Department of Planning,
Housing and Infrastructure

dphi.nsw.gov.au

Large-Scale Solar Energy Guideline

Technical Supplement for Landscape Character and Visual Impact Assessment

August 2022

Acknowledgement of Country

The Department of Planning, Housing and Infrastructure 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.

Published by NSW Department of Planning, Housing and Infrastructure

dphi.nsw.gov.au

Large-Scale Solar Energy Guideline – Technical Supplement for Landscape Character and Visual Impact Assessment

First published: August 2022

Last updated: November 2024

Current version: 1.1

Department reference number: DOC24/867452

Copyright and disclaimer

Contents

Image Credits

Page 19 – Canadian Solar

Page 29 – Leah Pippos, John Spencer, Elinor Sheargold

Page 33, 34, 56 – Lightsource BP

List of figures

List of tables

Glossary of terms

Term	Definition
Applicant	The applicant for a State significant development project seeking consent for a development or modification application under the *Environmental Planning and Assessment Act 1979*
Dwelling	A room or suite of rooms occupied or used as a separate domicile as well as a building that meets the criteria outlined in section 1.3
Landscape	A holistic area comprising its various parts, including landform, vegetation, buildings, villages, towns, cities and infrastructure
Large-scale solar energy development	Works, infrastructure and buildings for generating electricity using ground-mounted photovoltaic panels that are State significant development
Magnitude	The apparent size of a solar energy project in the landscape or when viewed from a given viewpoint
Neighbour agreement	An agreement negotiated between an applicant an the owner of land surrounding the project area (referred to as adjacent land) to manage the impacts from a development (including any exceedances of relevant assessment criteria)
Private agreement	An agreement between an applicant and a landholder to host a renewable energy project and/or manage the impacts from a development (including any exceedances of relevant assessment criteria)
Private receiver	A privately owned or used viewpoint type identified in Table 2
Protected area	Lands reserved or otherwise protected for conserving biodiversity or Aboriginal cultural heritage – this includes lands reserved under the *National Parks and Wildlife Act 1974*, flora reserves under the *Forestry Act 2012*, declared wilderness under the *Wilderness Act 1987*, Indigenous protected areas, world heritage areas and Ramsar wetlands
Public viewpoint	A publicly owned or used viewpoint type identified in Table 2
Rural dwelling	A dwelling within a rural zoned area (RU1, RU2, RU3, RU4 and RU6), large lot residential zoned area (R5), or environmental or conservation area zone (C2, C3 and C4)

Term	Definition
Sensitive receivers	Viewpoints that are more sensitive to change than others, including dwellings, historic homesteads, tourist accommodation, places of worship, town centres and central business districts
Sensitivity	A measure of the capacity of an element of the landscape to absorb the impacts from a proposed land use change and/or built form
View	The sight of a landscape or scene
Visual impact	The impact on views from private and public places, which is determined by considering the visual magnitude and sensitivity

1 Introduction

This technical supplement provides additional guidance for applicants, consent authorities and the community using the Large-Scale Solar Energy Guideline to understand the process and requirements for assessing visual and landscape character impacts of large-scale solar energy development 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 applications for large-scale solar energy developments include an assessment that is proportionate to the scale and impacts of the development, is easy to understand and considers community views and values of the surrounding landscape.

This technical supplement identifies information that a landscape character and visual impact assessment must provide and includes assessment tools and requirements that applicants must use to produce consistent and comparable results.

The technical supplement also aims to:

- encourage good site selection, layout and design of solar energy projects early in the planning process
- guide the relevant identification, mitigation and management of significant impacts on the surrounding landscape and viewpoints from private and public places
- 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 reduce delays in the assessment process
- facilitate appropriate development of the large-scale solar industry in NSW.

1.2 General requirements

Applicants must prepare a detailed landscape and visual impact assessment as part of an environmental impact statement.

The assessment must include a full description of the proposed solar energy project and use maps to show the location of the project in relation to public viewpoints, private receivers and surrounding landscapes that require analysis.

It must include details of:

- the type, height and scale of photovoltaic arrays, including tracking type (fixed, single-axis or multi-axis tracking)
- roads and access tracks
- ancillary infrastructure, including batteries, fencing, inverters, substations and electricity distribution lines.

Tools and reference information to help the assessment process include:

- the most recent and highest resolution satellite imagery, aerial photography and available orthophotos at a scale of 1:25,000 (applicants should also 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.

Applicants must engage with the community, including the Indigenous community, as early as possible and throughout the assessment, to inform outcomes and any measures to mitigate impacts.

Importantly, the assessment process should happen alongside the design and siting of a solar energy project so the community's input can effectively inform the design.

Field visits must inform the assessment to establish and ground truth important inputs into the process, including the scenic quality and sensitivity of the area. These site visits can include private property (with permission) or public areas surrounding the project footprint.

Professional assessment skills

Professional assessment skills are critical to an effective landscape character and visual impact assessment. Applicants must 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 large-scale solar energy development.

1.3 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 from those for visual impact.

Applicants should consult on landscape and visual impacts as part of their broader environmental assessment process.

Landscape character assessment

This process for determines 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 process determines the day-to-day visual effects of a project on people's views from the private and public domain.

The likely impacts of a large-scale solar energy development can only be determined by understanding the sensitivity of an area or view to change and the magnitude of a proposed development in that area or view.

This technical supplement recognises that visual amenity should be afforded some protections and provides a range of tools to do so. However, it also recognises the fundamental principle that landowners have no proprietary right to or ownership of a view,[1] and a visible solar array or ancillary infrastructure does not necessarily constitute a visual impact.

Changes to our rural and natural landscapes will be necessary to facilitate a transition to renewable energy and to support the development of the solar energy industry. This technical supplement aims to achieve balanced outcomes that avoid and manage significant landscape and visual impacts while supporting this change.

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

Sensitivity

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

Magnitude

Magnitude refers to the physical scale of the solar energy development. A range of factors influence magnitude, including:

- the apparent size of a large-scale solar energy development decreases significantly as the distance from the viewer increases
- the apparent size of a large-scale solar energy development increases as the relative height between the viewer and solar array increases
- the apparent size of a large-scale solar energy development increases with the physical scale and dimensions of a solar energy development, although these factors are less discernible as distance from the viewer increases.

Private receivers

The visual impact assessment must assess the potential impacts on private receivers, including private recreation areas and sporting fields, dwellings, and tourist and visitor accommodation.

For the purpose of this document, a dwelling has the same meaning as the Standard Instrument - Local Environmental Plan which is a room or suite of rooms occupied or used as a separate domicile.

Tourist and visitor accommodation has the same meaning as the Standard Instrument - Local Environmental Plan which is a building or place that provides temporary or short-term accommodation on a commercial basis, and includes backpacker's accommodation, bed and breakfast accommodation, farm stay accommodation, hotel or motel accommodation and serviced apartments.

To avoid doubt, a dwelling or tourist and visitor accommodation (which includes farm stay accommodation) does not include moveable dwellings as defined in the Standard Instrument – Principal Local Environmental Plan, including tents, caravans or other portable structures for human habitation.

A visual impact assessment must be undertaken for any of the following at the time the Planning Secretary's environmental assessment requirements are issued:

- existing dwellings and tourist and visitor accommodation

- dwellings and tourist and visitor accommodation that have been approved through a development application or complying development certificate, or are exempt from approval, and have physically commenced construction[2]
- dwellings and tourist and visitor accommodation that are constructed but not yet occupied or used.

A visual impact assessment is not required for any dwelling or tourist and visitor accommodation that is, at the time the Planning Secretary's environmental assessment requirements are issued:

- built illegally (as confirmed by the relevant council)
- derelict (as officially declared by the relevant council)
- under assessment or consideration as part of a development application or complying development certificate application
- approved (under a development consent or complying development certificate) but for which construction has not physically commenced.

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. The assessment should also consider the potential worst-case views that have the greatest potential to impact 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 adjacent gardens.

In assessing the visual impacts on tourist and visitor accommodation, the assessment must focus on views from the buildings that accommodate guests, and/or key areas of the property that significantly contribute to the visitor experience. The assessment should not consider views from areas that are inaccessible to guests or areas that would otherwise be primarily used by the permanent residents.

Where any dwelling or tourist and visitor accommodation has approval but has yet to physically commence construction, the applicant may need to consider the impacts on these development rights. This should be undertaken in accordance with the guidance in section 5.7 of the *Large-Scale Solar Energy Guideline* and the visual impact assessment process outlined in this document does not apply in these circumstances.

[2] 'Physically commenced' has the same meaning as that in section 96 of the Environmental Planning and Assessment Regulation 2021.

Private agreements

If a private receiver has a private agreement in which the landowner specifically accepts the full visual impacts of the project, then no assessment is required.

Should an applicant enter into a private agreement after submitting an environmental impact statement but before a project is determined, then the applicant should provide this information to the consent authority at the earliest opportunity.

The *Private Agreement Guideline* provides additional guidance.

2 Landscape character assessment

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

Landscape character is the distinct, recognisable and consistent pattern of elements in the landscape that make one landscape different from another. This includes physical elements, such as geology, soil, climate, flora and fauna, and the way these elements interact with each other. It also encompasses human influences, such as historical, cultural and economic activities that have shaped the land. Landscape character is an objective assessment of the physical and visual attributes of the landscape.

Landscape assessment is distinctly different from visual impact assessment, which solely focuses on individual views. Consequently, landscape character assessment can help to understand the cumulative effect of a project 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 development is proposed and should be proportionate to the likely impacts, including cumulative impacts, of the development.

The Department of Planning, Housing and Infrastructure encourages applicants to consult with it in scoping the project to determine the level of detail that the landscape character assessment may require.

The study area for the landscape character assessment should generally be 5 km from the proposed development. However, the character of landscapes can vary significantly, and applicants may provide justification for analysing a smaller area.

2.1 Baseline analysis

Applicants must conduct a baseline study to establish the landscape character of the area and its sensitivity. They should base this study on desktop analysis and field visits, and it should provide a descriptive and illustrative analysis of the qualities of the place, what makes it valued and any challenges that could arise from the proposed development.

It is important for applicants to engage with the community (including Indigenous communities), local council and potentially affected landowners as early as possible to identify and establish the importance of particular landscape values and characteristics. Landscape values are the qualities people attribute to a landscape. The values are subjective and reflect the personal, cultural, social and spiritual significance the landscape holds for people. Values can include aesthetic appreciation, cultural heritage, recreation, spiritual connection and ecological importance. Gauging these values can provide a firm basis for siting and designing a solar energy project that seeks to avoid or minimise impacts.

In undertaking consultation, applicants must adopt the approaches and objectives 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 waterbodies)
- ecological characteristics and land cover of an area (such as whether it is forested, wetland, scrub or grass) 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 associated with high visual interest or quality that stand out visually, including natural (such as a distinctive mountain peak or hilltop), cultural, agricultural features
- the aesthetic and perceptual aspects of the landscape, particularly those that are key contributors to the distinctive character of the landscape (such as its scale, complexity, openness, tranquillity or wildness)
- aspects that have important Aboriginal cultural heritage value (except artefacts and tangible values that would be assessed as part of an Aboriginal cultural heritage assessment) and why they are valuable to the community
- the overall character of the landscape in the study area, including any identifiable distinctive landscape character types or areas (see further guidance below)

- the condition of the landscape, including that 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 local and regional solar energy developments, including projects that may create direct or indirect cumulative impacts with the project.

Applicants should use 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 inform the visual impact assessment of assessable viewpoints.

2.2 Identify landscape character zones

If the landscape includes distinct areas with different qualities, applicants should break down the study area 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. Combinations of vegetation, waterbodies, landforms and land use form these patterns and allow for the identification of key landscape features.

Sources to use to identify and establish 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
- Australia's bioregional framework as delineated via the Interim Biogeographic Regionalisation for Australia (IBRA)
- eSPADE spatial viewer for soil landscape mapping, NSW Environment, Energy and Science.

Large-Scale Solar Energy Guideline

Sample Landscape Character Zone Map

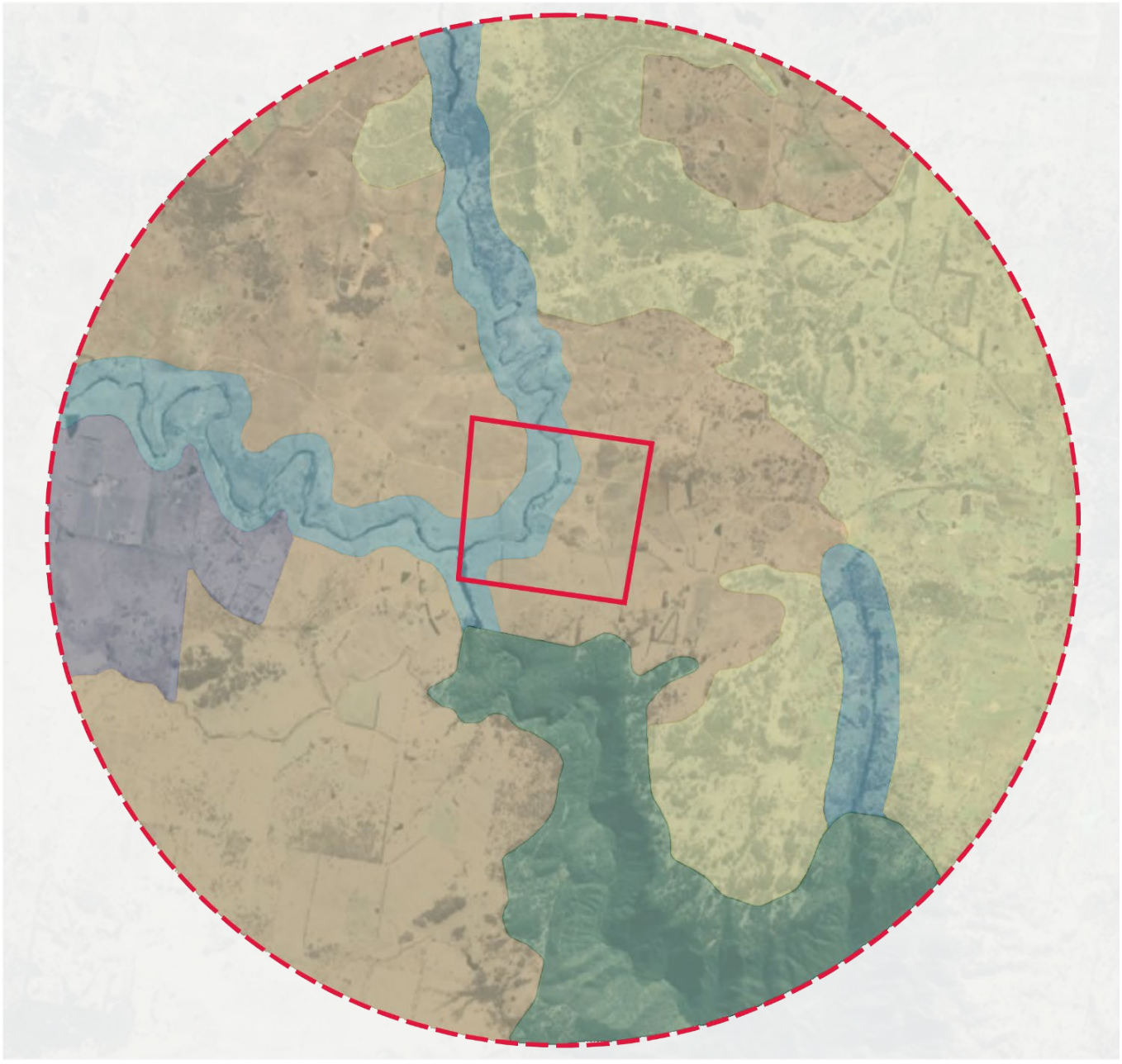


Figure 1. Example landscape character zone map

2.3 Assess the landscape character impact

Applicants should determine the impact of the proposal 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 get a rating (low, moderate or high) that can help determine the overall landscape character impact on any given zone. Applicants must provide rationale for the ratings as part of the assessment.

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

- size and scale including:
  - the extent of landscape elements that may be lost and the contribution of those elements make to the landscape character
  - the extent to which the project becomes a minor or major element in the landscape and its dominance in the visual catchment
  - the extent to which the project changes the key characteristics of the landscape that are critical to its distinctive character (including the removal of vegetation)
- geographical area – the area of the landscape that will experience the project's effects. This could vary from the immediate site setting to a larger scale, where the project may influence several landscape character zones.

Applicants should rate the sensitivity of the landscape character type 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 resizing project elements. Applicants should then summarise any significant residual impacts on the landscape after mitigation as the final step in the process.

Appendix A provides an example landscape character assessment.

3 Visual impact assessment framework

A visual impact assessment that considers the likely impacts of the development on public viewpoints and private receivers must accompany applications for large-scale solar energy development.

3.1 Visual impact assessment process

Applicants must conduct a visual impact assessment for all public viewpoints and private receivers according to the process described below and illustrated in Figure 2. The level of assessment should be proportionate to the likely impacts of the development (see section 4.2).

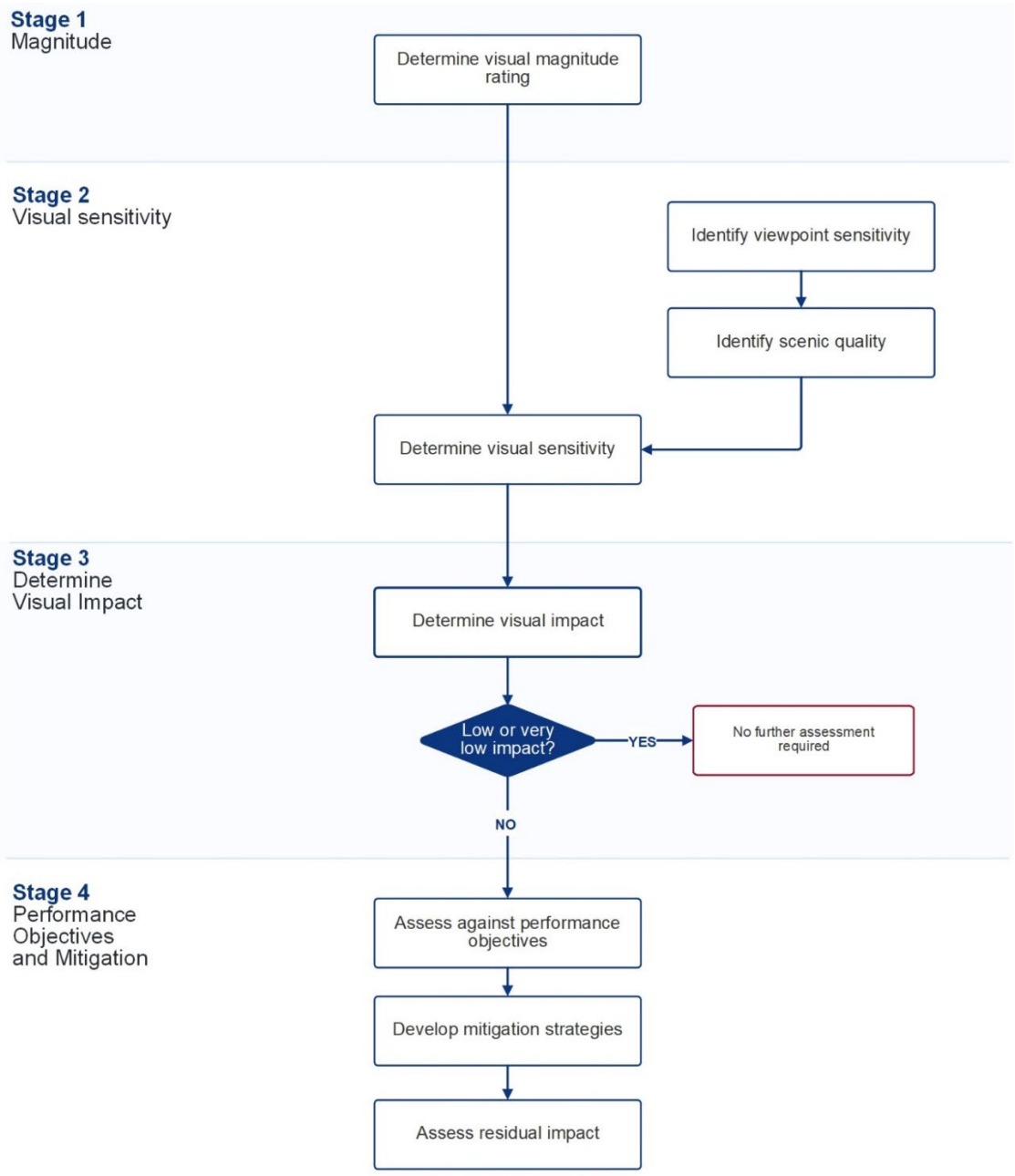


Figure 2. Visual impact assessment process

Visual magnitude

The visual magnitude of a project is its apparent size within the viewshed. It is a key factor in determining the overall visual impact. The typical design and layout of large-scale solar energy developments are 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 large-scale solar energy developments comprise similar infrastructure with common characteristics, including colour, texture, layout and contrast with the rural landscapes in which they are typically located.

Visual magnitude methodology

Visual magnitude should be determined by analysing the volume of the field of view a project would occupy. This can be determined by splitting any view into a grid comprising cells 1 degree high and 10 degrees wide (Figure 3) and counting the number of cells a project would occupy.

Figure 3. Determining visual magnitude

You can then compare the total number of cells with the visual magnitude thresholds in Table 1 to determine the visual magnitude rating. There are five ratings: very high, high, moderate, low and very low; these indicate the apparent size of the solar energy development from each public viewpoint or private receiver. Appendix B provides examples of each magnitude rating.

This method aims to weight vertical changes in magnitude more than horizontal changes. This reflects best practice understanding of visual impacts, including the concept that people are more sensitive to vertical changes to their field of view than horizontal changes.

For example, a 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 true 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 1. Visual magnitude thresholds

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

Using this concept, there are several ways to calculate magnitude for different purposes and with varying levels of accuracy. These include:

- a practical approach that you can use on location to visualise likely outcomes in real-world settings (see Figure 4)
- conservative desktop estimates that you can calculate by measuring the worst-case horizontal field of view and the relative elevation difference across a project
- detailed analysis using 3D visualisations of the proposed development, including basic 3D models (wire frames) and photomontages that account for influencing factors such as topography and vegetation screening.

The method to be 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).

Visual sensitivity

Visual sensitivity refers to the quality of the view and how sensitive it is to the proposed change. In some cases, visual sensitivity also relates to the direction of the view and where it can be viewed (such as a resident's living room).

You determine visual sensitivity by identifying the sensitivity of each viewpoint and receiver and categorising the scenic quality of the area in view.

Rule of thumb for measuring magnitude

You can 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 (see

Figure 4). This provides a practical approach for visualising how the magnitude ratings would appear and how they might compare with other features in the landscape.

To measure part of your field of view, 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 one cell wide. The height of your little finger is approximately one degree, or the equivalent of one cell high.

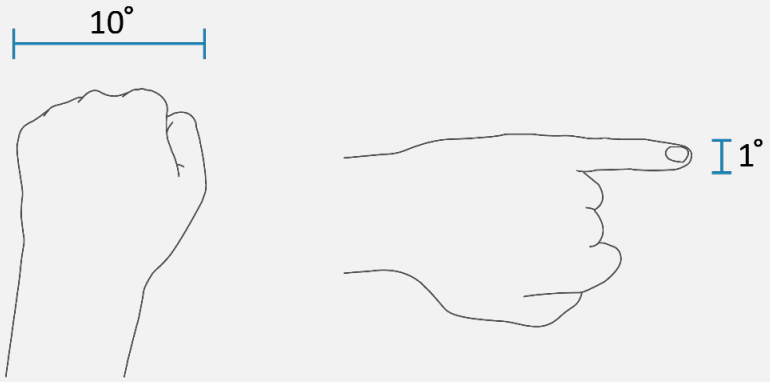


Figure 4. Rule of thumb for measuring magnitude

Viewpoint sensitivity

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

The sensitivity of each viewpoint must be classified into one of four sensitivity ratings: very low, low, moderate and high considering the examples in Table 2, the baseline landscape study and any consultation with the community and individual landholders. Although Table 2 is a good guide, it is not conclusive, and applicants must consider the other inputs to arrive at the final rating.

Applicants should categorise views from a rural dwelling according to their importance. Primary views are considered more sensitive than secondary views (see Table 3 for guidance and the Land and Environment Court planning principle related to views)[3]. Applicants should identify one primary

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

view for each dwelling, considering the guidance in Table 3 and the factors that contribute to residential amenity. All other views must be considered secondary.

When conducting simple and intermediate assessments (see section 4.2), applicants may conservatively assume that all views from rural dwellings are from primary viewpoints. Applicants can then refine these assumptions for rural dwellings that progress to a detailed assessment.

Applicants must identify how they have classified each of the residential viewpoints in the environmental impact statement.

Table 2. Viewpoint sensitivity levels and examples

Viewpoint type	Very low viewpoint sensitivity	Low viewpoint sensitivity	Moderate viewpoint sensitivity	High viewpoint sensitivity
Private receiver	Private recreation areas and sporting fields (land zoned RE2)	Secondary view from dwelling rural area (zoned RU1, RU2, RU3, RU4 and RU6), large lot residential areas (zoned R5) and environmental or conservation areas (zoned C2, C3 and C4)	Primary view from dwellings in rural areas (zoned RU1, RU2, RU3, RU4 and RU6), large lot residential areas (zoned R5) and environmental or conservation areas (zoned C2, C3 and C4) Tourist and visitor accommodation (bed-and-breakfasts, motels and hotels) and places of worship	Dwellings in residential and rural villages (zoned R1, R2, R3, R4 and RU5) Historic rural homesteads/ residences on the national, state or local heritage list
Public viewpoint	State highways, freeways and classified main roads Local sealed and unsealed roads	Cemeteries, memorial parks Tourist roads and scenic drives[4]. Significant entry ways to regional towns and cities Walking tracks and navigable waterways	Tourist uses in tourist areas (zoned SP3) Publicly accessible green and open spaces, including picnic areas, parks, public recreation areas and lookouts Town centres and central business districts	n/a

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

Table 3. Primary and secondary viewpoints from rural dwellings

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

Scenic quality

Scenic quality refers to the holistic and 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 very low, low, moderate or high scenic quality. It is typically a complex process undertaken by experts in visual impact assessment and must also consider community values.

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

Applicants can use the suggested scenic quality classification criteria in Table 4 as a guide; however, the environmental impact statement 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 be insufficient to justify the landscape as 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, regardless of other features.

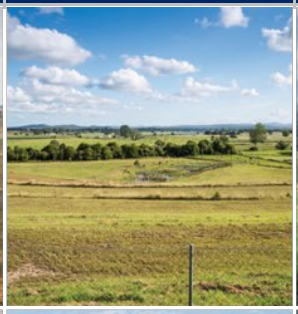
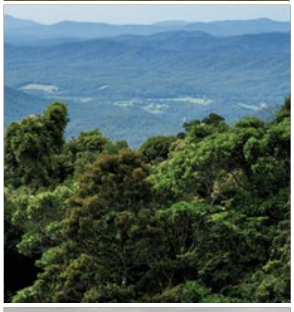
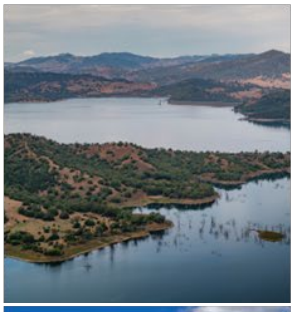
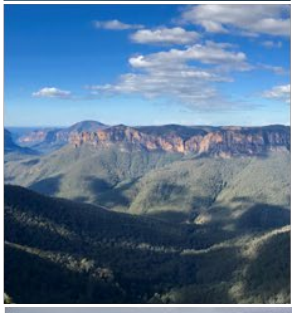
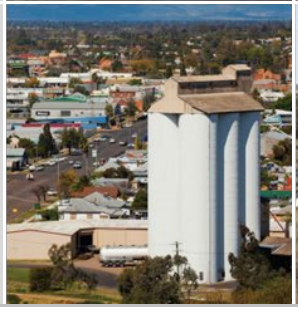
Table 5 provides a visual reference to help applicants, the community and consent authorities understand how scenic quality values may appear across the categories.

Table 4. Frame of reference for scenic quality values

Viewpoint type	Very low scenic quality	Low scenic quality	Moderate scenic quality	High scenic quality
Landform	Large expanses of flat or gently undulating terrain Indistinct, dissected or broken landforms that provide little illusion of spatial definition or landmarks with which to orient	Mostly flat or gently undulating terrain with isolated areas of undulating topography	Steep, hilly and undulating ranges that are not visually dominant Broad, shallow valleys Moderately deep gorges or moderately steep valley walls Minor rock outcrops	Isolated peaks, steep rocky ridges, cones or escarpments with distinctive form and colour contrast that become focal points Large areas of distinctive rock outcrops or boulders Well-defined, steep valley gorges
Vegetation	Extensively cleared and cropped areas with very limited variation in colour and texture Pastoral areas, human-created paddocks, pastures or grasslands and associated buildings typical of grazing lands	Predominantly cleared and cropped areas with small areas of variation in colour and texture Most pastures or grasslands with small blocks of distinct native vegetation	Predominantly open forest or woodland combined with some natural openings in patterns that offer some visual relief Vegetative stands ranging in size, form, colour, texture and spacing, including human-influenced vegetation (for example, vineyards, plantation forests and orchards)	Strongly defined natural patterns with combinations of native forest, naturally appearing openings, streamside vegetation and scattered exotics Distinctive stands of vegetation that may create unusual forms, colours or textures compared with surrounding vegetation
Waterbodies	Absence of natural waterbody Farm dams, irrigation canals or stormwater infrastructure	Minor water forms, such as creeks and streams	Intermittent streams, lakes, rivers, swamps and reservoirs	Visually prominent lakes, reservoirs, rivers, streams, wetlands and swamps Presence of harbour inlet, bay or open ocean

Viewpoint type	Very low scenic quality	Low scenic quality	Moderate scenic quality	High scenic quality
Social and cultural	Places of worship, cemeteries, memorial parks, private open spaces	Places of worship, cemeteries, memorial parks, private open spaces Local heritage sites	Local or state heritage sites Distinguishable entry ways to a regional city identified in the State Environmental Planning Policy (Transport and Infrastructure) 2021	Culturally important sites, wilderness, world heritage areas and protected areas World, national and state heritage sites
Human presence	Dominating presence of infrastructure, human settlements, highly modified landscapes and higher density populations, such as regional cities, industrial areas, agricultural transport or electricity infrastructure	Highly modified landscapes with visible infrastructure, such as transmission lines and railway corridors	Dispersed yet evident presence of human settlement, such as villages, small towns, isolated pockets of production and industry, lower scale and trafficked transport infrastructure	Natural, undisturbed landscape Minimal evidence of human presence and production

Table 5. Visual reference for scenic quality values

Viewpoint type	Very low scenic quality	Low scenic quality	Moderate scenic quality	High scenic quality
Landform				
Vegetation				
Waterbodies				
Social and 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 6 to determine the overall visual sensitivity of each viewpoint.

Table 6. Visual sensitivity matrix

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

Visual impact

The overall visual impact rating of each viewpoint must be determined for each assessable viewpoint by combining the visual magnitude and visual sensitivity using the matrix in Table 7. Appendix C provides examples of difference visual impacts.

Table 7. Visual impact matrix

Magnitude	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

Applicants must address the relevant performance objective for each assessable viewpoint and the identified level of impact (Table 8).

Table 8. Visual performance objectives

	High visual impact	This level of impact should be avoided unless the applicant has a negotiated agreement with the affected landholder or 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, • the project site is strategically important because of its **location,** and • the project is in the public interest.
	Moderate visual impact	**Public road viewpoints** As far as reasonable and feasible, the applicant 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 sightlines, could be confined to a relatively small area (for example, vegetation screening would not be required for several hundred meters along a transport corridor) and where agreed with the relevant road authority. **All other private receivers and public viewpoints** Visual impact mitigation is required in consultation with the affected landowner and should be proportionate to the scale of impact. There is no expectation that this mitigation should eliminate the view of the development entirely, but it must reduce the impact to an acceptable level. Appropriate mitigation options include re-siting, resizing, or re-orienting the solar arrays as well as vegetation screening or project landscaping to reduce impacts. If the available mitigation options would not be effective in reducing impact or are unsuitable due to the nature of the impact (for example screening would result in the obstruction of views), then project redesign and/or negotiated agreements should be considered.
	Low and very low visual impact	No mitigation required

Avoidance and mitigation

Applicants may consider several avoidance and mitigation options as methods of minimising visual impacts.

Resizing, re-siting or removing infrastructure

Solar arrays and other associated solar energy infrastructure (roads, buildings, electricity transmission) can be resized to reduce visual magnitude and to reduce impacts from sensitive viewpoints. Alternatively, solar arrays and other project infrastructure could be re-sited to locations where they will have less visual impact. Removal of solar panels should also be considered if there are limited options are available to re-site parts of the project. This should be the first measure applicants consider, and the consent authority may also consider it when assessing the project.

Vegetation screening

Vegetation screening, or planting trees and shrubs, may be useful for visually screening large-scale solar energy developments or other potential visual impacts (such as glint and glare). Applicants should first consider onsite screening, such as perimeter planting. If this likely to be ineffective, they can consider screening at affected public viewpoints and private receivers.

However, applicants must consider several limitations of vegetation screening. It can obstruct landscape views, resulting in further impacts to particular views. It can also take many years to establish, and during drought or other unfavourable conditions, it may not optimally grow 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 obstructed scenic views), and applicants should design it in consultation with the affected landowner.

Applicants should select appropriate plant species that suit the environment (for example, drought-tolerant native species, if relevant), are typical of the area and maintain their foliage throughout the year. If possible, they should be suitably mature to provide maximum screening effectiveness in the shortest possible time. Applicants should use vegetation of various heights to ensure the most effective screening and should plant vegetation as soon as possible to reduce the time that impacts would be unmitigated.

When applicants have exhausted options for other forms of screening, they could use earthworks, such as mounds or bunding, to mitigate visual impacts. If earthworks are the only viable option for effective screening, applicants should clearly demonstrate that the proposed measures are complementary and sympathetic to the landscape.

At-receiver mitigation

As an alternative to other mitigation options, applicants may consider using at-source treatments at affected public viewpoints and private receivers in consultation with the landowner. These options could include landscape treatments or building other structures or features (for example, a shed) to screen views. Any agreed mitigation must be subject to a private agreement.

Neighbour agreements

Applicants may consider agreements with specific landowners as a form of mitigation. The *Private Agreement Guideline* for energy projects provides more information about these agreements.

Residual impact assessment

Applicants 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 project would decrease.

4 Level of assessment

Applicants must conduct an assessment proportionate to the likely impacts on each viewpoint and receiver. This section identifies the required level of assessment in the scoping report and environmental impact statement.

4.1 Scoping report

Scoping presents an opportunity for applicants to select sites, designs and layouts to avoid and mitigate significant visual impacts. Consequently, applicants should consider 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 require assessment in the environmental impact statement. Applicants should also use this process to identify where to focus consultation with landowners and the local community.

As part of this process, applicants should conduct a mapping exercise that includes the following steps. This can be combined with the constraints map required by section 4.2.1 of the *Large-Scale Solar Energy Guideline*. You can find further guidance on the contents and form of a scoping report in the department's *State significant development guidelines – preparing a scoping report*.

If the project is not designated development, then a scoping report is not required (see section 2.3.1 of the *Large-Scale Solar Energy Guideline*). In these cases, the visual impact analysis required by this section does not need to be provided to the department. It should, however, be used to inform the preparation of the EIS.

Study areas

The first step of the scoping stage is for the applicant to identify two visual study areas of:

- 2.5 km from the proposed development for public roads
- 4 km from the proposed development for other private receivers and public viewpoints.

The calculations can be based on either the project area, or the development footprint depending on the level of information available at the time. A more refined approach that uses the development footprint, may result in less viewpoints requiring assessment.

Viewshed mapping

Once applicants have defined the study areas, they can use viewshed mapping to identify areas from which the project could be visible. This process eliminates the need to assess viewpoints within the study areas that have no line of sight to the development. This step is optional but is recommended as it can reduce assessment requirements in cases where topography will play a significant role in limiting the view of a project. Where viewshed mapping is used, it should be based on the maximum height of the proposed solar array, use geographic information systems to account for topography. and not account for other intervening factors, including built structures and vegetation screening.

Applicants should also consider undertaking a reverse viewshed analysis (see Figure 5). This can be a useful tool to refine project design to reduce any significant impacts. It can also be used to communicate the visibility of certain parts of the project and aid consultation with the community. This analysis should be used to highlight parts of the project that can be seen from the greatest number of viewpoints.

Identifying 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 sit within the study areas. Applicants should use Table 2 to help identify potential viewpoints; however, they need not identify the precise category of each viewpoint at this stage. Applicants should consider additional viewpoints if ancillary infrastructure, such as substations, could potentially cause impacts. Applicants should label all viewpoints for identification and keep this consistent through the assessment process.

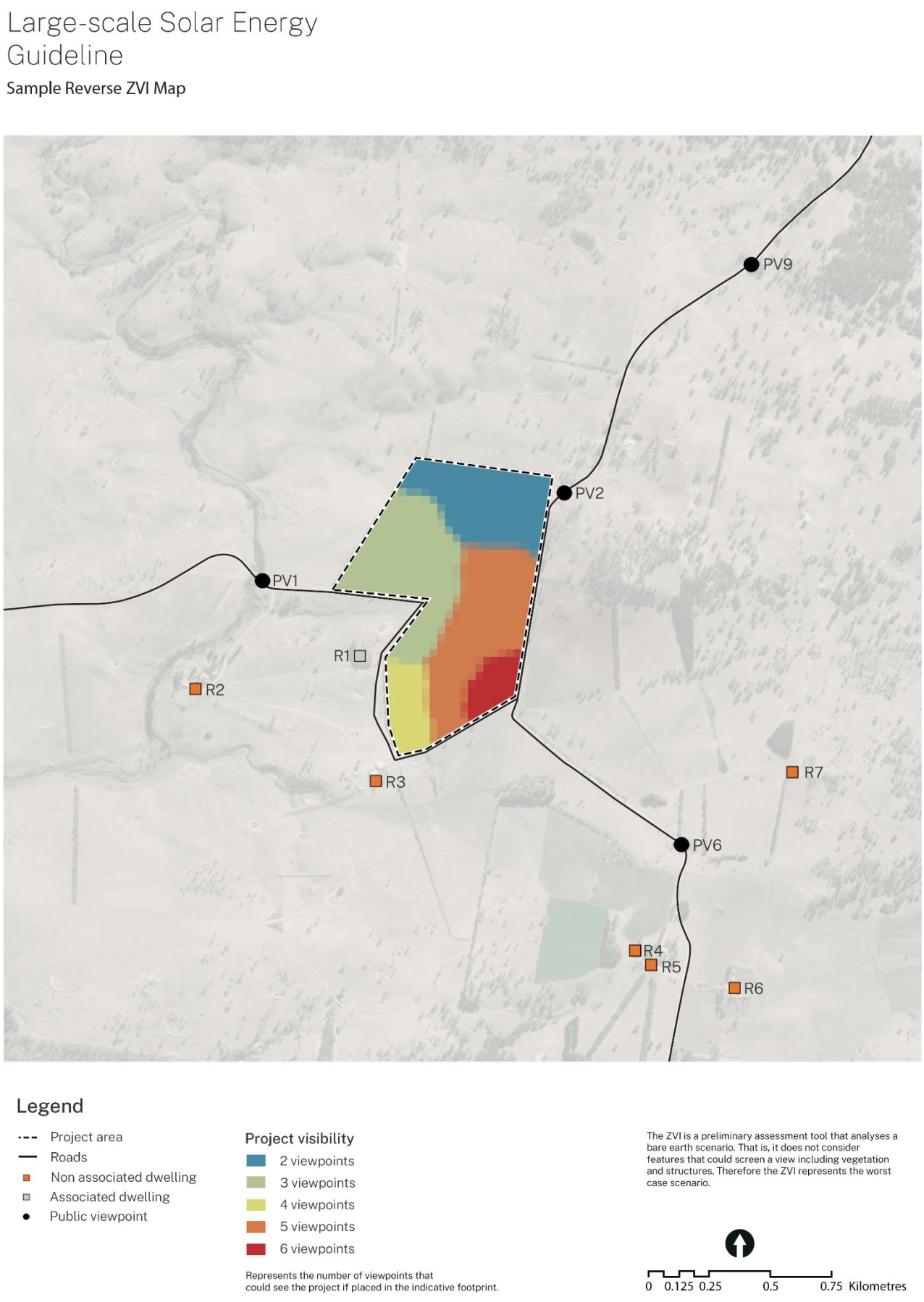


Figure 5. Sample reverse viewshed map

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 environmental impact statement. A full visual impact assessment is not required if features completely obstruct the view of the project. In such cases, the applicant must provide evidence that intervening topography, screening, or structures would eliminate any impact.

Representative receivers and viewpoints

Although assessing each private receiver individually is preferable, applicants may select and assess representative viewpoints in lieu of multiple dwellings. This can be appropriate when private receivers are clustered close together or when a view is representative or represents a worse 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 using representative viewpoints, applicants 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 the proposed project (that is, the worst-case) location in the selected areas as the representative viewpoint.

Applicants should not use representative viewpoints for views from the public domain except for public road viewpoints.

Proportionate visual impact assessment

The level of a visual impact assessment required for private receivers and public viewpoints should be proportionate to the likely impacts of the development. Applicants can begin by carrying out a simple assessment using desktop data and high-level assumptions. They should conduct further assessment if impacts are likely to be moderate or higher. This process is summarised in Figure 6 and described below. Applicants should also prepare the assessment according to 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 more accurately assess scenic quality and determine the effectiveness of existing or proposed screening in mitigating potential impacts.

Figure 6. Proportionate visual impact assessment

Simple assessment

Simple assessment provides a relatively streamlined way to eliminate the need for 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 approach below.

If the simple assessment indicates that a moderate or high impact is likely, then applicants must conduct an intermediate assessment (or detailed assessment if they choose). The environmental impact statement must present the outcomes of the simple assessment for each viewpoint and receiver (or representative location), unless applicants conduct an intermediate or detailed assessment.

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 views from rural dwellings are primary views to avoid extensive field work and site visits. Applicants can later refine this information as part of an intermediate or detailed assessment if moderate or high impacts could be expected. Applicants can also use desktop analysis to derive scenic quality. However, information and site visits that have been undertaken to inform the landscape character assessment should support this desktop analysis (see section 2).

Calculating potential magnitude

Simple assessment can rely on a theoretical calculation of the likely magnitude using simple parameters, including elevation changes and the distance between the development and each viewpoint. This potential magnitude is a conservative and worst-case scenario that ignores mitigating factors, including topography, vegetation and buildings.

To calculate potential magnitude:

1. Determine the worst-case vertical field from each viewpoint. You can do this by calculating the relative height difference between the development and each viewpoint (see Figure 7) and then plotting the viewpoint on Figure 8.
2. This will determine a conservative number of vertical cells that the project could occupy. Tools to assist in this process are also available on the Department's website.
3. Measure the horizontal field of view of the project and any proposed or approved solar energy projects from each viewpoint (not considering topography or vegetation). You can do this conservatively by measuring the absolute width of the project area or more accurately by measuring the development footprint. Divide the resulting measurement by 10 to determine the approximate number of horizontal cells that the project would occupy.
4. Multiply the vertical and horizontal cells and compare that figure to the magnitude thresholds in Table 1 to determine the potential magnitude.

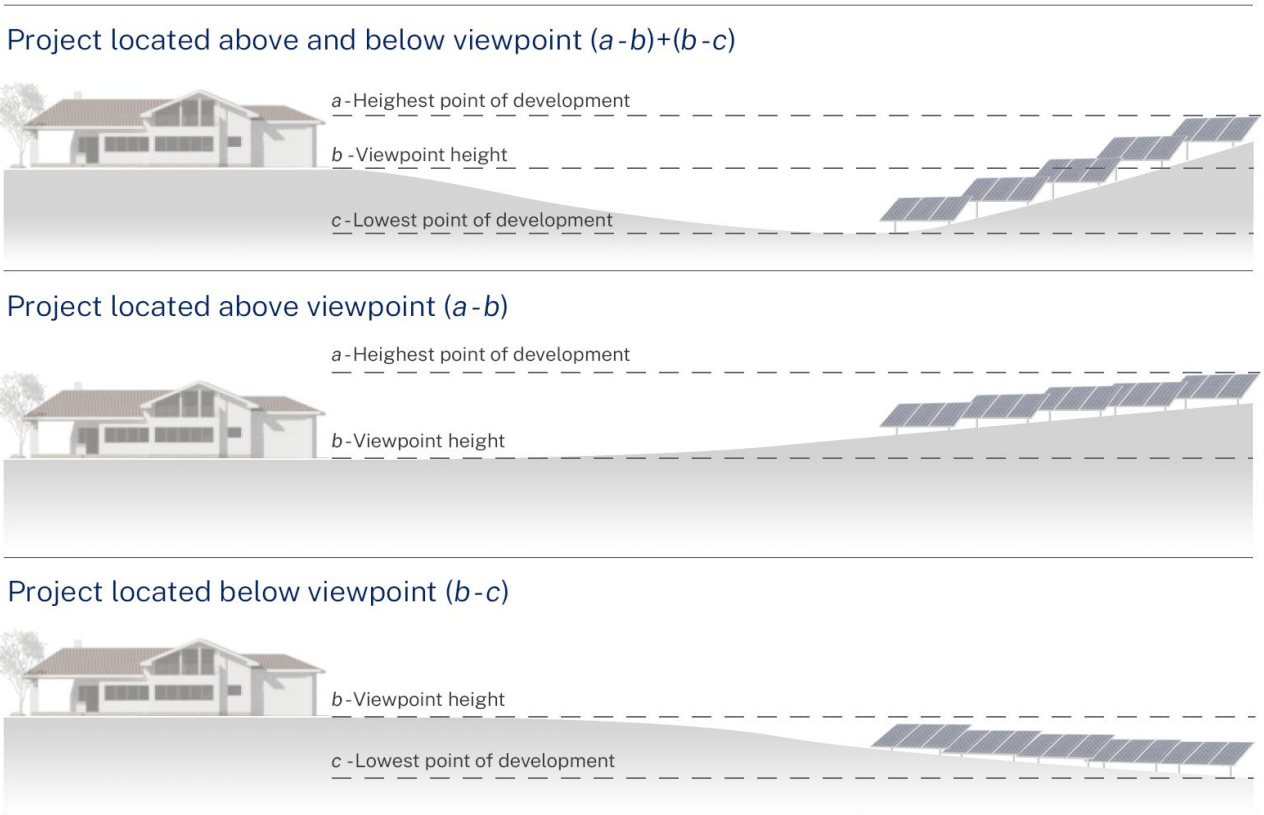


Figure 7. Calculating relative height difference

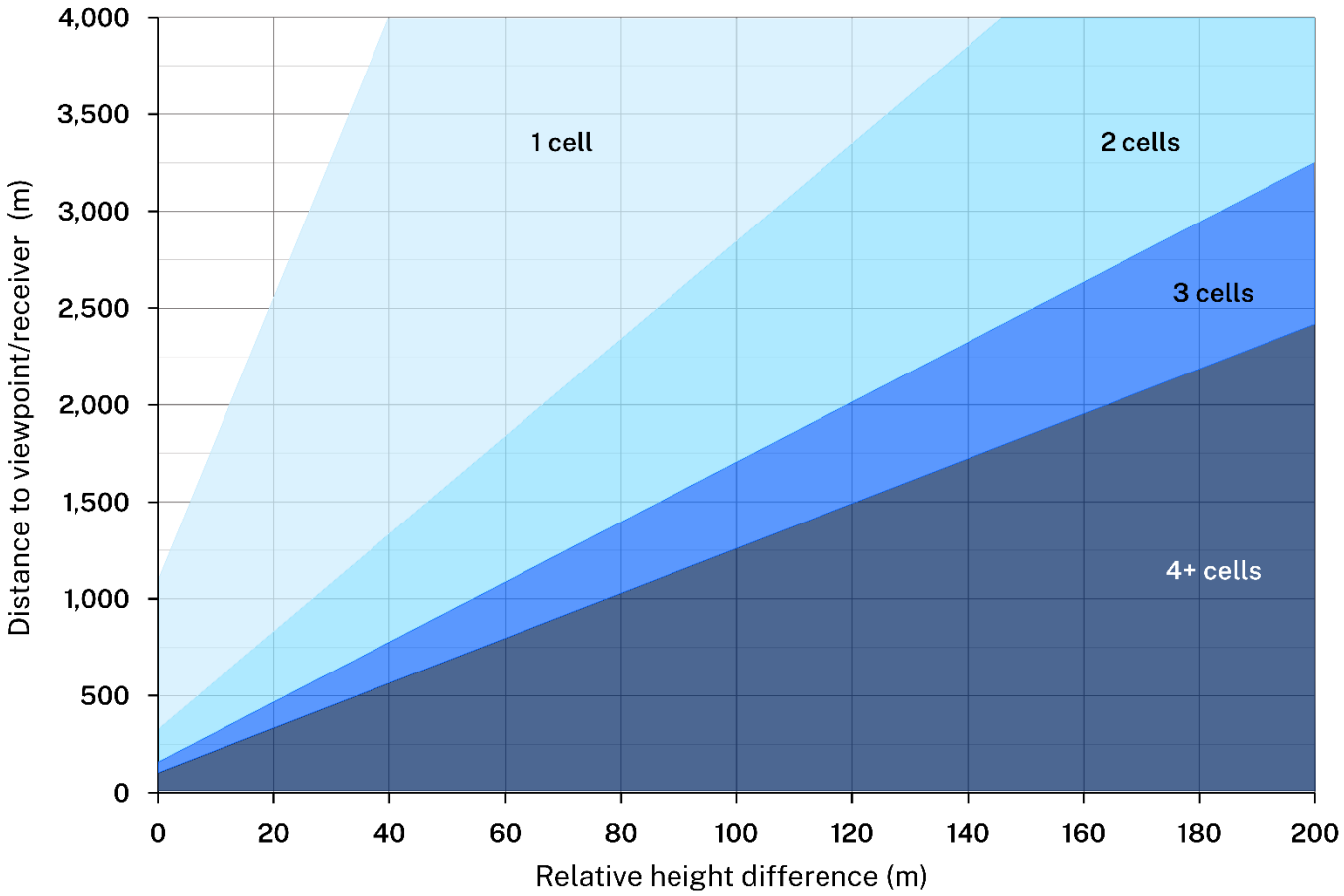


Figure 8. Potential vertical magnitude

Intermediate assessment

Intermediate assessment provides an opportunity to more accurately determine the visual magnitude of a proposal. This involves 3D modelling, which can account for many of the factors that influence magnitude including intervening topography and the different distances at which solar arrays will be visible.

If the intermediate assessment indicates that a moderate or high impact continues to be likely, then applicants must conduct a detailed assessment. The environmental impact statement must present the outcomes of the intermediate assessment for each public viewpoint and private receiver (or representative location) unless applicants conduct a detailed assessment.

Calculating magnitude

Building on the assessment outputs from the simple assessment, applicants can replace the calculation of potential magnitude with using a visual magnitude grid tool to achieve a more certain calculation of a project's bulk and scale relative to a view.

This tool is a transparent grid that, when you overlay it with an accurate 3D representation of a proposed project, can ensure a consistent way to understand the visual magnitude. Figure 9 and the paragraphs below describe this process in further detail.

To calculate visual magnitude for an intermediate assessment:

1. Produce a 3D model (such as wire frame or wireline model) that:
    a. comprises 180 degrees of horizontal field of view and
    b. is generated using a bare earth digital terrain model
    c. includes proposed solar arrays at maximum vertical tilt and fully facing the viewer
    d. includes any visible proposed or approved solar energy projects.
2. Overlay the visual magnitude grid tool on the wire frame 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 1.

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

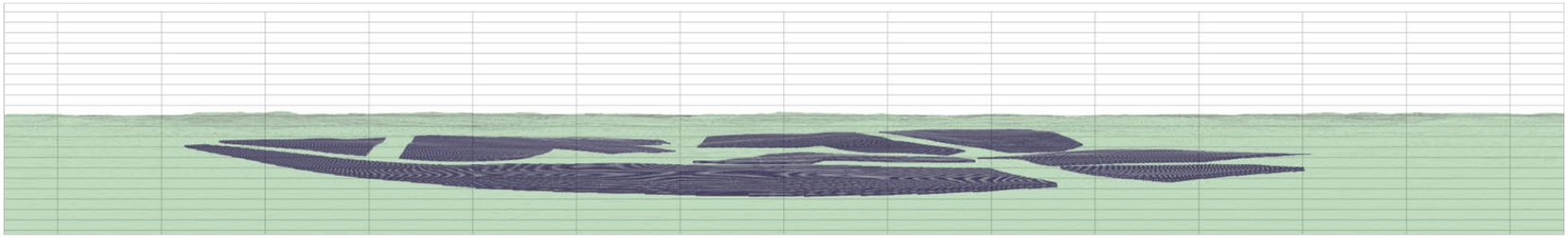
Once scaled appropriately, the visual magnitude grid tool should be moved incrementally to accurately cover the number of cells that would be occupied by the project and to reduce partly occupied cells.

Once the grid has been applied to the wireframe, the applicant must identify the number of cells that are occupied by the built form of the project. A cell is occupied if it contains any element of the project, including solar panels, battery energy systems, transmission lines or other associated infrastructure except if it occupies less than 25% of a cell.

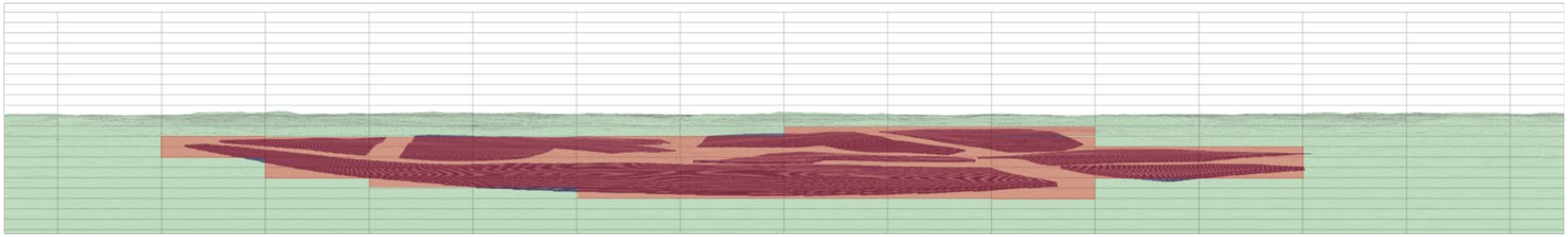
Figure 10 provides examples of occupied and unoccupied cells.

1 Produce wireframe

2 Overlay visual magnitude grid tool



3 Identify occupied cells



4 Determine magnitude rating

Magnitude Rating	Very Low	Low	Moderate	High	Very High
No. Cells	1-7	8-14	15-25	26-36	37+

Figure 9. Steps to determine visual magnitude for an intermediate assessment

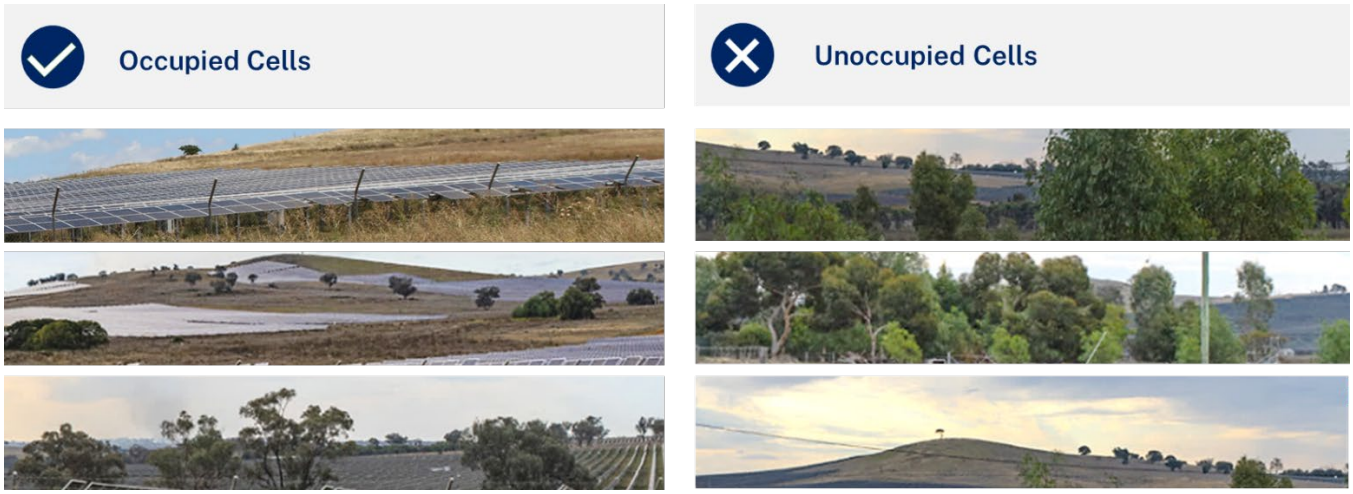


Figure 10. Visual reference for identifying occupied cells

Detailed assessment

Detailed assessment provides an opportunity to refine the magnitude and visual sensitivity inputs using panoramic photomontages and field visits.

A panoramic photomontage is a composite image generated by overlaying a panoramic photograph with a computer-generated model of the proposed solar energy development. When produced consistently, panoramic photomontages provide a highly effective means of assisting stakeholders and consent authorities in appreciating the scale and scope of a proposed large-scale solar energy development's visual presence in context with the landform, land uses and existing vegetation.

Photomontages can be used to refine the visual magnitude by considering the mitigating effects of existing vegetation, and scenic quality by considering 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. However, preparing montages for all scenarios may not be possible (for example, if a landowner does not grant consent for taking photographs from privately owned land). Applicants should make their best efforts to prepare photomontages according to the guidance in Appendix D**.** They can use alternative tools in lieu of a photomontage when land access is not possible (see Appendix D).

Although photomontages are highly effective visual communication tools, they can under-represent 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. This will more appropriately represents the view of the development from the human eye. Where appropriate, the accompanying 50 mm image should comply with the photographic requirements in Appendix D.

Refining visual sensitivity

As part of a detailed assessment, applicants 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. They should also verify information about viewpoint sensitivity, particularly whether views from rural dwellings are primary or secondary (see Table 3).

Refining visual magnitude

Building on the assessment outputs from an intermediate assessment, applicants can refine the calculation of magnitude to account for the mitigating factors of existing vegetation 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 the project.
2. Superimpose a 3D-rendered model and the magnitude grid tool on the panoramic photograph.
3. Verify whether vegetation or built elements would obstruct any elements of the project.
4. recalculate the magnitude rating based on the number of occupied cells and the thresholds in Table 1.

Existing screening should be considered effective, and a cell unoccupied if:

- existing vegetation would substantially screen 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.
- the vegetation is not temporary, seasonal or identified as a common weed.

Assessment against performance objectives

If, after the above analysis, the visual impact is moderate or higher, applicants must assess the impact according to the performance objectives in Table 8.

If applicants propose screening to mitigate an impact, they must prepare a photomontage to visualise the likely effectiveness of the vegetation (see Figure 11). They should present this photomontage with and without an overlay of the visual magnitude grid tool and indicate the age of the vegetation.

The environmental impact statement must also:

- include details of the proposed landscaping, including the type and species of any trees, shrubs, grasses and ground covers to be used,
- demonstrate that the proposed landscaping has a reasonable likelihood of mitigating the impacts due to the mature height and spread of the species
- include indicative timeframes for establishing vegetation, including an estimate for when the vegetation would achieve the desired mitigation level.

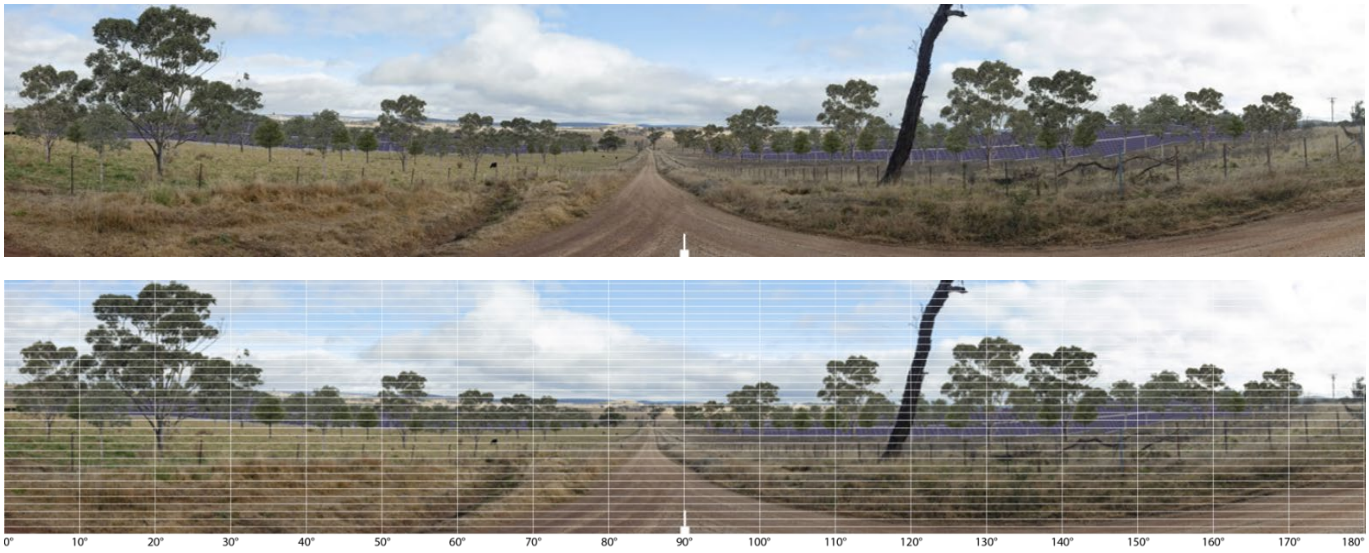


Figure 11. Photomontage with mitigation

Appendix

A

Example landscape character assessment

Table 9. Example landscape character assessment

Landscape character zone	Sensitivity	Magnitude	Landscape character impact
Landscape character zone 1: Undulating farmlands	**Low** • The landscape has been highly modified from its natural state to support grazing and cultivation. • 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 has some capacity to absorb the change from the proposed solar energy development. • No specific planning controls attribute special value to this landscape. • The landscape elements that contribute to its quality will remain unchanged. • The solar energy development would not disrupt any key landscape features.	**Low** • Some elements of the project, predominantly ancillary infrastructure, are proposed within this landscape character zone. • The proposed infrastructure in this landscape character zone will result in a minor change in landscape characteristics at close range. However, the extent of this change is minor in relation to the extent and use of this landscape character zone. • The proposed infrastructure is of a scale and form that is commensurate with the built form typology and could be adequately absorbed by the landscape.	**Low**
Landscape character zone 2: Forested mountain range or ridgeline	**Moderate** • This landscape character zone is generally heavily vegetated and relatively unmodified, particularly along ridgelines.	**Moderate** • When viewed from afar, the position of the project along the ridgeline is likely to disrupt the skyline of this prominent	**Moderate**

Landscape character zone	Sensitivity	Magnitude	Landscape character impact
	• It consists of conservation areas and has forested ridgelines that form a prominent landscape feature. • Some clearing and lightly modified landscapes are present in the lower foothills and fringes of the landscape character zone, including some large lot residential uses. • Some high-voltage transmission lines transect part of the landscape character zone.	landscape feature. In other words, the project will compete with the landform and associated vegetation. • When viewed from within the landscape character zone, views towards the project are expected to occupy a small portion of the horizontal and vertical fields of view, often through gaps in vegetation and topography. This will minimise their ability to impact the character of this landscape character zone.	

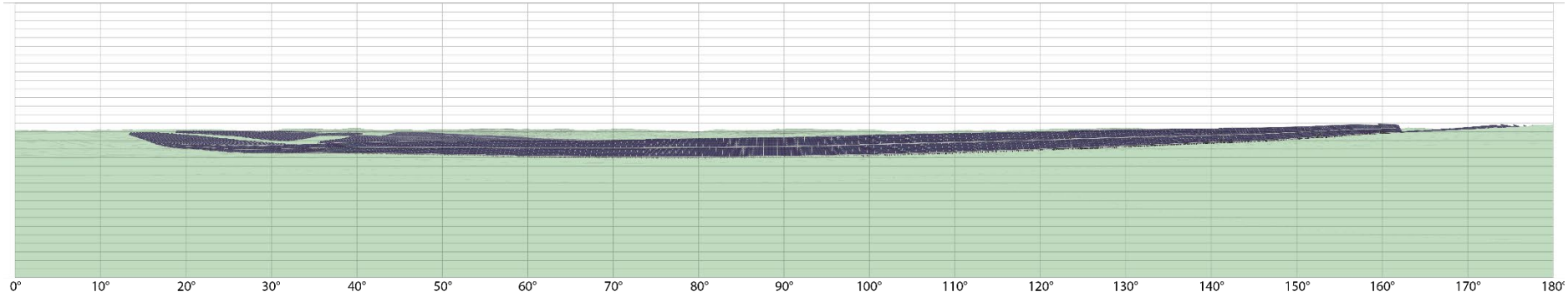
Appendix

B

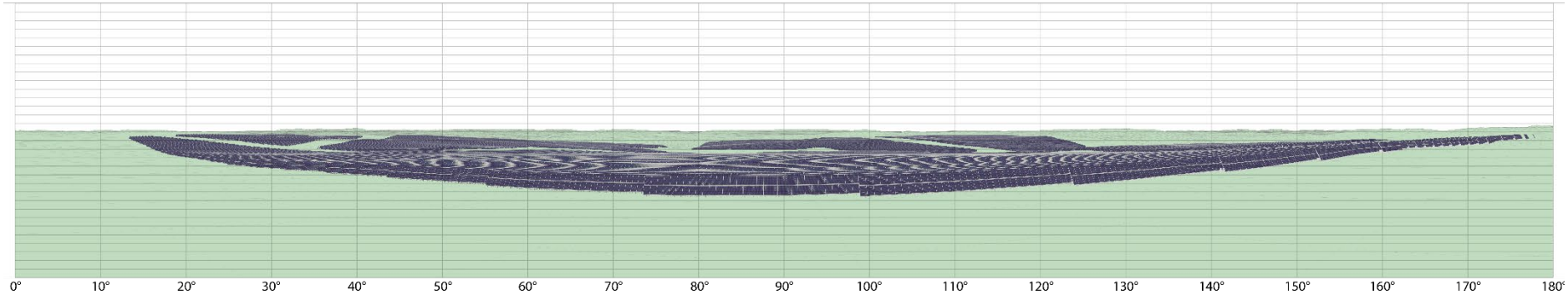
Visual magnitude examples

The following examples depict the magnitude of a solar energy development approximately 2 km wide and 2 km deep. These are highly conservative examples that do not consider intervening vegetation or other mitigating factors.

100m from development

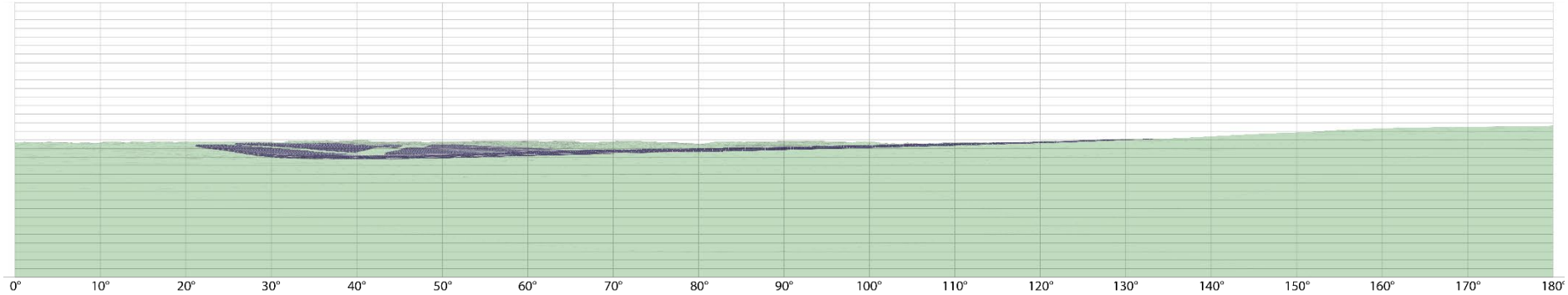


1.5m height (very high magnitude)

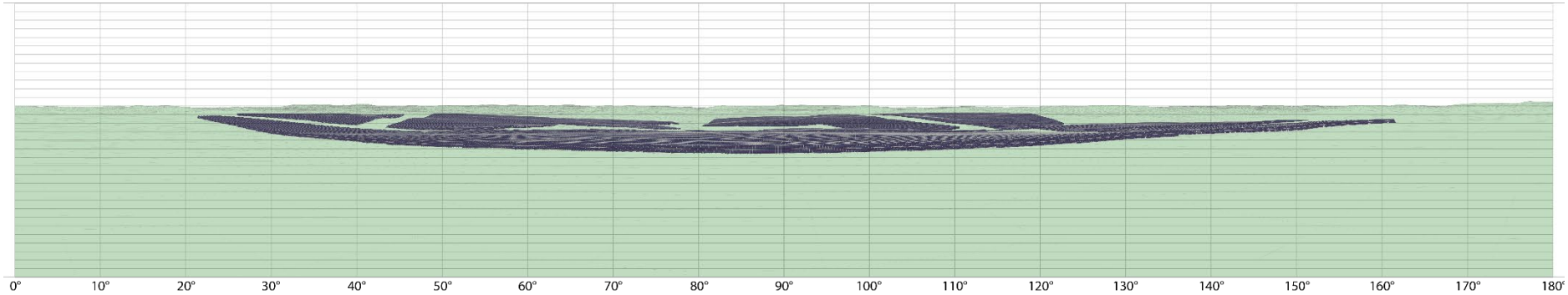


10m height (very high magnitude)

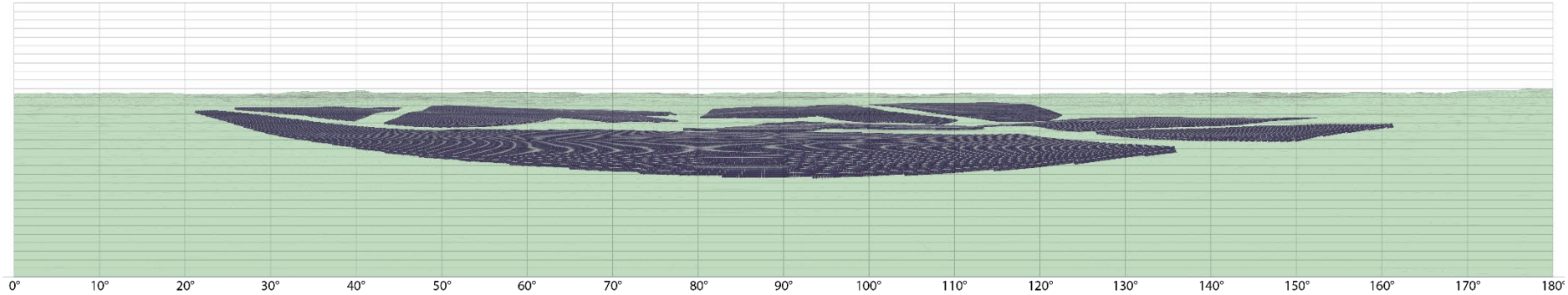
250m from development



1.5 m height (moderate magnitude)

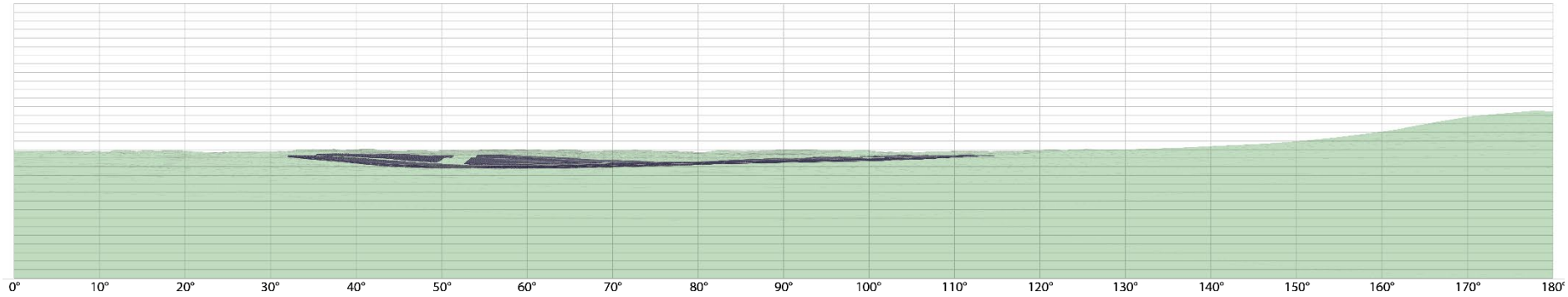


20 m height (very high magnitude)

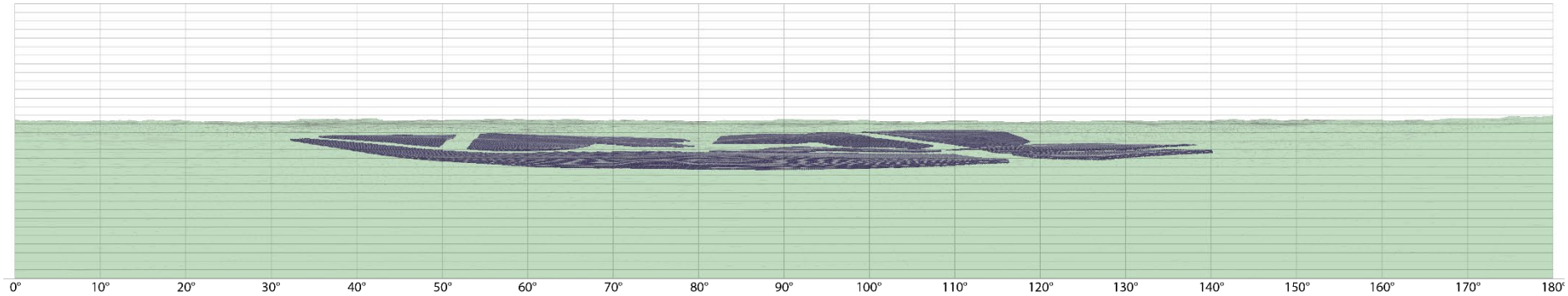


40 m height (very high magnitude)

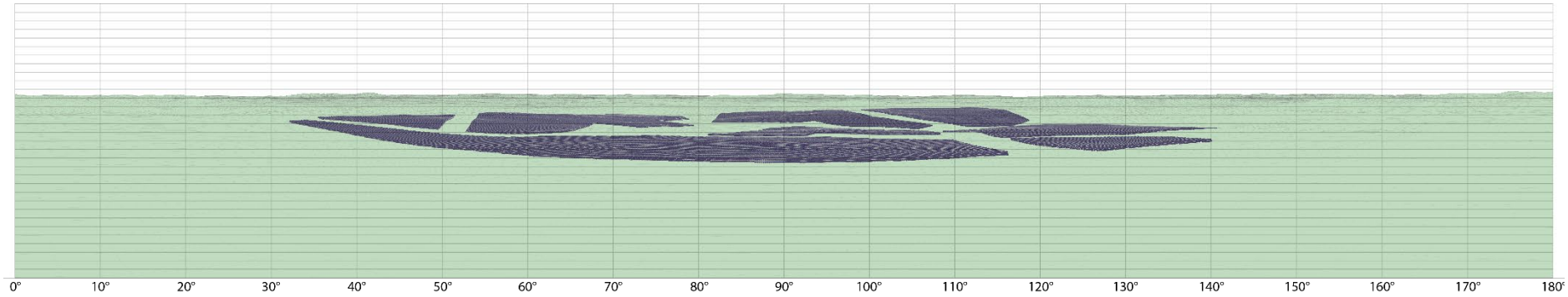
500m from development



1.5 m height (low magnitude)

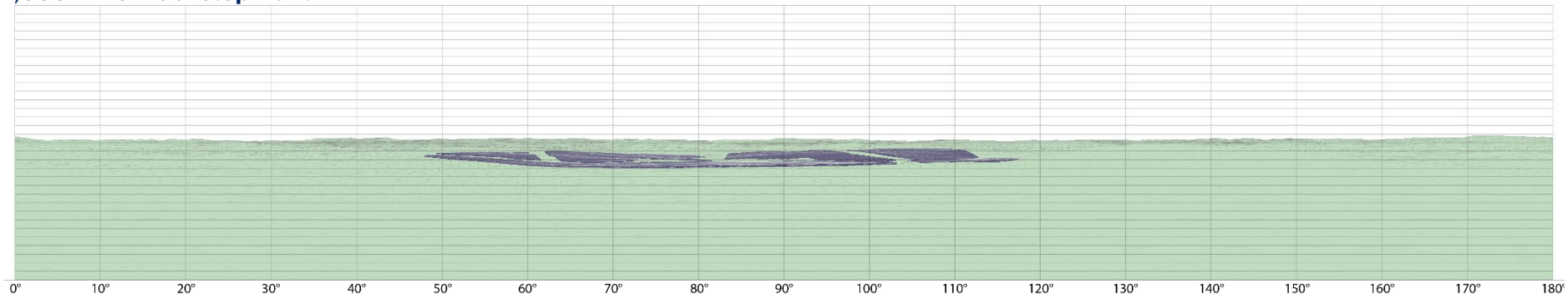


40 m height (very high magnitude)

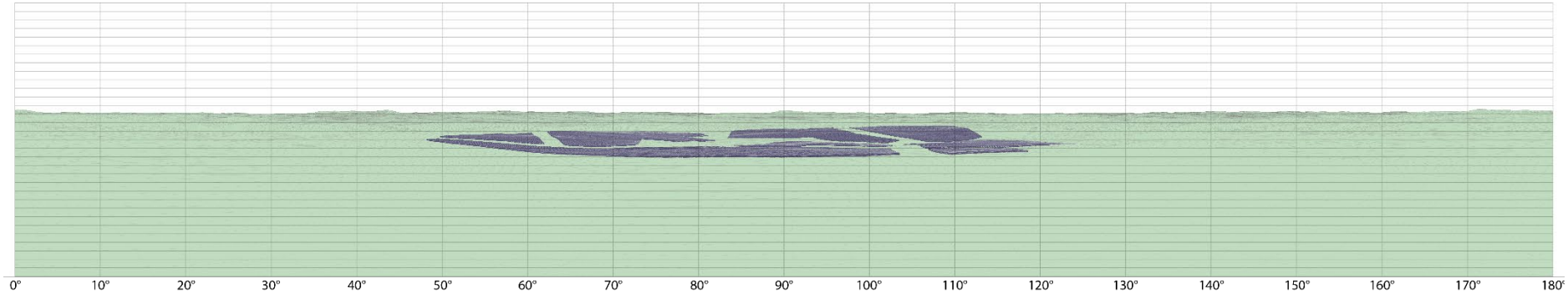


60 m height (very high magnitude)

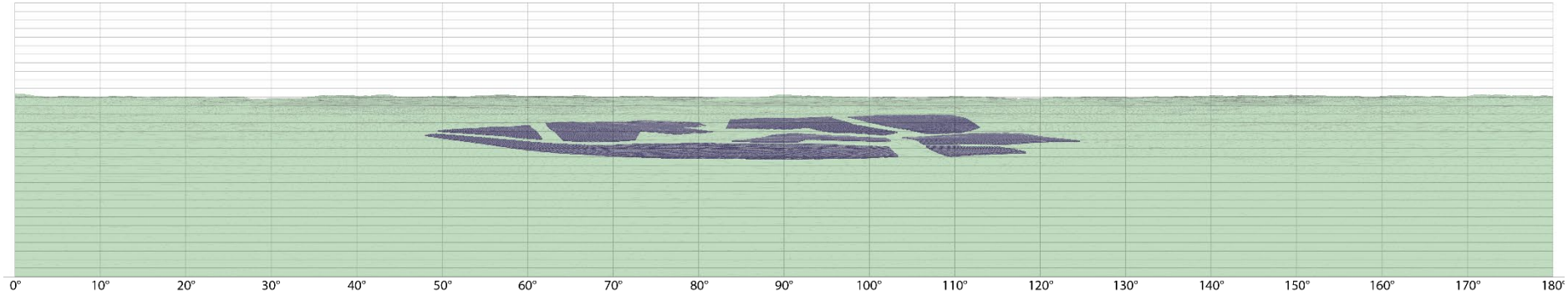
1,000m from development



40 m height (moderate magnitude)

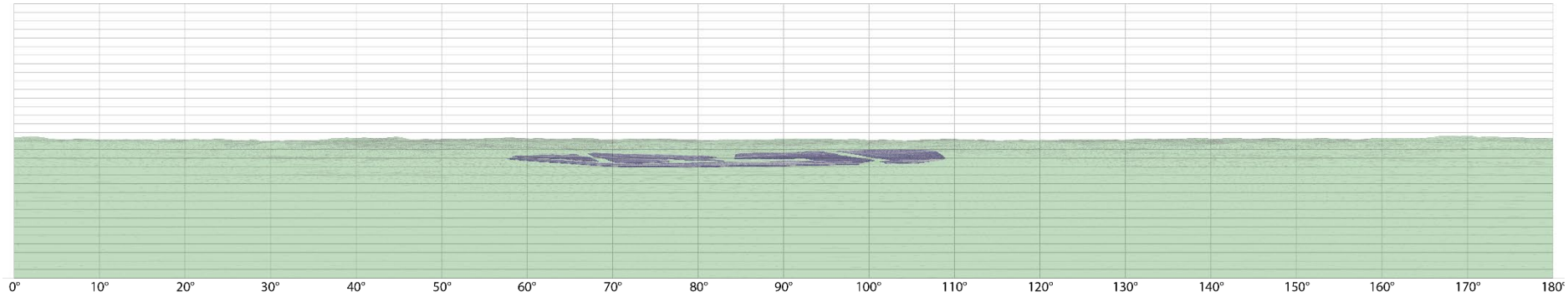


80 m height (high magnitude)

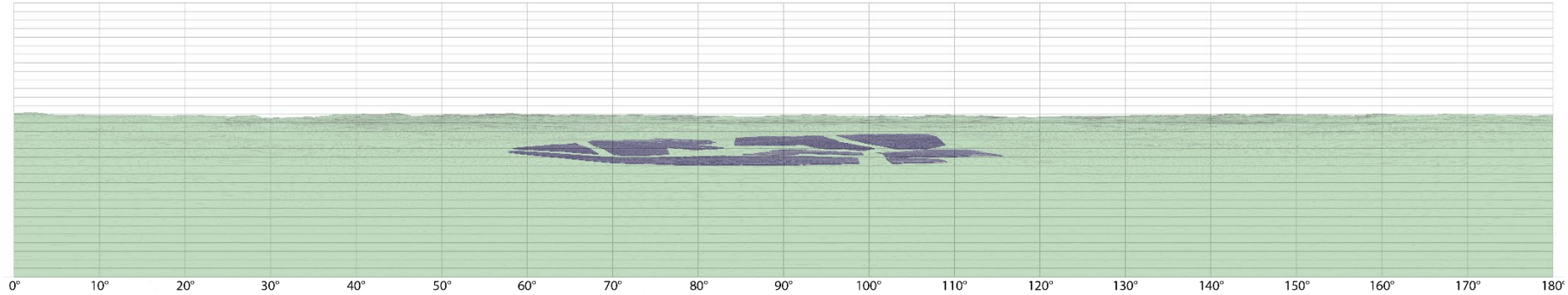


120 m height (high magnitude)

1,500m from dwelling

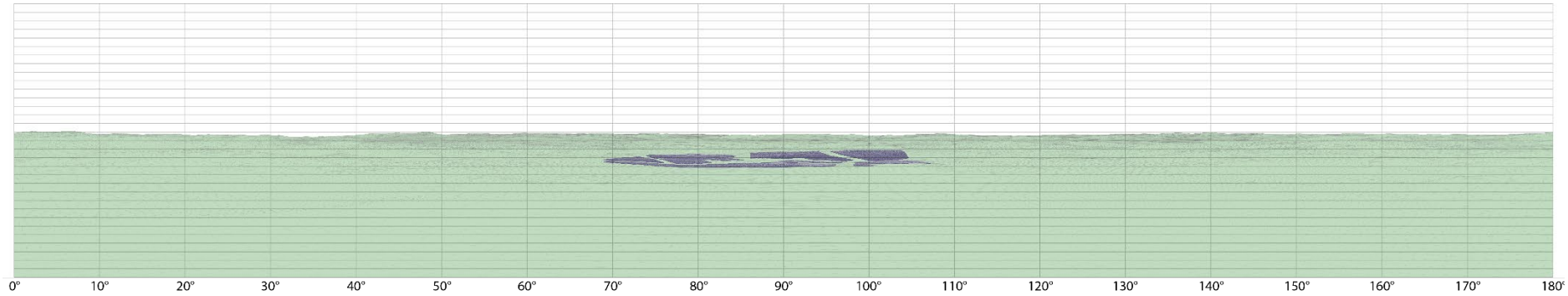


80 m height (low magnitude)



160 m height (moderate magnitude)

2,500m from dwelling



200 m height (low magnitude)

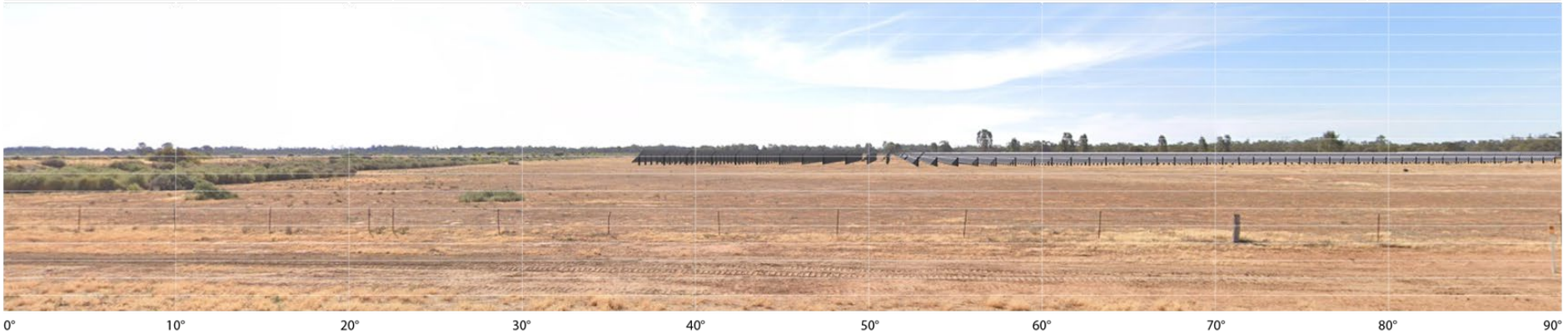
Appendix

C

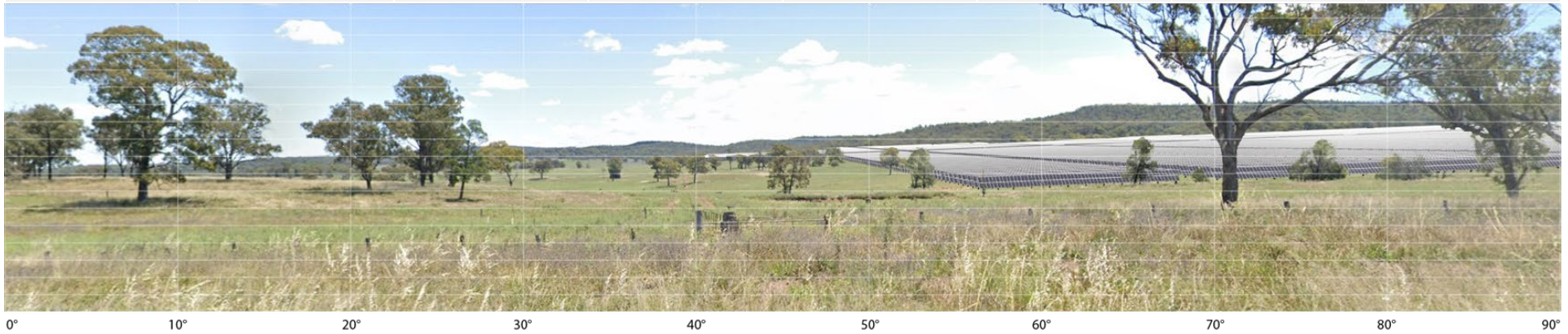
Visual impact examples

Private receivers

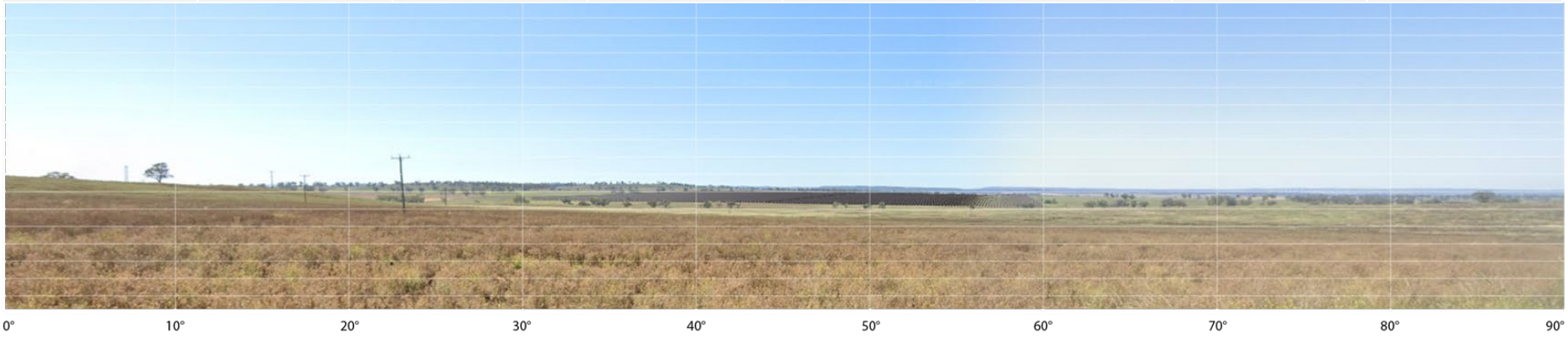
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
250 m	Rural dwelling secondary view	Low	Very low	Very low	10	Low	Very low



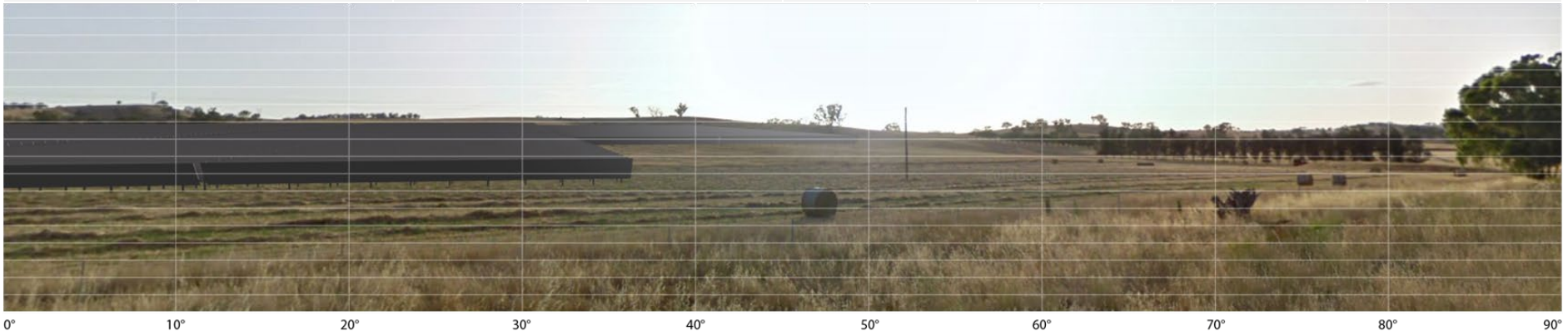
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
215 m	Rural dwelling secondary view	Low	Moderate	Low	14	Moderate	Low



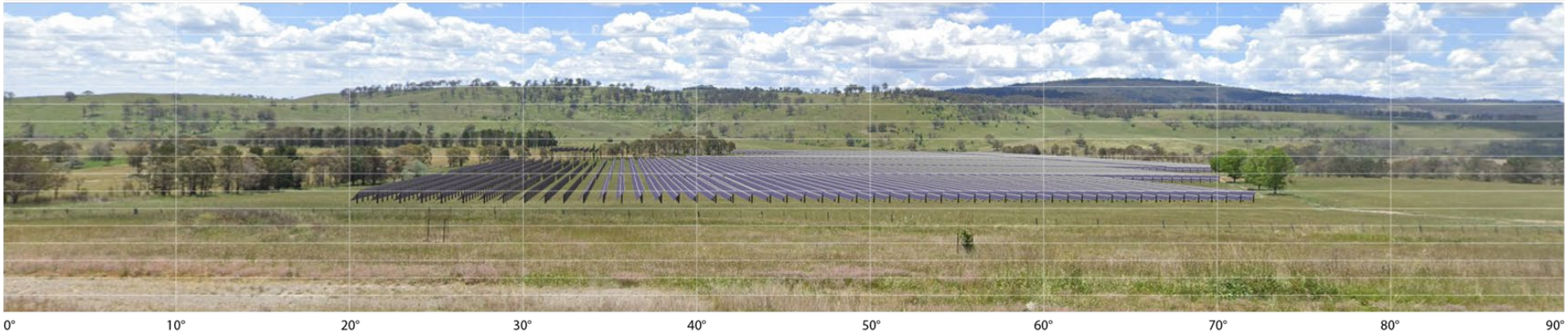
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
1,400 m	Rural dwelling primary view	Moderate	Low	Moderate	3	Very Low	Low



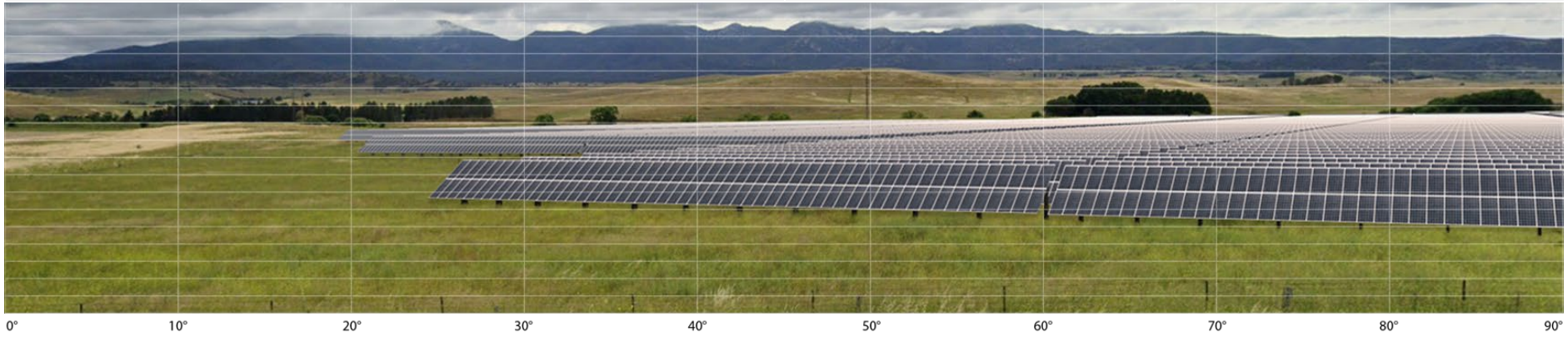
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
125 m	Rural dwelling primary view	Moderate	Low	Moderate	18	Moderate	Moderate



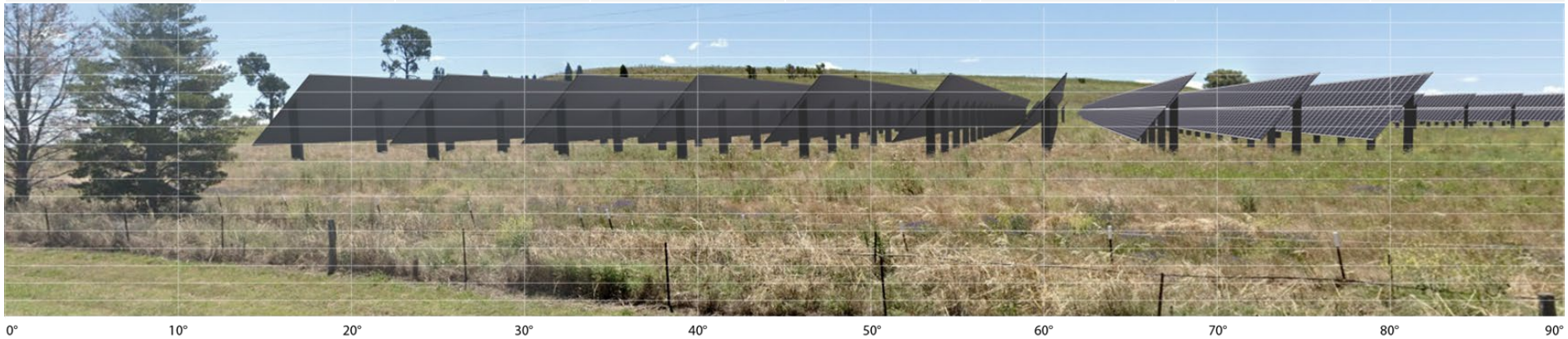
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
250 m	Rural village	High	Moderate	High	18	Moderate	Moderate



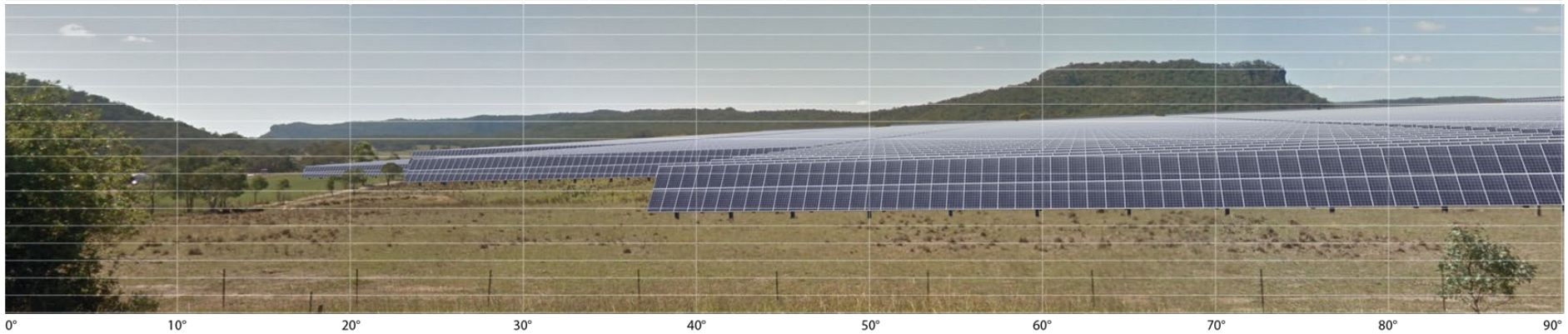
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
60 m	Rural dwelling primary view	Moderate	Moderate	Moderate	40	Very high	High



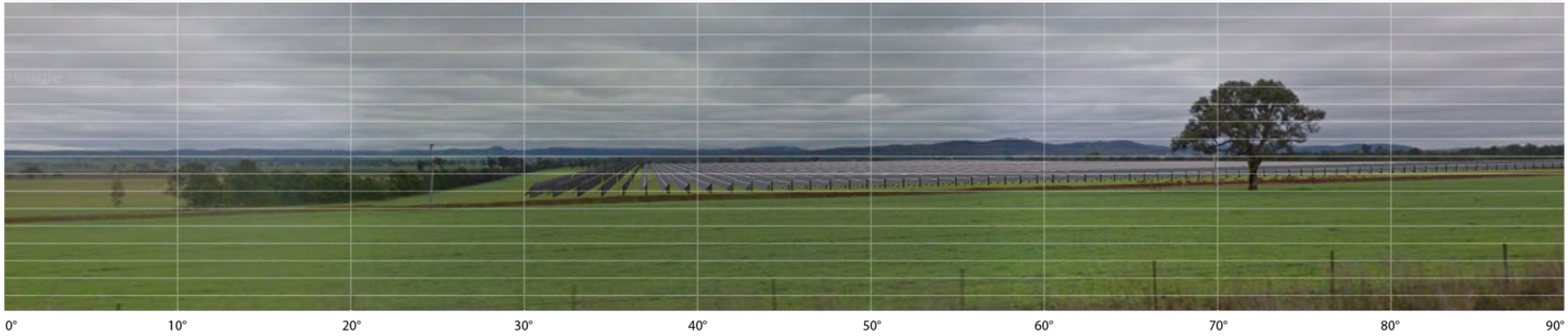
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
40 m	Historic homestead	High	Low	Moderate	39	Very high	High



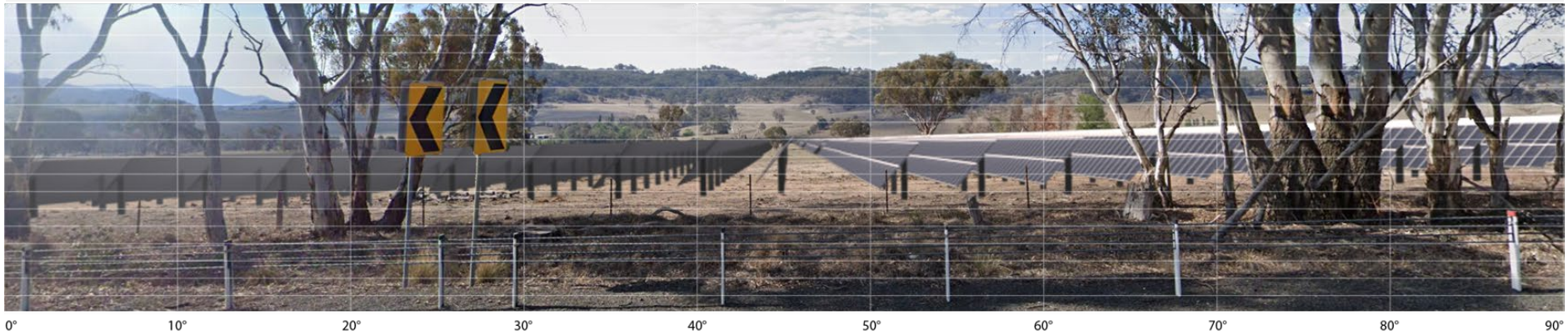
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
45 m	Rural dwelling primary view	Moderate	Moderate	Moderate	36	High	Moderate



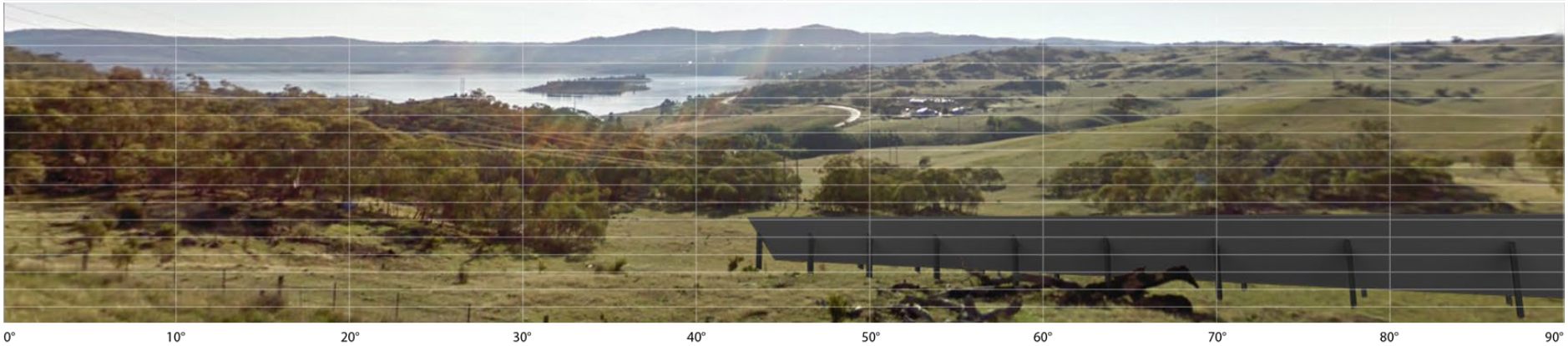
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
135 m	Local road	Very low	Moderate	Very Low	11	Low	Very low



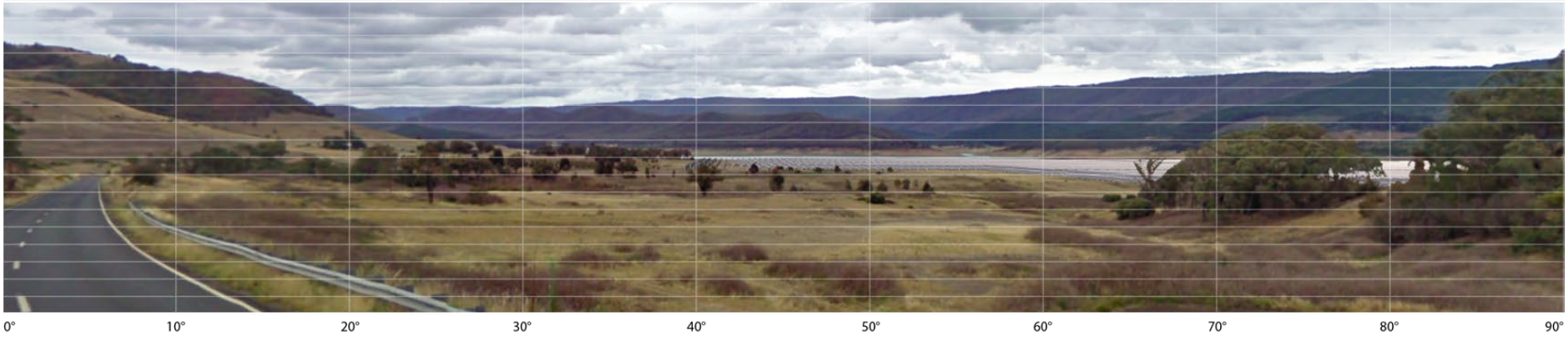
Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
50 m	Local road	Very low	Moderate	Very Low	26	High	Low



Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
270 m	Scenic drive	Low	High	Moderate	4	Very Low	Low



Distance to development	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
35 m	Scenic drive	Low	High	Moderate	24	Moderate	Moderate



Appendix

D

Photomontage requirements, land access and alternatives

Photomontages

Panoramic photographs must be constructed by merging a series of photographs to form one 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 applicants are unable to take a photograph from a viewpoint and cannot choose an appropriate representative viewpoint, they 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.

Table 10. Parameters and requirements for photomontages

Parameter	Requirement
Camera	• Full frame sensor • Camera positioned 1.5 m above the ground • Use of tripod (with levelling tools) and panoramic head
Lens	• 50 mm focal length • Aperture set to ensure all elements of the photograph are in focus
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 high in the sky (generally from 9 am to 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 horizontal field of view of 180 degrees • Merged panoramic photographs avoid distortion or warping of the individual images

Land access

Applicants generally require access to private property to prepare photomontages and make a detailed assessment of the primary and secondary views from rural dwellings. This generally involves taking photographs from locations outside any dwelling.

All landholders have a right to grant or refuse access to their property for this purpose. The Department of Planning, Housing and Infrastructure encourages all landholders to participate in this process, as it allows for a detailed understanding of the likely impacts of the proposed development. It also allows applicants to identify strategies to minimise impacts if required.

Providing consent for land access does not indicate endorsement of the project but will help ensure a comprehensive assessment of the potential impacts. If landowners do not grant access or restrict it in a manner that prevents applicants from conducting a detailed visual impact assessment, applicants will have to conduct alternative assessments. If landowners deny access or do not engage with the applicants or their consultants, then they may lose their ability to request a photomontage later.

Applicants should make their best efforts to get permission to access and assess visual impacts from private receiver viewpoints by following the guidance below. They should coordinate this with other environmental assessment activities to minimise consultation fatigue and interruptions to property owners or tenants.

Applicants should start by making written requests to landholders to request property access. These requests should include the following:

- a formal request for permission to enter the property, including a consent form
- the reasons they require private property access (for example, to conduct the detailed visual impact assessment)
- the types of activities that will take place during access and the estimated duration of access
- a 28-day timeframe for providing a response to the written request (excluding public and school holidays)
- contact details for the landholder to discuss access requirements and procedures and to provide a response.

Applicants should follow up with the landholder within this 28-day period to ensure the landholder received the request, understands the nature of and reasons for the request, and to answer any questions the landowner may have. Applicants should follow up in person, by phone and, as a last resort, with another letter.

If the landholder has not granted land access or made contact following this process and period, applicants may proceed to alternative methods of impact assessment. Examples of alternative methods are available below.

Where a landholder has provided consent, applicants should contact the landholder with dates and times they would require access, providing multiple options where possible. Sometimes weather conditions may impact planned property access, and applicants should make alternative arrangements in these circumstances.

If the landowner cannot accommodate access during the proposed times, applicants should provide alternative options and work with the landholder to find a suitable time within 28 days. If the landholder has not provided a reasonable option for access after this time, applicants may proceed to alternative methods of impact assessment.

Any use of drones to capture imagery for the visual impact assessment must be in accordance with the relevant laws and the Australian Government's Drone Privacy Guideline.

Photomontage alternatives

Although photomontages are the preferred tool for communicating the potential magnitude and overall impact to visual amenity, access to get the photographic elements can sometimes be intermittent or unachievable.

Applicants should make their best efforts to get permission to access private property for preparing photomontages. However, if the property owner denies or restricts access or is unreachable, applicants and their consultants may use one of the following alternatives:

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

Appendix

E

Imagery requirements

Applicants should present the visual impact assessment according to the requirements in the table below and generally according to the following examples.

Table 11. Visual impact assessment components and requirements

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 development • Direction of view towards the project • Identification of any other visible proposed or approved solar energy developments • Identification of any solar infrastructure subject to an agreement with a host or neighbouring landholder
Sensitivity analysis	• Identification of viewpoint type • Identification of viewpoint sensitivity (see Table 2) • Identification of scenic quality (see Table 4 and Table 5) • Overall sensitivity (using Table 6) • Relevant commentary on how the scenic quality has been derived
Magnitude analysis	• Identification of the total number of cells the project would occupy • Identification of the magnitude rating (using Table 1)
Visual impact rating	• Identification of the visual impact rating (using Table 7) • Excerpts of the relevant photomontage (if required) displayed at a 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 8) and any proposed mitigation measures • Detailed justification for high visual impacts that the project cannot avoid • Panoramic photomontage including proposed mitigation with and without the magnitude grid tool • Age of and timing for development of vegetation used in montages

Simple assessment example

Viewpoint	Viewpoint type	Viewpoint sensitivity	Scenic quality	Landscape character zone	Potential sensitivity	Maximum vertical field of view	Maximum horizontal field of view	Maximum occupied cells	Potential magnitude	Potential impact rating
1	Rural dwelling	Moderate	Moderate	Agricultural plains	Moderate	3° (3 cells)	20° (2 cells)	6 cells	Very low	Low
2	Rural dwelling	Moderate	Moderate	Agricultural plains	Moderate	3° (3 cells)	30° (3 cells)	9 cells	Low	Low
3	Rural dwelling	Moderate	Moderate	Agricultural plains	Moderate	3° (6 cells)	60° (3 cells)	18 cells	Moderate	Moderate
4	Rural dwelling	Moderate	Low	Agricultural plains	Low	4° (4 cells)	100° (10 cells)	40 cells	Very high	Moderate
5	Historic homestead	High	High	Forested escarpment	High	3° (3 cells)	120° (12 cells)	36 cells	High	High

Intermediate assessment example

VIEWPOINT 017

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	52 cells
Magnitude	Very High

Scenic Quality Discussion

The surrounding area contains sparse and inconsistent patches of native and exotic vegetation. Pastoral elements dominate the view, and there is a high degree of human presence.

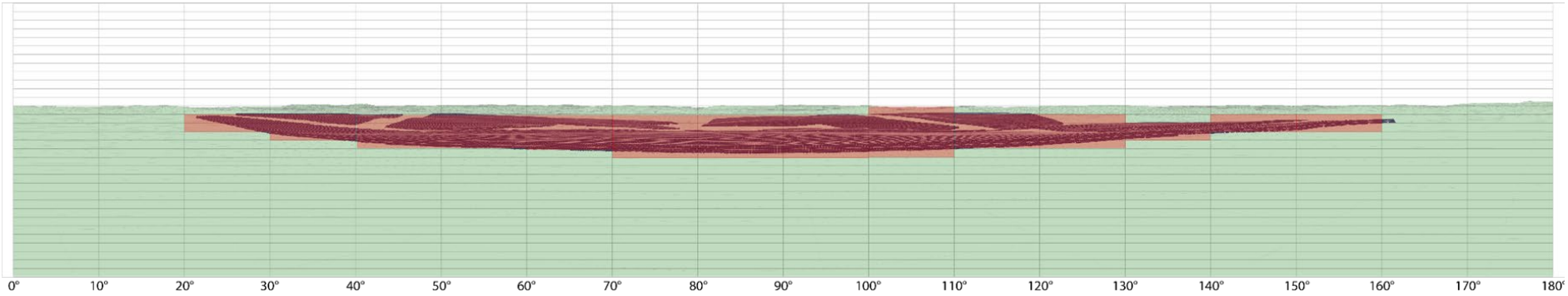
While some farm dams are present in the view, there are no significant waterbodies. There are also no unique or prominent landscape features such as ridgelines or gorges within the view and the landscape is typical of the broader region.

The landscape assessment also confirms that there are no remarkable landscape values within the LCA. As a result of this analysis, the scenic quality is considered low.

Impact Rating

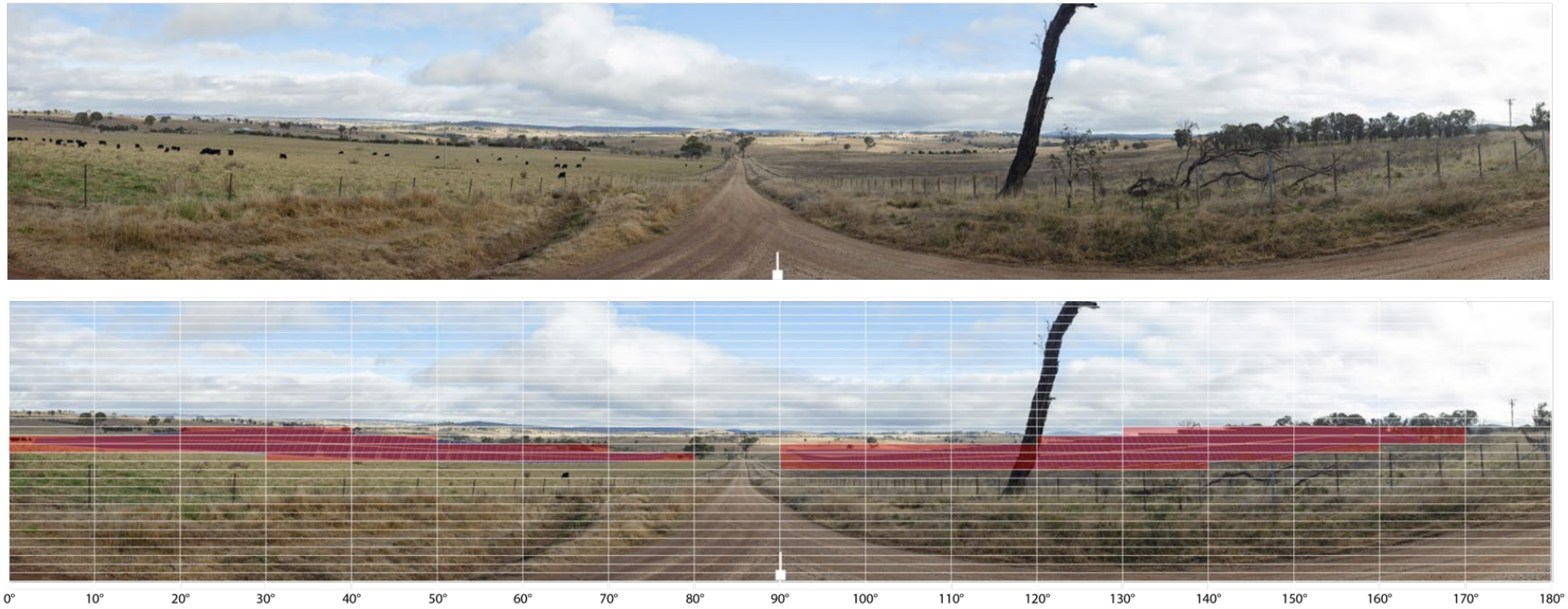
Impact Rating	High

Wireframe



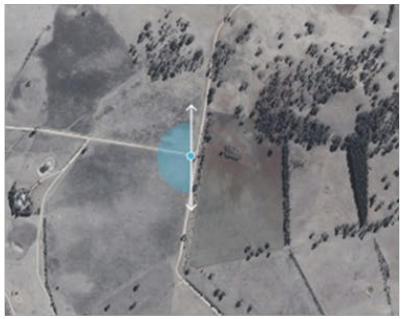
Detailed assessment example

VIEWPOINT 3



Scenic Quality Discussion

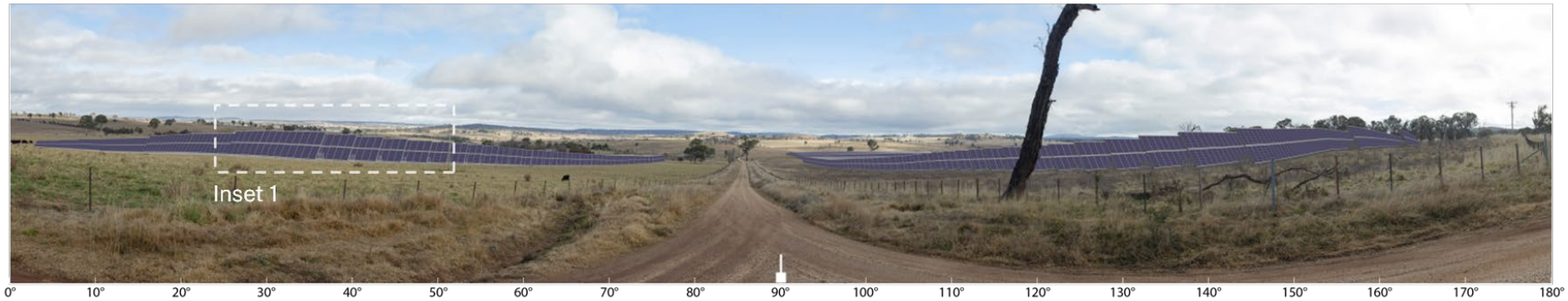
The surrounding area contains some remnant native vegetation but is predominantly cleared for agricultural use. Aside from the clearing for agriculture, human presence is not a dominant feature of the view. There are very distant forested ridgelines within the view, however, these are not a primary feature. No significant waterbodies are present. The scenic quality is considered low.



Distance to project	Viewpoint type	Viewpoint sensitivity	Scenic quality	Overall sensitivity	Occupied cells	Magnitude rating	Impact rating
450 m	Transport/ Infrastructure	Very Low	Low	Very Low	46	Very high	Moderate

VIEWPOINT 3

Visual Impact Rating: Moderate

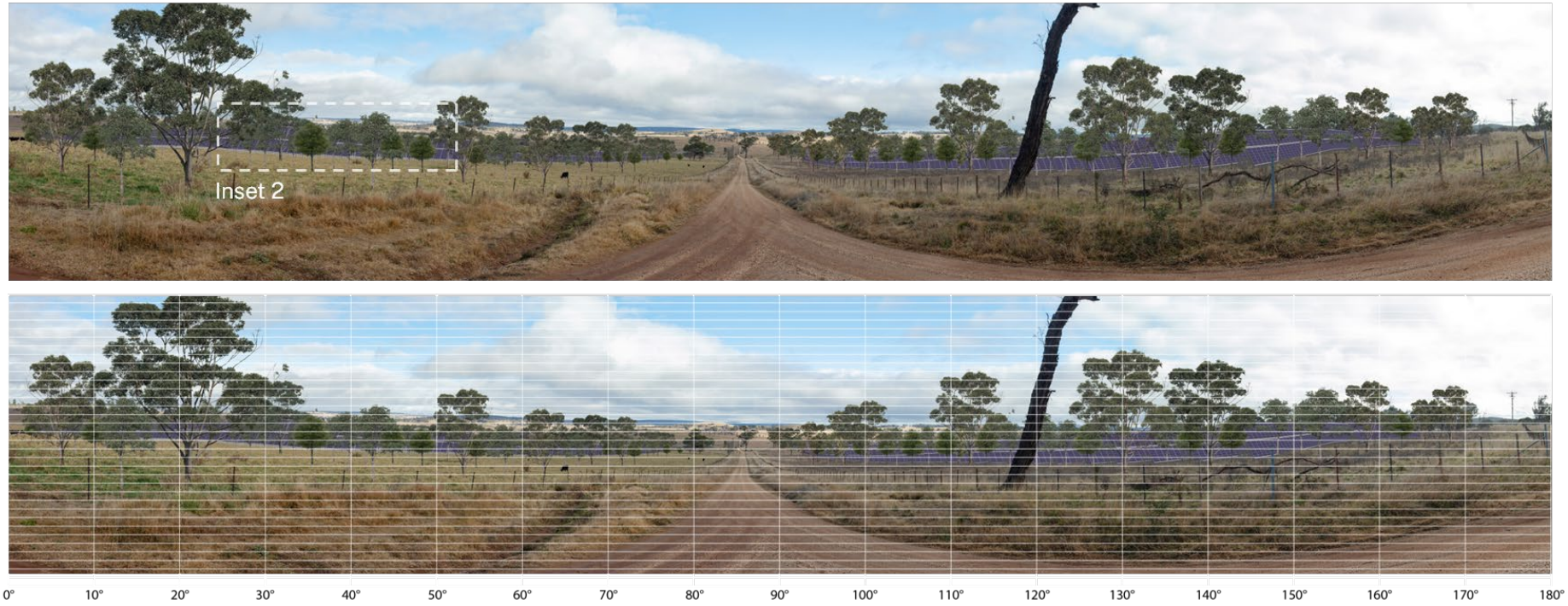


Inset 1 (cropped 50mm image)

The inset image provides an accurate representation of the view when you view the document online, at 100% zoom, and at arm's length from the screen.

VIEWPOINT 074

Mitigation – Vegetation Screening at 5 years



Mitigation and Residual Impact Discussion

Vegetation screening is proposed to mitigate the visual impact of the project when viewed from the local road. It would be comprised of native and drought tolerant eucalypts endemic to the region. After five years, these trees will screen a large portion of the project. This screening will not pose a safety risk to road users and will be contained within the project boundary. With this measure in place, the residual impact is expected to be low.

VIEWPOINT 074

Mitigation – Vegetation Screening at 5 years

Inset 2 (cropped 50mm image)

The inset image provides an accurate representation of the view when you view the document online, at 100% zoom, and at arm's length from the screen.