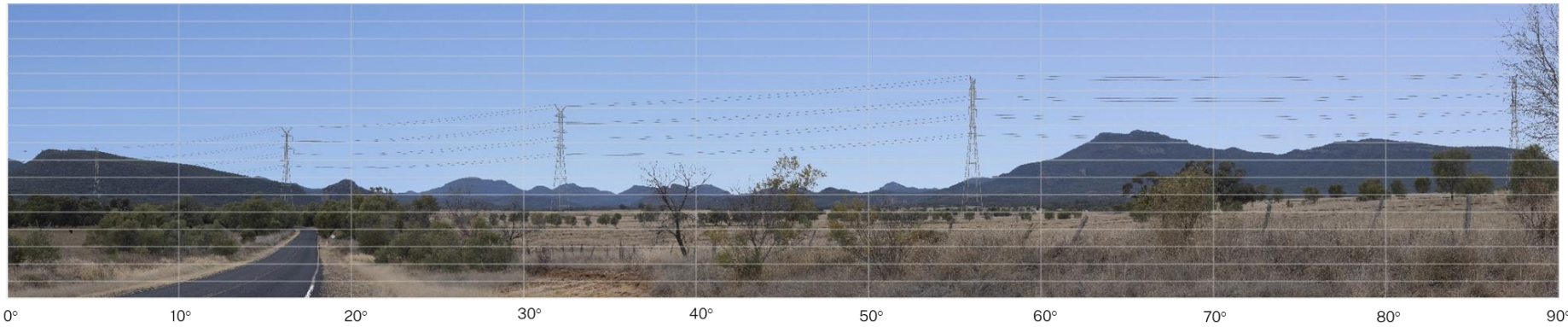
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
556 m	Rural dwelling primary view	Moderate	High	High	0 (cells less than 3 degrees)	Very low	Low

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
1,960 m	Historic homestead	High	Moderate	High	0 (cells less than 3 degrees)	Very low	Low

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
340 m	Rural dwelling secondary view	Low	Low	Low	25	Moderate	Low

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
1,420 m	Tourist accommodation	Moderate	Moderate	Moderate	0 (cells less than 3 degrees)	Very low	Low

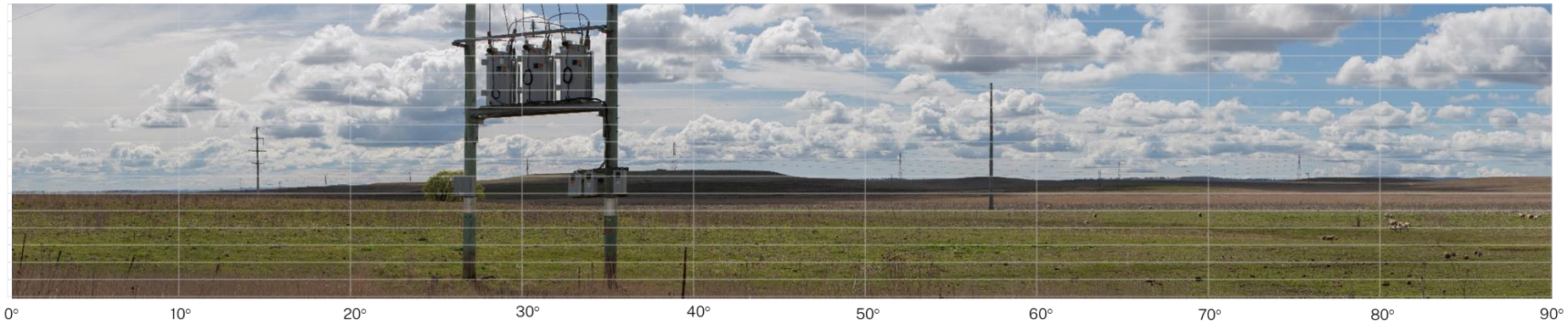
Public viewpoints



Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
556 m	Entry to regional city	Low	High	Moderate	31	High	Moderate

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
510 m	State highway	Very low	Low	Very low	22	Moderate	Low

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
1,966 m	Tourist road	Low	Moderate	Low	0 (cells less than 3 degrees)	Very low	Very low



Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
1,880 m	Classified main road	Very low	Low	Very low	0 (cells less than 3 degrees)	Very low	Very low

Appendix D – Photomontage requirements and alternatives

Photomontages

Panoramic photographs must be constructed by merging a series of photographs together to form a single image with a horizontal field of view of 180 degrees. To ensure consistency and accuracy, these montages must be prepared in accordance with the requirements below.

If the applicant is unable to take a photograph from a viewpoint and cannot choose an appropriate representative viewpoint, it may capture other photography to show the characteristics of the view and landscape. However, the applicant should make all reasonable efforts to take representative panoramic photos to ensure the assessment is as accurate as possible.

Parameter	Requirement
Camera	• Full frame camera • 50 mm focal length of lens • Camera positioned 1.5 m above the ground • Use of tripod (with levelling tools) and panoramic head
Composition	• Horizon positioned at the midpoint of the photographs • Multiple photographs taken every 15 degrees or at such frequency to provide adequate overlap (approximately 30%) between images
Location and conditions	• Where possible, photographs should be taken with no or minimal cloud cover and when the sun is positioned high in the sky (generally between the hours of 9 am and 3 pm) • Clear skies should be superimposed over any imagery that would otherwise contain overcast skies
Merging photographs	• Photographs merged to achieve a panoramic photograph with 180 degrees horizontal field of view • Merged panoramic photographs avoid distortion or warping of the individual images

Photomontage alternatives

Whilst photomontages are the preferred tool for communicating the potential magnitude and overall impact to visual amenity, access to take the photographic components of the process can sometimes be intermittent or unachievable.

Proponents should use best endeavours to obtain permission to access private property for the purpose of preparing photo montages. However, if the proponent is unable to obtain access, then it may use one of the following alternatives:

- select another point near the view location that is representative of the view and use the resulting imagery to prepare a montage
- use LiDAR combined with 3D modelling to clearly communicate the location and density of screening elements in the viewshed from the viewpoint, or
- rely on wireframes and worst-case assumptions about vegetation or other built elements in the viewshed that could screen the project. Where this option is used, the applicant should provide as much supporting evidence as possible.

Appendix E – Imagery Requirements

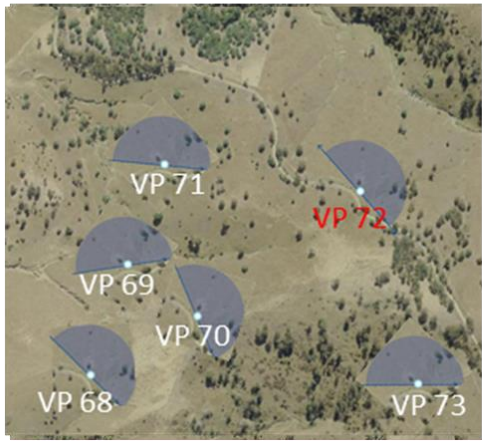
The visual impact assessment should be presented in accordance with the requirements outlined in the table below and generally in accordance with the following examples.

Assessment Component	Requirements
Viewpoint information and imagery	• reference to the viewpoint name/number • baseline panoramic image (using requirements in **Appendix D**) • viewpoint location and GPS coordinates • distance to the infrastructure • direction of view towards the project • identification of any known transmission tower, or partially visible transmission tower, that is within the setback from a sensitive viewpoint • numeric identification of known transmission towers consistent with information in the EIS • identification of any proposed transmission infrastructure that is subject to an agreement with a host or neighbouring landholder
Sensitivity analysis	• identification of viewpoint type • identification of viewpoint sensitivity (see **Table 3**) • identification of scenic quality (see **Table 5** and **Table 6**) • overall sensitivity (using **Table 7**) • relevant commentary on how the scenic quality has been derived
Magnitude analysis	• identification of the total number of cells that would be occupied by the project • identification of the magnitude rating (using **Table 2**)
Visual impact rating	• identification of the visual impact rating (using **Table 8**) • excerpt(s) of the relevant photomontage displayed separately and at size representative of the actual view showing areas with the greatest impact
Performance objectives, mitigation and residual impact	• commentary on the visual impact including relevant performance objectives (see **Table 9**) and any proposed mitigation measures • detailed justification for high visual impacts that cannot be avoided • panoramic photomontage with inclusion of proposed mitigation with and without the magnitude grid tool (see **Figure 14**) • age/timing for the development of vegetation used in montages

Simple assessment example

Representative Viewpoint Zone 7

Viewpoint Location



Potential Sensitivity

Viewpoint Type	Rural dwellings
Viewpoint Sensitivity	Moderate
Scenic Quality	Low
Landscape Character Zone	Agricultural Plains
Overall Potential Sensitivity	Moderate

Potential magnitude

Maximum vertical field of view	5°	5 cells
Maximum horizontal field of view	20°	2 cells
Maximum occupied cells	10 cells	
Potential magnitude	Low	

Scenic Quality Analysis and Evidence

The north easterly outlook from this dwelling toward the project are dominated by agricultural plains over a relatively flat landscape.
The vegetation in the view is sparse, with a mix of native and exotic species.
The surrounding agricultural plains are largely pastoral in nature and used for grazing.
There are no dominant landscape features in the areas and evidence of human presence is moderate with the presence of farming infrastructure.
No waterbodies are present within the viewshed between the viewpoint and the proposed turbine layout.
The LCA also confirms the agricultural value of the landscape character zone.
As a result of this analysis and of the information on from the LCA, the scenic quality is considered low.

Potential Impact Rating

Viewpoint in setback?	No
Impact Rating	Low

Viewpoint 084

Viewpoint Location

Potential Sensitivity

Viewpoint Type	Rural dwellings
Viewpoint Sensitivity	Moderate
Scenic Quality	Low
Landscape Character Zone	Agricultural Plains
Overall Potential Sensitivity	Moderate

Potential magnitude

Maximum vertical field of view	4°	4 cells
Maximum horizontal field of view	30°	3 cells
Maximum occupied cells	12 cells	
Potential magnitude	Low	

Scenic Quality Analysis and Evidence

The north easterly outlook from this dwelling toward the project are dominated by agricultural plains over a relatively flat landscape.
The vegetation in the view is sparse, with a mix of native and exotic species.
The surrounding agricultural plains are largely pastoral in nature and used for grazing.
There are no dominant landscape features in the areas and evidence of human presence is moderate with the presence of farming infrastructure.
No waterbodies are present within the viewshed between the viewpoint and the proposed turbine layout.
The LCA also confirms the agricultural value of the landscape character zone.
As a result of this analysis and of the information on from the LCA, the scenic quality is considered low.

Potential Impact Rating

Viewpoint in setback?	No
Impact Rating	Low

Intermediate assessment example

Viewpoint 005

Viewpoint Location

Potential Sensitivity

Viewpoint Type	Rural Dwelling
Viewpoint Sensitivity	Moderate
Scenic Quality	Low
Landscape Character Zone	Agricultural Plains
Overall Potential Sensitivity	Moderate

Magnitude

Occupied cells	40 cells
Magnitude	Very High

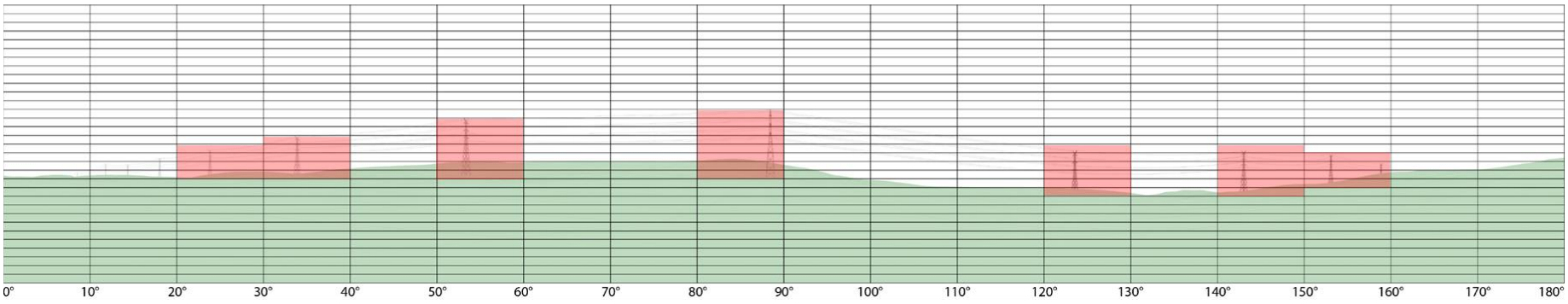
Scenic Quality Analysis and Evidence

The surrounding area of the viewpoint contains sparse and inconsistent patches of native and exotic vegetation within a highly modified agricultural landscape. Pastoral elements dominate the viewshed and there is a high human presence evident in the potential viewshed.
Some farm dams are present however no significant waterbodies are apparent in the potential viewshed nor are their unique or prominent landscape features such as ridgelines or gorges.
The landscape is common in the area and not considered rare.
The LCA also confirms the there are no remarkable important landscape values from within the agricultural plains landscape character zone.
As a result of this analysis and of the information on from the LCA, the scenic quality is considered low.

Impact Rating

Viewpoint in setback?	No
Impact Rating	High

Wireframe Assessment



Detailed assessment example

Viewpoint 018

Scenic Quality Discussion

The surrounding area of the viewpoint contains sporadic native and exotic vegetation across undulating land. Pastoral elements are highly evident along with human presence. The viewshed includes some distant and minor forested ridgelines. No significant waterbodies are apparent. As a result of this analysis and of the information on from the LCA, the scenic quality is considered low. There are minimal built or natural vertical elements in the landscape and no other feature protrudes above the foothills and ridgeline in the viewshed.

Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
450 m	Rural dwelling (primary)	Moderate	Low	Moderate	46	High	Moderate

Viewpoint 018

Visual Impact Rating: Moderate

Inset 1

Note: The inset image(s) provide an accurate representation of the view when the document is viewed at 100% zoom and at arm's length from the screen

Viewpoint 018

Mitigation

Vegetation screening at 5 years

Mitigation and Residual Impact Discussion

The moderate impact to the rural dwelling has been carefully considered in the siting and layout of the proposed turbines. Proposed mitigation at the affected residence includes the planting of native and drought tolerant eucalypts endemic to the region as vegetative screening on the site of the impacted dwelling. After five years these trees will effectively screen a large portion of the refined turbine layout. In addition this screening will not interrupt sight lines to the important distant ridge lines to the left in the above image. Overall, it is expected that with the mitigation measures, the residual impact will be low.

Viewpoint 018

Mitigation

Inset 2

Note: The inset image(s) provide an accurate representation of the view when the document is viewed at 100% zoom and at arm's length from the screen