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5.1 INTRODUCTION

This Chapter discusses on and off-site visual amenity issues relating to the visibility of the mine and operational activities such as transport movement and infrastructure that may have significant visual impacts if not managed properly. The assessment describes the approach to be taken by Waratah Coal to visual issues, minimisation and provides management and mitigation measures that aim to protect community values from the associated affects of the identified visual impacts. The outcomes summarised in this chapter are part of an overall technical report which is provided in **Volume 5, Appendix 8**.

This study covered the *visual impact* assessment, dealing with the potential effects on the visual resources (view) of the setting from changes in the composition and quality of views, people's response to likely changes and the overall effect on visual amenity.

5.2 VISUAL LANDSCAPE CHARACTER

5.2.1 REGIONAL CONTEXT

The region containing the mine site is classified as 'Capricornia Uplands' (Department of Transport and Main Roads, *Road Landscape Manual* 2004). The Capricornia Uplands is an area of flat to gently undulating farmland, woodland and forest. The majority of the region is sparsely populated and vegetated.

The landscape visual character is shaped by the continuous open vegetation cover, which displays the mosaic of plant varieties characteristic of the topography and soil types, combined with impacts of low intensity grazing. In developed areas, this character is changed subtly with more cleared patches and cropping patterns typical of rural areas.

5.2.2 LOCAL CONTEXT

The mine tenement is located 17 km north of the Capricorn Highway, and 25 km north-west of Alpha on low-intensity grazing lands with scattered trees and intermittent waterways. Within the mine site, the landscape is predominantly used for low intensity

grazing and has largely been cleared of native vegetation, resulting in grasslands with some low shrubs and scattered trees. The exceptions to this is the Bimblebox Nature Refuge and a small creek system to the north-east, which both sit within and to the edge of the open cut mine footprint and are heavily vegetated.

There are 38 known homesteads, of which, 30 occur outside the mine tenement. Two of these homesteads occur within close proximity to the mine, being 'Monklands' (Homestead 6) which is located within the mine facilities, and 'Hobartsville' (Homestead 8) which is located to the north of the open-cut section.

5.3 VISUAL IMPACTS

This section describes the potential changes to the landscape and perceived visual amenity within the vicinity of the mine as a result of the project, and the potential impacts as a result of these changes.

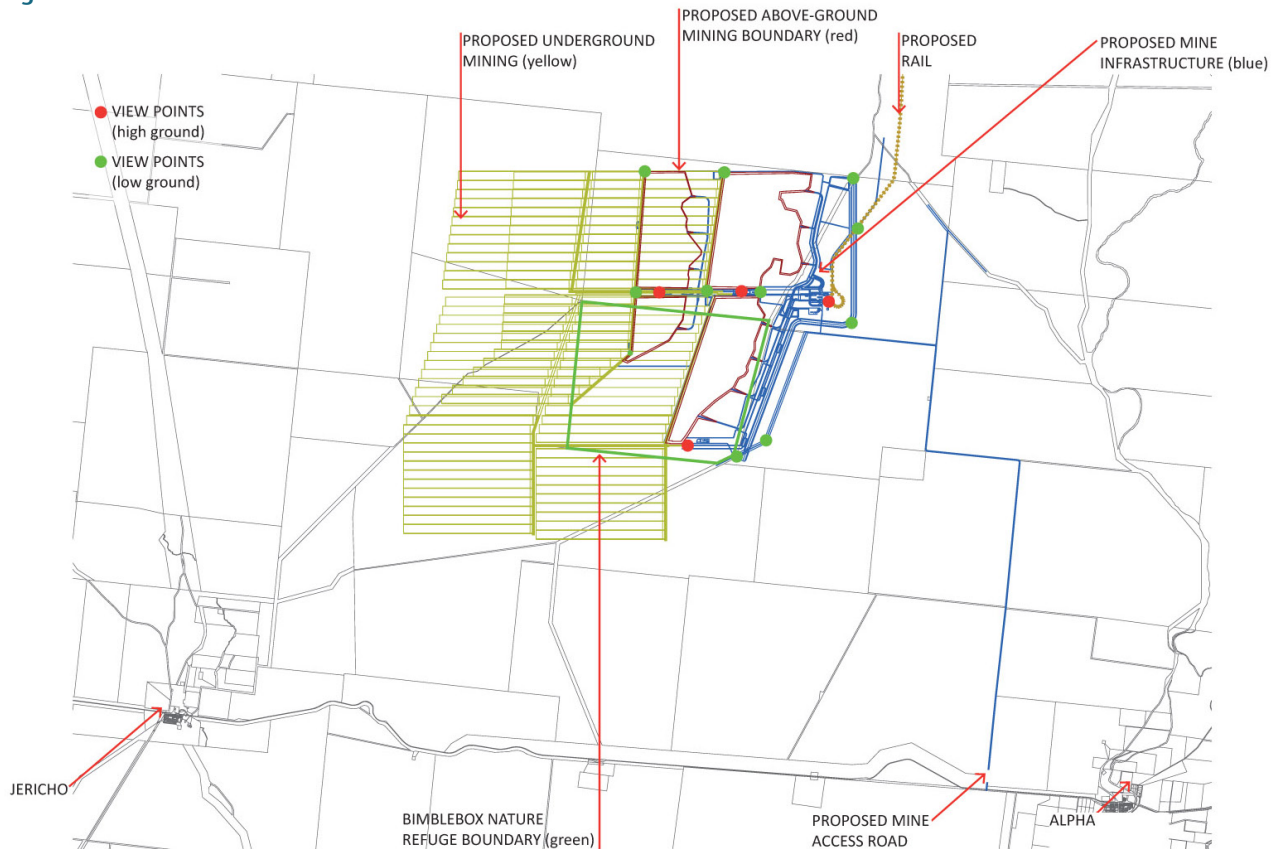
5.3.1 VIEW SHED

The visual assessment of the mine was undertaken using 15 elevated points which were located at strategic locations within the mine facility plan (**Figure 1**). These points were divided into low (11) and high (4) points with the low points (**green dots on Figure 1**) located around the perimeter of the open cut batters, staff facilities and rail infrastructure at a level 6 m above the topography. The high points (**red dots on Figure 1**) have been located at expected stockpiles and loading facilities at a height of 40 m above the topography.

View shed models were created for each of the 15 points, and aggregated to give a total impression of the visual impact area. This assessment allowed areas surrounding the mine (at 1.6 m above the topography) to be categorised by the number of the 15 mine viewpoints that could be seen. The viewshed was calculated to a distance of 50 km as the open limit of the study corridor.

As a maximum the highest number of points that can be seen from any location is 15 view points, representing the entire mine facility and high visual impact.

Figure 1. Mine View Shed Locations



(Refer to plan SA-001 in Volume 5, Appendix 8 for large scale plan.)

5.3.2 VISUAL SENSITIVITY

The mine site is the least visible of the project components due to the proposed location, isolation and depression within the surrounding topography and, the nature of the operations although it will have the biggest impact on the immediate landscape. The features associated with the mine are expected to be various single level facility buildings, coal stockpiles, conveyers, vehicles, overburden stockpiles and pits. The most obvious visual feature of the site is expected to be the overburden and coal stockpiles that may reach to 40 m in height, which is well above the existing tree line. Dependent on visual buffering, these features will be of high visual significance within 5 km, but would rapidly diminish further from the site. The view shed models use the following distances in assessment:

- **High sensitivity:**
locations within 5 km of the site;
- **Moderate sensitivity:**
locations between 5 km and 10 km from the site;

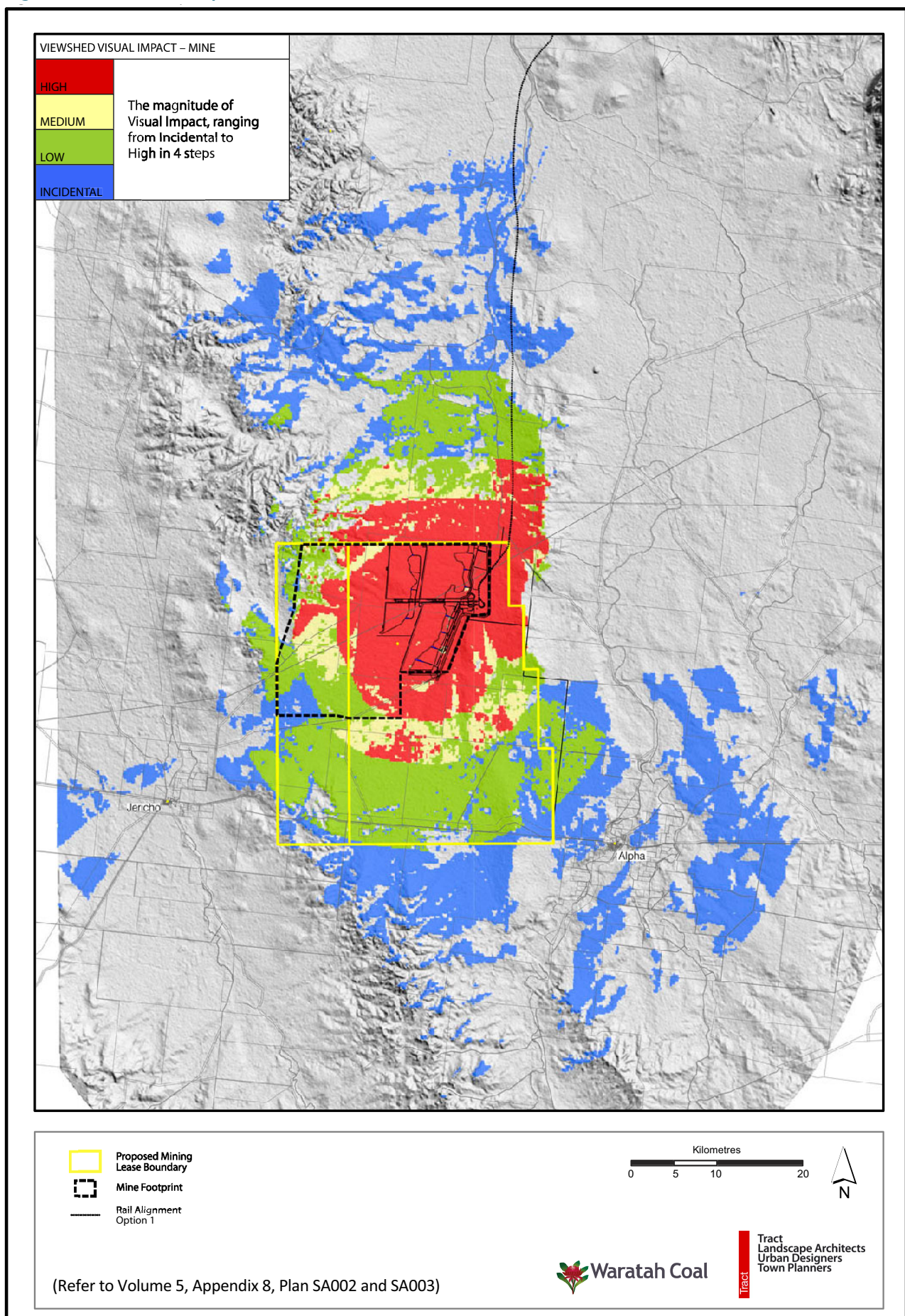
- **Low sensitivity:**
locations between 10 km and 20 km from site; and
- **Incidental sensitivity:**
locations between 20 km and 50 km from site.

Due to the scale and landscape impact of the mine site and infrastructure which is significant, the foreground distance was taken as 0 km to 5 km with the other distances extending from 5 km out to 50 km. The number of points visible has also been considered in compiling the visual sensitivity plan (Figure 2,) with the resulting impact being a combination of distance and quantity of points seen.

5.3.3 VISUAL IMPACT

To account for the distance from the mine facility and the resulting reduction of the perceived impact, the visual assessment was adjusted based on the four distance parameters. (Refer Volume 5, Appendix 8 Plan SA003). The number of points visible has also been considered in compiling the visual impact plan with the resulting impact being a combination of distance and quantity of points seen.

Figure 2. Mine Visual Impact Assessment



(Refer to Volume 5, Appendix 8, Plan SA002 and SA003)

5.3.4 VISUAL IMPACT ASSESSMENT

The mine is the most isolated component of the project being located between Alpha and Jericho. The site is also located within a low range of hills to the east and west, resulting in the mine facility (as the major component) being visible at some points along the Capricorn Highway. This impact is due to the area being low to flat grasslands which could be mediated. The major visual impact of the mine may therefore be confined to the mine entry, the few homesteads which have direct visibility to the mine site and the increased traffic of vehicles entering and leaving the site via the access road to the Capricorn Highway near Alpha. The small towns of Alpha and Jericho may also have indirect impact from the mine which would create change to the visual character of the towns.

Few houses directly affected by this project component will be visually impacted by both direct visual access to the mine, and visibility of the vehicles moving to and from the site. Of the 38 homesteads within the mapped region, eight were found to experience a visual impact. Four homesteads would have a low visual impact (two near the Capricorn Hwy south south-west, one

south-west and one on the mine tenement boundary south-east), two homesteads would be subjected to a moderate impact (south south-east beside a creek and directly west) there are two homesteads which would experience high visual impacts.

These homesteads are 'Monklands' (Homestead 6) and 'Hobartsville' (Homestead 8) located within and to the north of the mine. As these homesteads have visual impacts from both mine and rail project components, it is assumed visual mitigation will be unable to be achieved in these locations.

Dust-clouds produced from normal mine operations pose another impact from the mine site component. This form of impact is almost impossible to quantify, yet can be vastly reduced through effective environmental management measures on site.

The realignment and filling of permanent and semi-permanent waterways would cause local high visual impacts together with the decline of fauna in the immediate area to the mine which adds to the visual landscape character.



Semi-permanent water way within the suggested open cut mine site was found to have a high value landscape character and offer habitat for many bird species, image by Tract Consultants, 2011.

An indirect visual impact would be experienced in the small towns of Alpha and Jericho along to Capricorn Highway. Although these places would not have direct visual access to this project component, the increase of people in the region would create a change to the visual impact to these town's visual characteristics.

The visibility of the mine will be amplified during night operations due to lighting which could pose a high impact. Without careful design, this facility could create a light-pollution 'glow' which could be seen from vast distance above the landscape elements which may block any visibility of the mine during the day.



Alpha looking out of the town to the west in the early evening, image by Tract Consultants, 2011.

5.4 MITIGATION AND MANAGEMENT

The management measures to be implemented for the mine site include:

- Endemic plant species will be used to provide vegetation buffers on key visual receptors where possible. These buffers will be identified and established pre-construction, then maintained during development to ensure effective screening by the commencement of operations. Where practicable, existing vegetation will be retained and augmented with appropriate planting. Attention will be given to choosing species which will best buffer the visual impact and complement the existing visual landscape character with species range that is currently present. Specifically the areas impacted along the highest utilised visual receptor in the area, the Capricorn Highway, should be buffered;
- Soil stockpiles may be vegetated to be incorporated into visual buffering of the immediate mine area;
- Restricted widening and effective revegetation planting of local roads can maintain the rural visual landscape character;
- Colour of mine infrastructure should be used in an attempt to 'blend' to the horizon. Non-reflective materials should be used in infrastructure to reduce glare impact;
- Best practice environmental dust control management should be utilised;
- Small towns, such as Jericho and Alpha, which would be indirectly effected by this project should prepare a local visual character plan to ensure that these changes have a positive effect;
- Waterways within the effected site should be maintained where possible or sensitively redirected to ensure fauna movement in the visual landscape;

- All site lighting should be designed by a lighting specialist to ensure that surrounding areas do not experience light pollution from the mine site and management measures can be utilised in combination with lighting management outlined in *Terrestrial Ecology* Chapter 6, Section 6.3.6, to reduce visual impacts; and
- Where all other mitigation measures fail to alleviate the visual impact, homesteads identified as having high impact should be considered for relocation to a less sensitive location.

5.5 CONCLUSION

Although the mine is the most isolated component of the project, the large scale of the facility and its location within the tenement will facilitate negative visual perceptions.

The location of the mine between low hills to the west and east, combined with the visual distance from the towns of Alpha and Jericho, allow the mine to have low to incidental visual impact at a distance. Viewpoints occur from the Capricorn Highway and smaller local and mine access roads which could be visually buffered, indicating that the mine would pose a low visual impact to the majority of its surrounds.

The night landscape could create a high visual impact to many of the visual receptors in its surrounds, however, through good design by an expert lighting designer and a lighting system focused on task lighting rather than flood lighting, in combination with stringent light management and use hours, this should have a low impact.

As dust-clouds could be generated from the normal operations of the mine, this visual impact could be managed with best-practice environmental dust control and so is deemed as being of low impact.

The presence of the Bimblebox Nature Refuge within the mine creates the greatest visual impact perception, as the two are unlikely to be able to co-exist. Although the above ground works are expected to clear slightly greater than 50% of the reserve, this may lead to public and environmental perception that there is a substantial visual impact even though the site is only partially affected.

The small towns surrounding the mine shall experience an indirect impact from this project component. To guide future changes an understanding of the present town visual characteristics should be established to incorporate into active planning outcomes for these place.

The visual landscape character of the open-cut mine and facilities areas would dramatically change the area. At the end of this mining process, the topographical and vegetated landscape should be returned to a situation which the landscape can best regenerate with the various mix of plantings which replicate the existing landscape character.

5.6 COMMITMENTS

Waratah Coal commits to undertaking actions that will reduce potential impacts through a proactive rather than reactive approach to changes in the visual landscape character and minimise visual impacts. Waratah Coal commits to the implementation of the following management measures:

- Existing topsoil from the site will be stripped and placed into temporary stockpiles prior to construction to provide additional visual buffering;
- Endemic plants will be used to provide buffer and screening and will be established pre-construction, and maintained during development to ensure effective screening by commencement of operations;
- Effective revegetation planting of local roads will occur to maintain rural landscape character;
- Colour of mine infrastructure will be chosen in an attempt to 'blend' to the horizon;
- Best practice environmental dust control management will be utilised;
- Small town communities, such as in Jericho and Alpha, will be aided in the production a local visual character and infrastructure plans for their expected growth;
- Waterways within the effected site will be maintained where possible or redirected;
- Site lighting will be designed by a lighting specialist to ensure that surrounding areas do not experience light pollution; and
- Where all other mitigation measures fail to alleviate the visual impact, homesteads identified as having high visual exposure will be relocated or vacated.

5.7 ASSESSMENT METHOD DISCLAIMER

5.7.1 DESKTOP ASSESSMENT

The initial step in the assessment of visual quality was undertaken as a desktop study of the area, in August 2009, including detailed assessment of aerial imagery and site photographs combined with topographic mapping data, this was then checked with a combined aerial and ground based observations under taken in early June 2011. This combined research approach has been critical to the visual assessment of this vast study area and served to identify the following potentially sensitive visual receptors (or focal points) including:

- Alpha Township;
- Jericho Township; and
- Bimblebox Nature Reserve.

This visual assessment of the site's character resulted from the analysis of electronic data, street directories, digital terrain models, and preliminary electronic survey and site observations. This combination of research was intellectually analysed against a virtual 3Dimensional landscape (created using the Mapinfo computer program) to provide an accurate base for this assessment.

5.7.2 VIEW SHED MODEL

To establish a relevant base for this assessment a 3Dimensional model of the landscape was combined with elevated points representing the location and height of significant mine component. This comprehensive site model was then analysed with MapInfo to create a series of view sheds for the mine at 15 strategic locations.

Each of the view shed models were calculated through an inferred 'see and be seen' methodology effectively reverting the observed to be the observer by calculating vistas from the project components. The elevation of the view point (project component) used was specific for each of the components based on an understanding of the specific machinery, stockpile or structure height, the observer was based on the elevation of the topography with an additional height of 1.6 m to represent the average eye level of the observer.

The view shed of the works was calculated by combining the individual view sheds for each of the project components to create visual assessment plans.

5.7.3 VISUAL CONSIDERATIONS

5.7.3.1 View Distance

The distance an observer/visual receptor is away from a project component, changes the visual impact due to that persons perception of distance. This is a result of the relative size and proportion of the observable field of view that the project component fills; this proportion increases the closer the observer is to the project.

The assessment corridor (50 km from the project centre line) was divided into four distance zones representing foreground, middle-ground, background and context views. These four zones were integrated with the view shed calculations, allowing observer distance to influence the visual impact assessment. This was then applied to the view shed modelling.

Effects of the curvature of the Earth on visual distance were not calculated into this visual assessment mapping. It should be noted that this factor influences views over 7km across flat land and sea.



View of Abbot Point Port facilities from Cape Upstart, this image provides an example of the effects of curvature of the earth and horizon line. The observer (camera) is at sea level with the port facility over 7km away, resulting in the base of the object not being visible.

5.7.3.2 Visual Sensitivity

Visual Sensitivity is a combination of factors that affect how a site may be impacted by a view to a project component. This sensitivity combines the nature of the view source (visual receptor) with the character of the landscape between the receptor and the project component (source) and the ability for the view to accommodate change (absorption capacity).

5.7.3.3 Landscape Receptors

Landscape receptor sensitivity is a measure of the direct or indirect effects that the project may have on a landscape locality or place. Receptors and places could include physical elements, landscape features and cultural sites, combined with the nature of the activity undertaken at each of these locations and the number and concentration of people influenced.

5.7.3.4 Visual Landscape Condition

Landscape condition is a measure of the physical status of a landscape area. This measure is directly in line with people's perception of the landscape, rather than the direct visual impact or ecological values.

The landscapes around the project being so diverse would be perceived differently by different people and communities depending on perception.

5.7.3.5 Visual Absorption Capability

Visual absorbency is a measure of the area's ability to accommodate changes while maintaining the existing landscape character. An area with high visual absorption would have mixed land patterning or previous 'like' development.

5.7.3.6 Visual Landscape Perceptions

Is the psychology of seeing and attaching value or meaning to a landscape. Community perceptions associated with Landscape Character differ depending on values and association with that landscape. As this project does not include pragmatic research relating to community perceptions, generalised public preferences were used from the *South East Queensland Regional Plan 2005–2026, Implementation Guideline No. 8 (2007)*.

5.7.4 VISUAL IMPACT

Visual impact refers to the extent which a landscape can change without unacceptable adverse effects on its visual character or scenic quality. For the purposes of this impact assessment, visual impact is defined as a combination of the distance of the visual receptor to the proposed new works, the nature of the visual receptor and the impact the works may have on the existing landscape.

5.7.4.1 Distance Relationship of Visual Receptor to Impact

Distance zones indicate the spatial relationship between site facilities and community receptors. Distance is a measure of the visual intensity of the impact, the degree of detailed information and the experience a viewer is likely to receive. The following visual impact assessment measures have been adopted in this study:

Foreground – High Level Impact

- dominant visual change to the landscape and landform characteristics;
- structure likely to be a dominant visual feature;
- clear appreciation of the form and size of works and vehicle movement;
- visual recognition of infrastructure; and
- landform, vegetation, colours, surface textures and other landscape features are discernible to a detailed level.

Midground – Moderate Level Impact

- obvious or dominant visual change to the landscape and landform characteristics;
- structure is a moderate to significant element within the view and may or may not be a dominant feature;
- infrastructure is generally not evident;
- views are more likely to be broken by foreground features; and
- landform characteristics and the relationship between landscape features are clearly discernible.

Background – Low Level Impact

- minor visual change to the landscape and landform characteristics;
- landform and vegetation silhouettes, overall form and scale is more visually prominent than individual landform features or surface characteristics;

- visual impact is partly dependant on weather, colour contrasts, light conditions; and
- low recognition of form and detail, including vehicle movement.

Context– Incidental Level Impact

- almost no visual change to the landscape and landform characteristics;
- landform and vegetation silhouettes, overall form and scale is more visually prominent than individual landform features or surface characteristics;
- visual impact is highly dependent on weather, colour contrasts, light conditions; and
- almost no recognition of form and detail.

5.7.4.2 Nature of Visual Receptor

The sensitivity of the visual receptor to an impact is directly related to the nature of the receptor. Visual receptors have been separated into high, medium or low sensitivity and are listed below.

High Level Sensitivity:

- designated state level parks, scenic reserves and major recreation trails;
- highways and major tourist routes;
- tourist facilities;
- town centres;
- residential properties (not rural); and
- rural residential properties that are sited to take advantage of existing landscape views.

Moderate Level Sensitivity:

- large volume regional link roads;
- secondary roads and recreational driving routes;
- major landscape dependant outdoor recreation facilities, i.e. golf courses;
- rural residential properties; and
- schools and hospitals.

Low Level Sensitivity:

- local rural roads;
- farming properties;
- industrial land uses; and
- local sports facilities.