



CHAPTER 20

VISUAL AMENITY



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20 Visual Amenity 20-1

20.1	Applicable Legislation and Standards	20-1
20.2	Assessment Method	20-2
20.2.1	Desktop Study.....	20-2
20.2.2	Site Visit and Photography	20-3
20.2.3	Landscape Context Analysis	20-3
20.2.4	Impact Assessment.....	20-5
20.3	Existing Environment	20-6
20.3.1	Topography.....	20-6
20.3.2	Vegetation	20-8
20.3.3	Landscape Types.....	20-11
20.3.4	Key Receptors.....	20-16
20.3.5	Summary of Key Environment Values	20-20
20.4	Context and Views of Affected Parties	20-20
20.5	Potentially Impacting Events	20-21
20.6	Control Measures to Protect Environmental Values	20-21
20.6.1	Design Measures	20-21
20.6.2	Management Strategies and Commitments	20-22
20.7	Impact and Risk Assessment.....	20-22
20.7.1	Visual Impact During Construction.....	20-23
20.7.2	Visual Impact During Operation	20-23
20.7.3	Visual Impact Post Closure	20-23
20.7.4	Light Spill	20-24
20.7.5	Weighted Viewpoint Assessment.....	20-25
20.7.6	Summary of Impacts and Risks.....	20-35
20.8	Proposed Outcomes and Criteria.....	20-36
20.9	Findings and Conclusion	20-37

List of Figures

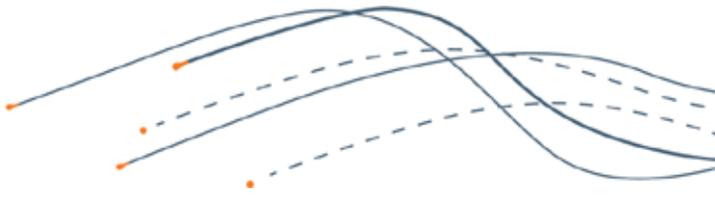
Figure 20-1	Proposed Mining Lease LVIA Study Area.....	20-4
Figure 20-2	Vegetation Coverage	20-10
Figure 20-3	Landscape Types within the Study Area.....	20-12
Figure 20-4	Key Receptors within the Study Area	20-19
Figure 20-5	Proposed Mining Lease LVIA Viewpoint Locations.....	20-26

List of Plates

Plate 20-1 Undulating Plains Near the Proposed Mine	20-7
Plate 20-2 Darke Range Viewed from Burtons Road, South of Wudinna Road	20-7
Plate 20-3 Typical Roadside Vegetation	20-8
Plate 20-4 Planted Township Vegetation Behind Buildings at Kyancutta	20-9
Plate 20-5 Flat to Gently Undulating Farmland (within the Proposed CEIP Site)	20-13
Plate 20-6 Grain Silos (Warrambo)	20-13
Plate 20-7 Darke Range Viewed from Kirchner Road	20-14
Plate 20-8 Hambidge Wilderness Protection Area	20-15
Plate 20-9 Wudinna Viewed from Ballantyne Street	20-16
Plate 20-10 Warrambo Township Viewed from Barns Street	20-18
Plate 20-11 Lock Township Viewed from Tod Highway	20-18
Plate 20-12 Visual Representation of Proposed Mine Site from Viewpoint M02, Warrambo (present to Year 10)	20-29
Plate 20-13 Visual Representation of Proposed Mine Site from Viewpoint M02, Warrambo (Year 15 to Year 25)	20-30
Plate 20-14 Visual Representation of Proposed Mine Site from Viewpoint M13, Lock Road (present to Year 10)	20-31
Plate 20-15 Visual Representation of Proposed Mine Site from Viewpoint M13, Lock Road (Year 15 to Year 25)	20-32
Plate 20-16 Visual Representation of Proposed Mine Site from Viewpoint M14, Matthews Road near Groecke’s Hill (present to Year 10)	20-33
Plate 20-17 Visual Representation of Proposed Mine Site from Viewpoint M14, Matthews Road near Groecke’s Hill (Year 15 to Year 25)	20-34

List of Tables

Table 20-1 Summary of Landscape Types	20-11
Table 20-2 Control and Management Strategies: Visual Amenity	20-22
Table 20-3 Proposed Mining Lease LVIA Viewpoint Locations and Weighted Visual Amenity Impacts	20-27
Table 20-4 Impact and Risk Summary	20-35
Table 20-5 Outcomes and Assessment Criteria: Visual Amenity	20-36



20 Visual Amenity

The area covered by the proposed mining lease supports ongoing agricultural activity including the cultivation and harvest of mixed crops and grazing, representative of a typical South Australian rural landscape. Farm houses and supporting agricultural infrastructure occur throughout the landscape, with bulk grain handling facilities at a number of nearby locations, including Kyancutta, Warramboo, Darke Peak, Kielpa and Rudall.

The project area and surrounding region is largely clear of native vegetation, with the exception of designated conservation areas and isolated remnants largely restricted to dune crests and linear strips within road reserves. Inland areas are typified by dryland farming, with scattered farmhouses and agricultural infrastructure visible.

This chapter provides an overview of the existing environment relevant to visual amenity in the area of the mine site based on the existing scenic values, sensitivity of the landscape to change, degree of visual exposure and degree of visual change as a result of the proposed mining operations. Establishment of the proposed mine has the potential to affect the existing rural character, reducing the amenity of the locality. The scale of impact to existing environmental values is discussed and, where relevant, management and/or mitigation measures that would minimise impacts are identified.

20.1 Applicable Legislation and Standards

The relevant legislation in relation to landscape and visual amenity at the proposed mine site is the *Mining Act 1971 (SA)* and *Mining Regulations 2011 (SA)*. Specifically, Regulation 30(1)(d) requires a set of mine rehabilitation outcomes that address external visual amenity. Further information regarding the requirements and relevance of the legislation is provided in Chapter 4.

The following policies and standards provide a range of criteria relevant to visual amenity:

- AS 4282: Control of the obtrusive effects of outdoor lighting
- AS 1158.1.1: Lighting for roads and public spaces – Vehicular traffic lighting
- AS1158.3.1: Lighting for roads and public spaces – Pedestrian area lighting
- AS2293: Emergency escape lighting and exit signs for buildings
- Principles of Good Design (Office for Design and Architecture 2014)
- Wudinna District Council (DC) Development Plan

The nominated Australian standards each specify design criteria that will be incorporated into mine site infrastructure to protect the key environmental and stakeholder values relevant to visual amenity.

The Principles of Good Design identify five overarching design principles that are used to evaluate the design quality of proposed developments. The five principles are:

- **Durability:** new development should consider the surrounding development and promote the desired future character of an area.
- **Inclusivity:** new development should create places for everyone to enjoy, promoting community cohesion.
- **Sustainability:** new development should minimise embodied energy and contribute to social and environmental sustainability.
- **Value:** new development should add value by creating desirable places that attract further local investment.

- **Performance:** new developments should function appropriately for all intended users.

The Wudinna DC Development Plan outlines a number of requirements relating to the management of visual impacts from activities for mineral extraction purposes. In particular, the Development Plan provides that mining development should:

- Protect areas of scenic or conservation significance from undue damage.
- Cause minimal damage to the natural landform.
- Allow for the progressive rehabilitation of disturbed areas.
- Screen and orientate mine site infrastructure away from public view, tourist and scenic routes.

A detailed discussion of the relevant policy within the Wudinna DC Development Plan is provided in Chapter 4.

20.2 Assessment Method

A Landscape and Visual Impact Assessment (LVIA) was completed for the entire CEIP. The LVIA assesses the likely effect of the CEIP on landscape and visual amenity, considering the sensitivity of the landscape to change, the presence of publically accessible locations, vantage points and key tourist viewing areas and identified mitigation measures to reduce the overall visual impact.

The LVIA was undertaken with reference to the Guidelines for Landscape and Visual Impact Assessment (2002), Visual Landscape Planning in Western Australia (2007) and Methods of Environmental Impact Assessment (2009). No specific guidelines relating to the assessment of landscape and visual impacts in South Australia are available. The guidelines used for the basis of this assessment are considered representative of standard industry practice. The LVIA was completed in a four step assessment process:

- Desktop study
- Site visit and photography
- Landscape context analysis
- Assessment of visual impacts

Each stage of the four step LVIA assessment process is discussed in the following sections.

20.2.1 Desktop Study

A desktop study was undertaken to determine the most visually prominent components of the proposed mine and determine a suitable study area for assessment. To define the study area, a zone of theoretical visual influence (ZTVI) was established. The zone establishes from which areas the project is theoretically visible based on the height of project elements and the regional topography. The ZTVI did not take into account the presence of vegetation or additional landscape elements that may obscure views to the project; therefore it provided a conservative indication of the visibility of the project.

The ZTVI study area was refined based on the region within which a modification to the landscape will be easily discernible to the naked eye. At distances where landscape modifications blend into the background, the visual impact will be negligible and these areas were therefore not considered. The study area for the proposed mine is depicted in Figure 20-1.

Desktop investigations also identified locations that may be more sensitive to visual change, including elevated scenic lookouts, public recreational areas, state and national parks, townships, major thoroughfares and tourist sites.

20.2.2 Site Visit and Photography

A site visit was conducted in April 2014 to photograph and document the LVIA study area. A number of locations surrounding the mine site (viewpoints) were selected for analysis to provide a representative sample of publically accessible locations in terms of distance and direction. The selection of viewpoint locations was also guided by publically accessible locations nominated by the community during stakeholder engagement activities. Photographs and an analysis of the landscape gathered during the site visit formed the primary basis for the LVIA. Panoramas have been prepared for each of the viewpoints (refer Appendix P) to simulate the wider horizontal field of view that a person typically experiences, as opposed to what is represented in a single photograph. In all cases, the LVIA has been based on site observations; photos and field notes served as a record only.

20.2.3 Landscape Context Analysis

The capacity of the landscape to absorb additional visual elements was considered with reference to geology, landform and vegetation coverage. This analysis was undertaken to gain an understanding of elements available to restrict line of sight to the proposed mine, as well as the existing level of visual amenity.

The study area was categorised into landscape types based on the visual absorption capacity, land use, topography and level of existing visual amenity. Landscape categories were grouped together with other areas displaying similar visual characteristics and sensitivities to modification. The landscape types are identified in Section 20.3.3.

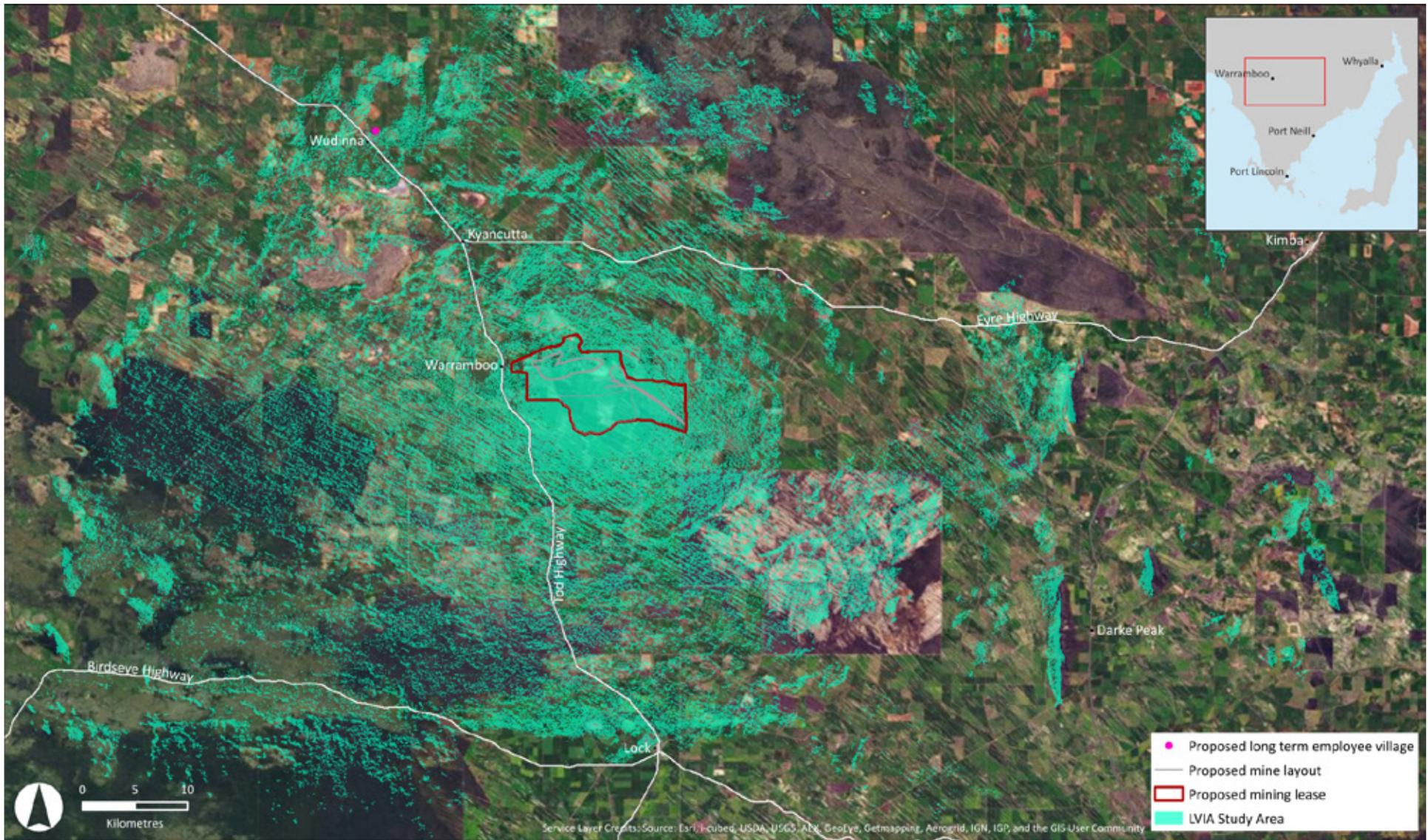


Figure 20-1 Proposed Mining Lease LVIA Study Area

20.2.4 Impact Assessment

Impacts to landscape and visual amenity will occur during construction, operation and closure of the proposed mine. As visual impacts are considered to represent a social issue, the criteria outlined in Table 6-2 have been utilised for categorising the level of visual impact as a result of the construction, operation and closure of the proposed mine.

The social impact assessment criteria in Table 6-2 are considered to represent a high level assessment of impacts to landscape and visual amenity and not provide an accurate depiction of the true visual impact of the proposed mine. As such, impacts were assessed from a range of viewpoints surrounding the proposed mine and were weighted taking into consideration:

- The distance of the viewpoint from the proposed mine.
- The existing level of visual amenity at the viewpoint.
- The exposure of the viewpoint (i.e. the comparative number of people that are likely to experience the visual change).

An overview of the weighted viewpoint assessment process is provided below.

Weighted Viewpoint Assessment

Impacts to landscape and visual amenity were assessed at each of the nominated viewpoints surrounding the proposed mine. Visual impacts were assessed based on three key criteria, each of which was assigned a value of 'high', 'medium', or 'low' to form a rating of overall visual impact. The three key criteria and value rankings are:

- **Distance** – the distance of a viewpoint from an introduced visual element.
 - High – where the proposed mine would be a highly dominant element in the view.
 - Medium – where the proposed mine would be a moderately dominant element in the view.
 - Low – where the proposed mine would be difficult to discern as it is in the far distance.
- **Sensitivity** – the existing level of visual amenity at the viewpoint, in relation to the ability to absorb the visual impacts of the proposed mine. Generally, a highly modified landscape with many artificial elements will have low sensitivity and therefore a greater visual absorption capacity when compared to a natural landscape.
 - High – relatively undisturbed, naturalistic landscapes of high visual amenity.
 - Medium – moderately disturbed landscape, displaying remnant natural features and limited introduction of artificial elements with medium visual amenity.
 - Low – highly modified or disturbed landscapes with low visual amenity.
- **Exposure** – the degree of visual exposure relates to the comparative number of people that are likely to experience the change of visual qualities of the landscape brought about by the construction, operation and closure of the proposed mine.
 - High – public areas which experience a high degree of visitation, including populated areas. Public locations with high exposure include areas such as major roads, parks and recreation reserves, scenic lookouts and townships. High sensitivity is generally assigned to locations with the express purpose of observing and appreciating the landscape.
 - Medium – secondary roads and less frequented tourist attractions such as unsealed tourist attractions and unsealed tourist drives.
 - Low – infrequently visited locations which are separated from populated areas and major thoroughfares including local roads and farm dwellings.

Based on the distance, sensitivity and exposure ratings assigned to each viewpoint, an overall visual impact is determined. The overall rating is determined on a case-by-case basis taking into consideration the individual criteria and site-specific conditions at the viewpoint. Typically, viewpoints that are highly exposed or highly sensitive experience a greater level of impact. Impact tends to decrease with distance as visual elements blend into the horizon and surrounding landscape. Site-specific conditions that may influence overall visual impact include the presence of intervening vegetation (which may reduce the level of impact) or the presence of unique landscape features (which may increase the level of impact). The scale of visual impact at each viewpoint is considered as follows:

- **High** – a significant and detrimental change to the landscape characteristics and visual amenity.
- **Medium** – a moderate detrimental change to the landscape characteristics and visual amenity.
- **Low** – a minor detrimental change that is noticeable, however would not result in a substantial change to the visual characteristics of the landscape.
- **Negligible** – the level of visual change would be virtually unnoticeable.
- **Nil** – the development would not be visible, therefore would not have a visual impact.

20.3 Existing Environment

This section provides an overview of the existing environment within the mine site study area in relation to visual amenity. Topography, vegetation coverage and landscape types are discussed, as well as identified receptors sensitive to the introduction of new visual elements.

20.3.1 Topography

The central Eyre Peninsula is dominated by sand dune covered plains, with several hilly areas and granite plains. The gentle, undulating topography (Plate 20-1) continues to the northeast of the Eyre Peninsula, with several areas of higher elevation near Cowell. To the south, the Lincoln Uplands run along the east coast, with the Marble Range along the west coast.

Topography within the LVIA study area ranges from approximately 30 to 280 m AHD. General uplift towards the northeast is associated with the Gawler Ranges with highest elevations aligned with rocky outcrops. The south-western part of the study area consists largely of northwest-southeast trending dune lines. The majority of the site lies within the dunal plains and is less than 100 m AHD.

The flat to gently undulating nature of the terrain across much of the study area permits clear views across the landscape from most locations. In landscapes such as this, if intervening vegetation or other features such as existing buildings are absent, constructed features have the potential to be seen from a broader area as compared with hilly country, where views of particular features have greater potential to be constrained by intervening terrain.

The presence of a few steeply rising landforms (such as Darke Range (Plate 20-2) and Mount Wudinna) within an otherwise flat to gently undulating terrain offers the chance to take in panoramic views of the surrounding landscape. It is from locations such as this that visual impact is potentially greatest, if high exposure occurs, as compared with views from lower elevations.

The topography of the Eyre Peninsula and project area are described further in Chapter 2.



Plate 20-1 Undulating Plains Near the Proposed Mine



Plate 20-2 Darke Range Viewed from Burtons Road, South of Wudinna Road

20.3.2 Vegetation

The majority of land on the Eyre Peninsula has been cleared of native vegetation for agricultural purposes including broad acre cereal cropping and grazing. Significant areas of native vegetation remain intact, although these are largely restricted to conservation reserves. Isolated patches of degraded vegetation remain along some dune crests and linear bands of vegetation are commonly present along roadsides. Where these occur, they are often tall enough to restrict views out across the landscape. The other common location where tall vegetation is present is within residential properties and townships with planted and introduced species commonly present.

Plate 20-3 shows a typical view of roadside vegetation near the proposed mine. Plate 20-4 is an example of the taller vegetation associated with townships (Kyancutta is shown in this example). Figure 20-2 shows the most extensive areas of remnant vegetation within the study area.

In conjunction with topographic variation, vegetation has the greatest capacity to constrain views within the study area toward the proposed mine. Roadside vegetation, where it occurs, typically exists as dense stands which are often high enough to inhibit views of all but the tallest constructed elements. It is noted however, that there are locations in these same areas where little to no roadside vegetation occurs.



Plate 20-3 Typical Roadside Vegetation



Plate 20-4 Planted Township Vegetation Behind Buildings at Kyancutta



Figure 20-2 Vegetation Coverage

20.3.3 Landscape Types

There are three key landscape types prevalent in the proposed mining lease LVIA study area:

- Undulating farmland
- Parks and reserves
- Townships

Landscape types were collated according to areas with similar visual characteristics in terms of vegetation cover, landform, amenity value, level of modification and unique site characteristics. Each landscape type has an associated level of sensitivity to the construction, operation and closure of the proposed mine. A summary of the landscape types within the study area and their associated sensitivity to visual modification is provided in Table 20-1.

Table 20-1 Summary of Landscape Types

Landscape Type	Description	Sensitivity to Change
Undulating Farmland	The most prevalent landscape type within the study area. Undulating farmland consists of broad acre agricultural land which has been mostly cleared of vegetation. This landscape type has experienced a continuous change to its original character since European settlement.	Low
Parks and Reserves	Areas of high landscape (experiential) as well as visual (scenic) value. May include recreational parks and reserves with hiking trails and scenic lookouts.	Medium to High (depending on topographical diversity)
Township	Comprising areas of settlement, with a relatively high number of viewers. Typically sensitive to visual changes in surroundings.	High

The extent and location of landscape types are depicted in Figure 20-3 and a detailed overview of each landscape type is provided below.

Undulating Farmland

Flat to undulating farmland is a highly represented landscape type within the study area. It generally consists of broad acre agricultural land mostly cleared of vegetation and is primarily used for cropping and grazing. There are residential dwellings and supporting agricultural infrastructure sparsely distributed across the landscape, consistent with rural population densities.

This landscape type has experienced continuous change to its original character since European settlement. Typically, it is not of high visual amenity when compared to dynamic, naturalistic landscapes. In appearance, it is a landscape which is common throughout much of Eyre Peninsula and the broader regional landscape. Apart from vegetation clearing, other human modifications to the landscape are evident in the form of fence lines, access tracks, roads, sheds, water tanks, cultivated land, grain handling and storage infrastructure, electricity transmission and distribution lines and earthworks.

Plate 20-5 shows undulating farmland near Wudinna and Plate 20-6 shows a typical grain silo which is a common feature across the Eyre Peninsula, demonstrating the prevalence of agriculture and cereal growing in the region.

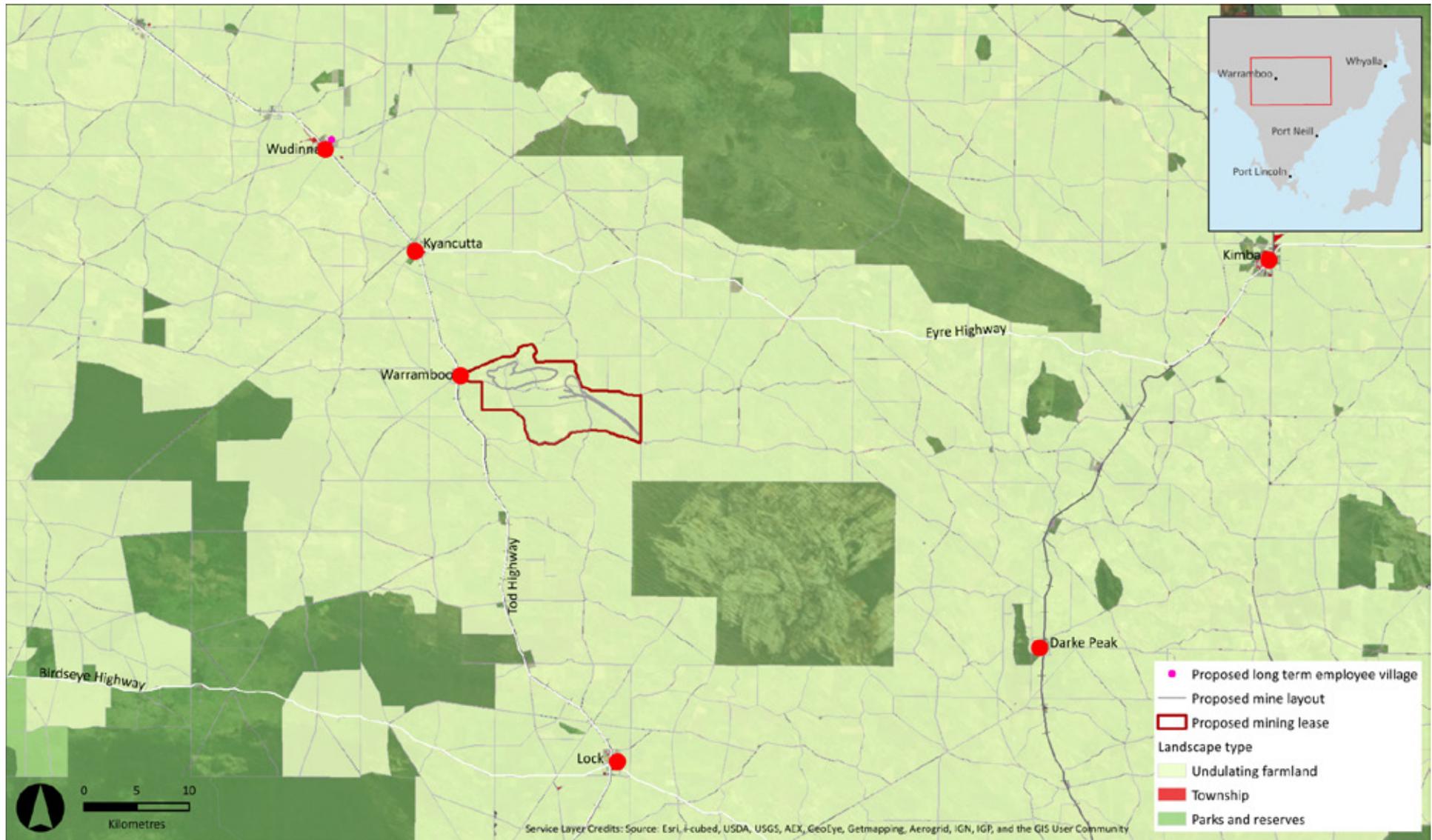


Figure 20-3 Landscape Types within the Study Area



Plate 20-5 Flat to Gently Undulating Farmland (within the Proposed CEIP Site)



Plate 20-6 Grain Silos (Warrambo)

Parks and Reserves

The parks and reserves landscape type is typically associated with areas of high landscape (experiential) and visual (scenic) value. That is, parks and reserves landscapes are visually valued for close range engagement for recreational purposes as well as for viewing from a distance, especially when it is topographically dynamic. Generally, large areas of contiguous vegetation are sparsely distributed across the Eyre Peninsula, which is a landscape that is primarily dominated by agricultural land. It is for this reason that they are more sensitive to visual modifications as compared with farmland.

The key parks, wilderness protection areas and reserve areas within the LVIA study area include Darke Range, Mount Wudinna and Hambidge Wilderness Protection Area (WPA). Other conservation areas in the region include Pinkawillinie Conservation Park, Caralue Bluff Conservation Reserve, Carapsee Hill Conservation Park and Rudall Conservation Park. The latter are further away from the proposed mine and are unlikely to be visually impacted by the mine.

Darke Range (Plate 20-7) is a prominent local geographical feature of high visual amenity. Although this area contains large, contiguous tracts of native vegetation (e.g. Hambidge WPA, Plate 20-8), its terrain is generally flat to gently undulating and is not as topographically dynamic as the isolated peak of Darke Range.



Plate 20-7 Darke Range Viewed from Kirchner Road



Plate 20-8 Hambidge Wilderness Protection Area

Townships

The townships landscape type comprises areas of settlement, but does not include standalone rural dwellings. A representation of the visual impact of the proposed mine from standalone rural dwellings has been provided to relevant landowners upon request, however these have not been included in this chapter in order to maintain their privacy.

The visual character of a town and its relationship to the landscape are an important parts of a town's identity and reflective of its history. Townships may be sensitive to the introduction of visual elements as changes to the surrounding landscape context can affect the perceived character of the township. As a result of accommodating higher population densities and the importance of the landscape setting of towns, the township landscape type is typically sensitive to visual changes.

Townships within the LVIA study area include Warrambo, Wudinna, Kyancutta and Lock. Among these, the towns of Wudinna and Lock are primarily agricultural service centres, with Wudinna also providing a gateway to the Gawler Ranges tourism region. Plate 20-9 shows a view of the Wudinna Township.



Plate 20-9 Wudinna Viewed from Ballantyne Street

20.3.4 Key Receptors

Key receptors are localities and travelling routes within the LVIA study area that are more highly frequented by people and hence have greater potential to be visually impacted by the project as compared with less frequented areas. The inclusion of viewpoint analysis locations from key receptors assists with the completeness of the assessment by covering the areas with the greatest risk of impact. This section provides an overview of key receptors within the study area including roads, parks, reserves and townships. Key receptors within the study area are identified in Figure 20-4.

Major Roads

The Eyre Highway links Western Australia and South Australia through the Nullarbor Plain. It runs for 1668 km from Norseman in the west to Port Augusta in the east, flanking the northern periphery of Eyre Peninsula. In Port Augusta it splits into the Princes Highway which connects to Adelaide and Melbourne and Stuart Highway which connects to Alice Springs and Darwin. Within the study area, the Eyre Highway passes through the towns of Wudinna and Kyancutta.

The Tod Highway is approximately 177 km in length and services the grain growing areas of the Eyre Peninsula. It runs in a north/south direction from Kyancutta to Port Lincoln, essentially dividing the Eyre Peninsula into eastern and western halves. The highway passes through agricultural land, providing access to grain terminals in Port Lincoln. The main town on the highway is Lock which is approximately in the centre of the Eyre Peninsula.

Parks and Reserves

Hambidge WPA is located approximately 3.5 km southeast of the mining lease boundary. It covers around 38,000 ha and contains vegetation mainly consisting of low Mallee in a dune landscape. Its main purpose is for conservation rather than recreation; however an elevated area locally known as Prominent Hill is located within the WPA and rises above the terrain. It is accessible via a track from the south and offers a view over the WPA.

Darke Range is a prominent topographical feature extending for approximately 10 km in a north/south orientation. It is situated approximately 2.5 km west of the township of Darke Peak and 40 km southeast of the mining lease boundary. Darke Range Conservation Park is located at the southern end of the range and is used for recreational purposes such as bushwalking and bird watching. Federation Lookout was constructed during 2001 to commemorate Australia's Centenary of Federation and is also located at the southern end of the range. A directional plaque shows points of interest and it is an 800 m walk to the lookout from the car park area. Federation Lookout is not considered to be highly frequented by tourists as it is only accessible via a farm gate and a steep, rocky access track that would not be suitable for all vehicles.

Mount Wudinna is located approximately 27 km from the mining lease boundary and 12 km northeast of Wudinna. It is the largest exposed granite monolith in South Australia. It is accessed via unsealed roads which are suitable for all vehicle types. At the base of Mount Wudinna is a picnic site with barbeque facilities, car parking, toilets and a shelter. An interpretive trail has been developed from the car park providing an overview of the rock, its history, formation and local flora.

Townships

Warrambo (Plate 20-10) is located 750 m to the west of the mining lease boundary. Warrambo and the surrounding area comprise a population of 47 people and 30 dwellings as at the 2011 Census (ABS 2013a). The township of Warrambo has little in the way of services, with no shops or petrol stations, however the local post office still services the local community. Kyancutta is located approximately 12 km north of Warrambo and marks the junction of the Eyre and Tod Highways. Kyancutta acts as a small service centre for the surrounding agricultural community offering a general store and post office.

Wudinna (Plate 20-9) is approximately 25 km northwest of the mine site boundary and is the main service centre for the district, providing a range of social and recreational services. At the 2011 Census Wudinna has a residential population of 557 persons (ABS 2012b). The proposed long-term employee village which will house the working population of the mine will be located on land immediately adjacent to the township of Wudinna.

Lock (Plate 20-11) is located approximately 40 km south of the mining lease boundary and is a small service centre for the surrounding rural community. At the 2011 Census Lock had a residential population of 432 persons (ABS 2013c).



Plate 20-10 Warramboe Township Viewed from Barns Street



Plate 20-11 Lock Township Viewed from Tod Highway

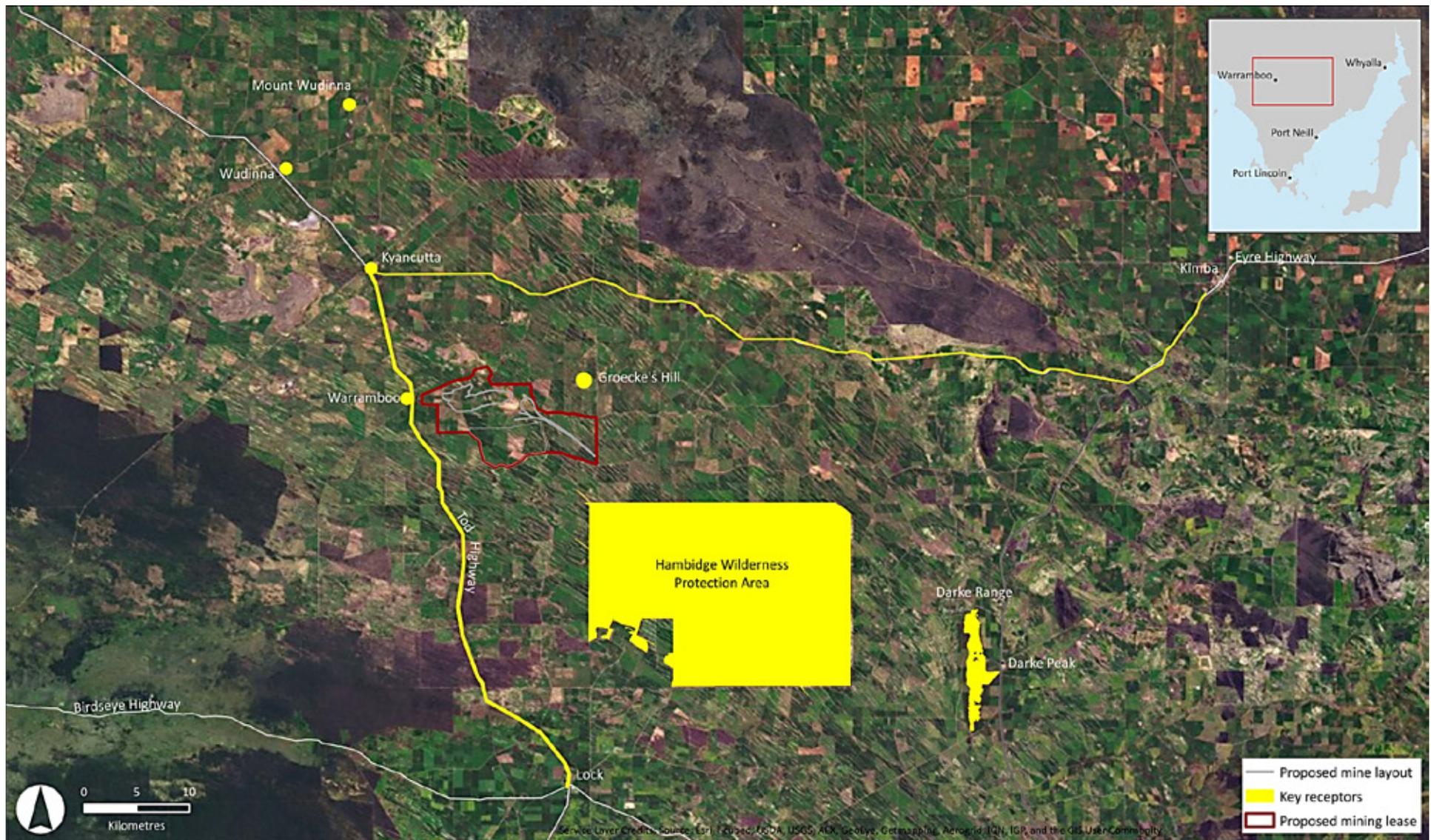


Figure 20-4 Key Receptors within the Study Area

20.3.5 Summary of Key Environment Values

The area of the mine site is not located within areas commonly regarded as being of significant scenic or aesthetic value. The immediate area in which the mine is proposed is predominantly characterised by dryland farming. Isolated patches of vegetation are scattered throughout the landscape, predominantly along road reserves and within townships. Large areas of native vegetation in the region are typically restricted to designated conservation parks, on dune crests within agricultural paddocks or on prominent ranges.

The key receptors in the area considered most sensitive to visual change include:

- Major roads
 - Tod Highway
 - Eyre Highway
- Conservation areas
 - Hambidge WPA
 - Darke Range
 - Mount Wudinna
- Townships
 - Warrambo
 - Wudinna
 - Kyancutta
 - Lock

In addition, individual landowners and dwellings on private property located adjoining the proposed mining lease were also considered in the visual impact assessment. As detailed in Chapter 5 Stakeholder Consultation, consultation has occurred with local landowners through a range of mechanisms, including one on one meetings, where agreed by the landowner. As part of this consultation, Iron Road offered to prepare digital representations of the proposed mine as viewed from each private dwelling. A number of landowners accepted this offer and these representations were provided to the landowner. To maintain privacy, they have not been included in this chapter.

20.4 Context and Views of Affected Parties

Stakeholders relevant to visual amenity include the local landowners and community, Wudinna DC, users of the Tod Highway, Eyre Highway and minor local roads and the tourism industry. The key environmental value relevant to visual amenity identified by stakeholders was the preservation of the rural character of the region. Stakeholders are seeking the following outcomes relevant to visual amenity:

- Maintain the rural character of the region (IM_20_01 – IM_20_06)
- Minimal light impacts during night time (IM_20_08)

Several key vantage points were identified for consideration by stakeholders as part of the mine LVIA (refer to Section 20.7.4 for assessment of impacts at each of these locations):

- Warrambo Township
- Groecke's Hill (Matthews Road, near the intersection with Mays Road)
- Lock Township
- Wudinna Township
- Kyancutta Township

Impacts and risks relating to the existing environmental values and the issues identified by relevant stakeholders are discussed in Section 20.7.

All issues raised by stakeholders across the entire CEIP are presented in Chapter 5 and summarised in Table 5-2. Impacts and risks relevant to each of the existing environmental values associated with landscape and visual amenity and potential issues identified by stakeholders are discussed below and summarised in Table 20-4. All impact events across the entire CEIP are presented in the Impact and Risk Register in Appendix C.

20.5 Potentially Impacting Events

Considering the views and contexts of affected parties and the issues identified during technical studies, an assessment of Source Pathway Receptor (SPR) has been undertaken, as per the methodology outlined in Chapter 6, to determine which potential impact events are considered applicable to this project. Potential impact events associated with the construction, operation and closure of the mine site that have a confirmed SPR linkage which affects the landscape and visual amenity of the surrounding region include:

- Reduced visual amenity as a result of mine development (landform, stockpiles, mine buildings, fencing and other structures) (IM_20_01 – IM_20_03)
- Reduced visual amenity as a result of removal of vegetation (IM_20_04, IM_20_05, IM_20_06)
- Lighting to allow a safe working environment for a 24 hour operation (IM_20_07)

The impact and risk register presented in Appendix C provides confirmation of a source pathway and receptor for each of the potential impact events (PIMs) considered and therefore follows each through as actual impact events (IMs) with a complete impact and risk assessment.

20.6 Control Measures to Protect Environmental Values

This section identifies design measures and management or control strategies which will be implemented to mitigate the level of impact and risk associated with visual amenity, such that it is considered to be as low as reasonably practicable (ALARP).

20.6.1 Design Measures

The following design control measures have been incorporated to minimise impacts and risks to visual amenity as a result of the construction, operation and closure of the proposed mine:

- Air quality and dust management measures as discussed in Chapter 15.
- Outside slopes of the integrated waste landform are to be constructed at an angle that allows for progressive revegetation.
- Where practicable, buildings and structures will be of muted, earthen tones consistent with dominant colours in the landscape. Highly reflective materials will be avoided to avoid glare and reduce the visibility of buildings and structures.
- All outdoor lighting on site will be designed to minimise light spillage and the visual impact of the mine, without compromising the safety of workers on site. Australian Standards provide specific guidelines on lighting levels and general lighting setups to control the obtrusive effects of outdoor lighting. Relevant standards that will be applied are:
 - AS 4282: Control of the obtrusive effects of outdoor lighting
 - AS 1158.1.1: Lighting for roads and public spaces – Vehicular traffic lighting
 - AS1158.3.1: Lighting for roads and public spaces – Pedestrian area lighting
 - AS2293: Emergency escape lighting and exit signs for buildings

20.6.2 Management Strategies and Commitments

In order to minimise and mitigate impacts to landscape and visual amenity during construction, operation and closure activities, control and management strategies would be incorporated into the PEPR and implemented for relevant project phases. Key control and management strategies are outlined below in Table 20-2.

Table 20-2 Control and Management Strategies: Visual Amenity

Control and Management Strategies	Project Phase
Vegetation clearance will be limited to with approved areas and will be managed through implementation of the flora and fauna sections of the approved PEPR.	Construction Operation Closure
Earthworks and land clearance will be limited to within approved areas and will be managed through implementation of the soil and land quality sections of the approved PEPR.	Construction Operation Closure
Visible dust will be managed through implementation of the air sections of the approved PEPR.	Construction Operation
Rehabilitation and revegetation of the integrated waste landform will be progressed as it is developed to reduce dust and erosion and to soften the impact of the landform visually.	Operation Closure
Where practicable, landscaping will be incorporated in association with each project component utilising locally endemic species. The landscaping will be used to assist in the management of surface water runoff and to provide visual relief and partial screening of infrastructure within the proposed mine site.	Construction Operation
Screening vegetation will be strategically planted to soften the view of the mine from surrounding roads, townships and residences, where agreed with landowners.	Construction, operation, closure
Construction equipment will be demobilised from site as soon as practicable to minimise affect to visual amenity.	Construction

20.7 Impact and Risk Assessment

This section identifies and assesses impact and risk associated with landscape and visual amenity as a result of the construction, operation and closure of the proposed mine. Impact events (confirmed by presence of a source, pathway and receptor) are those predicted to occur as a result of the development, whilst risk events would not be expected as part of the normal operation of the project, but could occur as a result of uncertainty in the impact assessment process. Although the risks may or may not eventuate, the purpose of the risk assessment process is to identify management and mitigation measures required to reduce the identified risks to a level that is ALARP. This assessment has been undertaken in accordance with the methodology outlined in Chapter 6.

Impact and risk events were identified through technical studies and stakeholder consultation. Impact events can include multiple sources, pathways or receptors and where practical have been grouped together to minimise duplication of information. A summary of impact and risk events relating to landscape and visual amenity is presented in Table 20-4 at the end of this section (with Impact IDs) and a complete register of impact and risk events by source, pathway and receptor is provided in Appendix C.

Impacts and risks are assessed following the application of the design measures outlined in Section 20.6. Where required, management measures are proposed to reduce the impact to a level that is considered ALARP. Through the adoption of design modification or specific mitigation measures, all identified impacts and risks were categorised as medium or low and considered ALARP. The key environmental risks would be monitored through the environmental management framework.

Impacts to landscape and visual amenity will occur during construction, operation and closure of the proposed mine. As visual impacts are considered to represent a social issue, the criteria outlined in Table 6-2 have been utilised for categorising the levels of impact.

20.7.1 Visual Impact During Construction

During construction, visual impacts are likely to be limited to local receivers as visual elements within the mining lease will be largely screened from view by the presence of intervening terrain or vegetation. As such, visual impacts during construction are considered to be a **low impact**, representing a short term (< 3 years) negative change, affecting receivers within the local study area.

As previously outlined, landscaping will be established at key vantage points and highly exposed locations to minimise the visual impact of the proposed mine. The removal of construction equipment as soon as practicable will further reduce the visual impact. As construction activities will be largely screened from view by intervening terrain and landscaping, the unsuccessful implantation of these control measures are considered to be of **minor** consequence and would not represent a long-term alteration or increased visual impact within the local study area. The unsuccessful use of control measures during construction is considered to be unlikely given the low level of uncertainty associated with their implementation. As such, it is considered **unlikely** that control measures will fail, with the overall risk considered to be **low**.

20.7.2 Visual Impact During Operation

The visibility of the proposed mine will progressively increase during operation as the integrated waste landform (IWL) increases in size and visual prominence. As previously depicted in Figure 20-1, elements within the mining lease (principally the IWL) are expected to be visible from an approximate 30 km radius once fully established. As such, visual impacts during operation are considered to be a **medium impact**, representing a long term (> 3 years) negative change, affecting receivers within the local study area.

As outlined in Section 20.6, landscaping will be established at key vantage points and highly exposed locations to minimise the visual impact of the proposed mine. The final location and nature of the landscaping will be determined in conjunction with Wudinna DC, DSD and the local community. Delayed or unsuccessful vegetation of the targeted landscaped areas would result in a higher than anticipated visual impact at highly exposed locations. Should the use of vegetative screening be unsuccessful, alternative planting strategies will be adopted based on improved soil condition, care and maintenance of vegetation or species choice. As such, any consequences are considered to be **minor** and would not represent a long-term alteration or increased visual impact within the local study area. Given the strategies available to support the successful implementation of landscaping and the extent of existing planted vegetation in townships and in road reserves, the unsuccessful use of additional vegetation is considered to be **unlikely**, with the overall risk considered to be **low**.

20.7.3 Visual Impact Post Closure

Following closure of the proposed mine, the site will be progressively rehabilitated to maximise the use of land for agricultural or native vegetation purposes. As such, no additional negative changes to visual and landscape amenity within the local study area will be observed. Although the IWL will be revegetated, it will continue to represent an ongoing alteration to the landscape. Similarly, the mine pit will remain as an excavated feature in the landscape, although visibility of the pit will be limited to the immediately adjacent area. As such, visual impacts during closure are considered to be a **medium impact**, representing a long term (> 3 years) negative change, affecting receivers within the local study area.

The concept closure plan for the proposed mine includes objectives to re-vegetate (at a minimum) portions of the IWL to reduce the visual impact, integrate it into the existing landscape and create long-term landform stability. The consequences of failed revegetation would be considered **minor** as unsuccessful or delayed revegetation would not result in a significant alteration to the prominence of the IWL and subsequent visual impact to the local study area. The likelihood of an unsuccessful revegetation programme is considered to be possible in the short term, but **unlikely** over the longer term as the landform grows slowly (approximately 500 m per year at the perimeter of the structure) over the life of the mine, allowing for sufficient time to optimise and implement revegetation trials. Therefore the overall risk of an increased visual impact as a result of failed revegetation is considered to be **low**.

20.7.4 Light Spill

The majority of construction activities will occur during daytime hours; therefore the need for artificial lighting during construction is minimal. Artificial lighting will, however be required for way finding and security purposes, in addition to some occasions where night time construction activities are required. During operation, artificial lighting will be required for way finding, security purposes and for lighting areas to support the 24 hour operation of the proposed mine. No lighting is proposed at the mine post closure.

Lighting at the proposed mine will be designed to support safe and efficient operation of the site, avoiding light spill through the use of directional lighting as much as practicable in accordance with AS 4282-1997. Despite the implementation of design measures, low levels of light spill are anticipated to be visible beyond the mining lease boundary during operation. As such, light spill during construction and operation is considered to be a **medium impact**, representing a long term (> 3 years) negative change, affecting receivers within the local study area.

There is a risk that the extent of light spillage is greater than anticipated and will be visible beyond the local study area. Light spillage over a larger area would be considered an ongoing visual impact, considered to be of **minor** consequence, representing an ongoing social issue to those affected. Given the implementation of design measures, light spillage from the proposed mine beyond the mining lease boundary is considered **unlikely** to be discernible beyond the local study area. Therefore the overall risk of an increased visual impact as a result of greater than anticipated light spillage is considered to be **low**.

20.7.5 Weighted Viewpoint Assessment

As previously detailed in Section 20.2, a high-level assessment of impacts to landscape and visual amenity does not provide an accurate depiction of the true visual impact of the proposed mine. As such, impacts were assessed from a range of viewpoints surrounding the proposed mining lease boundary and were weighted, taking into consideration:

- The distance of the viewpoint from the proposed mine.
- The existing level of visual amenity at the viewpoint.
- The exposure of the viewpoint (i.e. the comparative number of people that are likely to experience the visual change).

Viewpoint locations utilised for the purposes of the proposed mining lease LVIA are summarised and presented spatially in Figure 20-5. The viewpoints were been selected to be representative of a range of distances and directions from the proposed mine. An analysis of each viewpoint was undertaken in accordance with the methodology outlined in Section 20.2 and presented in Appendix P. A summary of impacts relating to visual amenity as a result of the construction, operation and closure of the proposed mine is presented in Table 20-3.

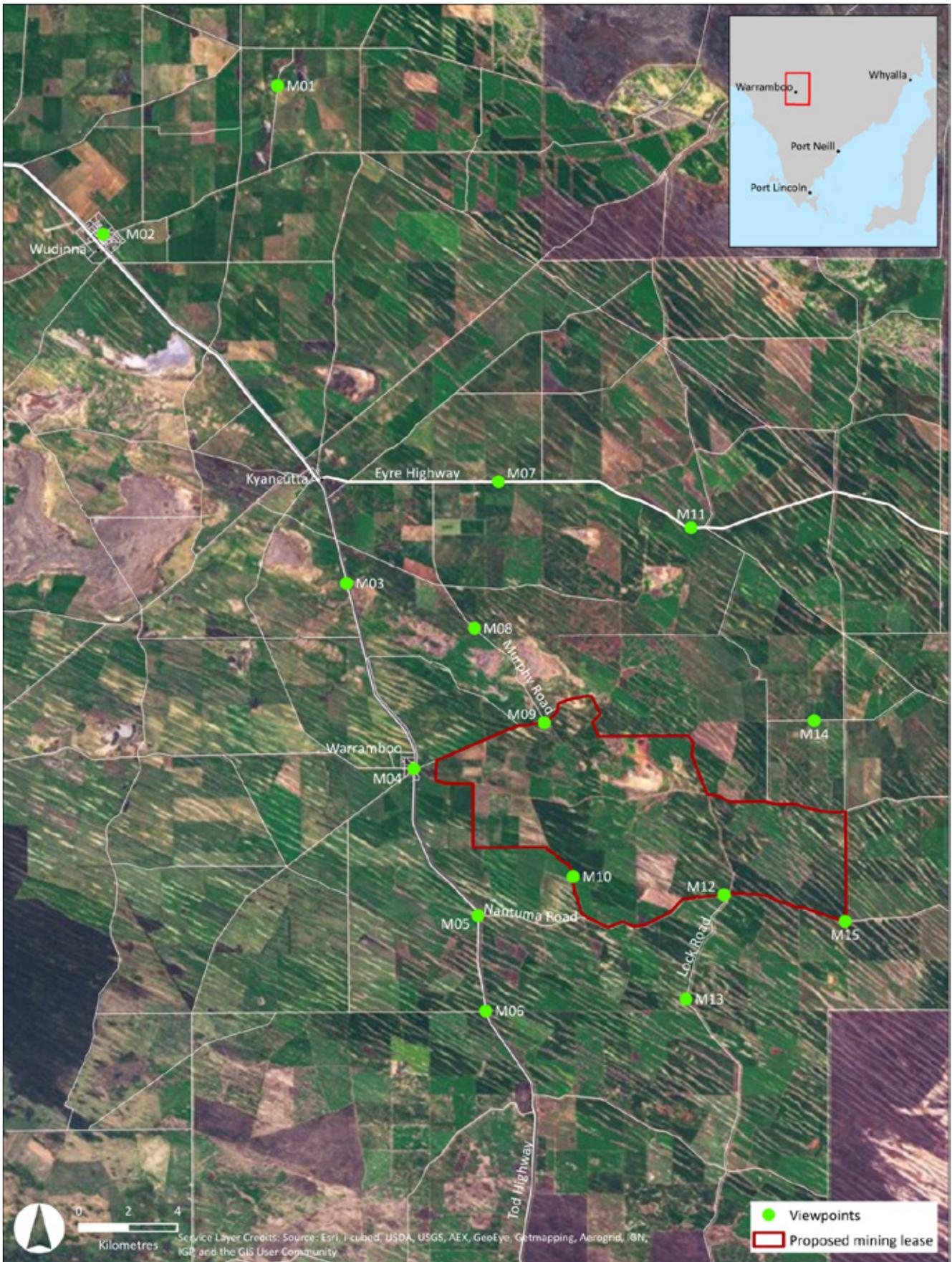


Figure 20-5 Proposed Mining Lease LVIA Viewpoint Locations

Table 20-3 Proposed Mining Lease LVIA Viewpoint Locations and Weighted Visual Amenity Impacts

Viewpoint	Comment	Level of Impact
Viewpoint M01 East Wudinna Road, approximately 1.7 km south of Edmonds Road, near Mount Wudinna	Although there are clear views toward the proposed mine from a moderately exposed location, the mine is a substantial distance away from this viewpoint and will largely be visually absorbed into the distant landscape. The IWL will be visible on the horizon, however is not considered to be a prominent visual element.	Negligible
Viewpoint M02 Medley Terrace, Wudinna Township	No elements of the proposed mine will be visible from this location. A representation of the view of the proposed mine site as it develops throughout the project life is provided in Plate 20-12 and Plate 20-13.	Nil
Viewpoint M03 Tod Highway, approximately 4 km south of Eyre Highway	Although the viewpoint is located at a highly exposed location, the proposed mine is largely obscured from view as a result of intervening terrain and vegetation. When fully developed, the IWL will be visible above the ridgeline in the foreground. The capacity of the landscape to absorb the visual impact of the IWL is enhanced due to the distance from the viewpoint and the presence of intervening vegetation. As a result of the low sensitivity of the landscape, the presence of intervening topography and the high capacity of the landscape to absorb additional visual elements, the overall visual impact from this viewpoint is considered to be medium.	Medium
Viewpoint M04 Tod Highway, Warrambo	Although the viewpoint is located at a highly exposed location that is moderately sensitive to change, the proposed mine is largely obscured from view as a result of intervening terrain and vegetation. When fully developed, the IWL will be partially visible above the vegetation on the horizon. The capacity of the landscape to absorb the visual impact of the IWL is enhanced due to the presence of existing structures and significant intervening vegetation. On balance, due to the high capacity of the landscape to absorb additional visual elements, the overall visual impact from this viewpoint is considered to be low.	Low
Viewpoint M05 Tod Highway, at the intersection of Nantuma Road	Although this viewpoint is a highly exposed location, the proposed mine is largely screened from view by intervening vegetation and terrain. In addition, the viewpoint has a low sensitivity to visual change. When fully established, the IWL will be visible above the vegetation at the right of the viewpoint, however is not anticipated to be a dominant visual element. As such, the overall visual impact from this viewpoint is considered to be low.	Low
Viewpoint M06 Tod Highway, at the intersection of Rohrlach Road	Although this viewpoint is a highly exposed location, the proposed mine is largely screened from view by intervening vegetation. In addition, the viewpoint has a low sensitivity to visual change. When fully established, the IWL will be visible in the breaks between the vegetation, however is not anticipated to be a dominant visual element. As such, the overall visual impact from this viewpoint is considered to be negligible.	Negligible
Viewpoint M07 Eyre Highway, approximately 7 km east of Tod Highway	No elements of the proposed mine site will be visible from this location.	Nil
Viewpoint M08 Murphy Road, approximately 6.4 km south of Eyre Highway	Although the proposed mine is clearly visible from this viewpoint, on-site infrastructure will be located in the far distance, near the horizon line. In addition the sensitivity of the landscape to modifications is low and there is a low level of visual exposure from this viewpoint. As such, the overall visual impact is considered to be low.	Low

Viewpoint	Comment	Level of Impact
Viewpoint M09 Schulz Road, approximately 100 m west of Murphy Road	Although the mine will be clearly visible in the medium distance, the sensitivity of the landscape to modifications is low and there is a low level of exposure. In addition, minor topographic variations provide partial screening of the proposed mine, therefore the overall visual impact is considered to be low.	Low
Viewpoint M10 Dolphin Road, approximately 1.8 km north of Nantuma Road	Once fully established, the integrated waste landform will be a dominant visual element from this viewpoint. Prior to the establishment of the integrated waste landform, the ore processing and concentrate handling facilities will be a prominent visual modification in the middle distance. However as the location has a low level of exposure and low sensitivity to visual modifications, on balance the overall visual impact is considered to be medium.	Medium
Viewpoint M11 Eyre Highway, approximately 500 m west of Bens Hill Road	With the exception of sporadic views of the integrated waste landform, all elements of the mine site will be obscured from view at this location. Given that the viewpoint has a low sensitivity to visual modifications, the overall visual impact is considered to be negligible.	Negligible
Viewpoint M12 Nantuma Road, approximately 100 m west of the intersection with Lock Road	Once fully established, the integrated waste landform will be a dominant visual element from this viewpoint. Prior to the establishment of the integrated waste landform, the ore processing and concentrate handling facilities will be a prominent visual modification in the middle distance. However as the location has a low level of exposure and low sensitivity to visual modifications, on balance the overall visual impact is considered to be medium.	Medium
Viewpoint M13 Lock Road, approximately 4.8 km south of Nantuma Road	Once fully established, the integrated waste landform will be a prominent visual element from this viewpoint. Prior to the establishment of the integrated waste landform, the ore processing and concentrate handling facilities will be partially visible. However as the viewpoint has a low level of exposure, low sensitivity to visual modifications and is 3.5 km away from the mine site boundary, on balance the overall visual impact is considered to be low. A representation of the view of the proposed mine site as it develops throughout the project life is provided in Plate 20-14 and Plate 20-15.	Low
Viewpoint M14 Matthews Road, approximately 1.2 km west of intersection with Mays Road (Groecke's Hill)	The integrated waste landform, ore processing and concentrate handling facilities will be visible in the middle to far distance, however intervening vegetation will partially or wholly obscure views toward them and none are considered to be dominant visual elements. At this viewpoint, the sensitivity of the landscape to modifications is low and there is a low level of visual exposure from this viewpoint. As such, the overall visual impact is considered to be low. A representation of the view of the proposed mine site as it develops throughout the project life is provided in Plate 20-16 and Plate 20-17.	Low
Viewpoint M15 Nantuma Road at the intersection of Mays Road	Once fully established, the integrated waste landform will be a prominent visual element from this viewpoint. However as the location has a low level of exposure and low sensitivity to visual modifications, on balance the overall visual impact is considered to be low.	Low

Current



Year 5



Year 10



Plate 20-12 Visual Representation of Proposed Mine Site from Viewpoint M02, Warramboos (present to Year 10)

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Year 15



Year 20



Year 25



Plate 20-13 Visual Representation of Proposed Mine Site from Viewpoint M02, Warrambo (Year 15 to Year 25)

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Current



Year 5



Year 10



Plate 20-14 Visual Representation of Proposed Mine Site from Viewpoint M13, Lock Road (present to Year 10)

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Year 15



Year 20



Year 25



Plate 20-15 Visual Representation of Proposed Mine Site from Viewpoint M13, Lock Road (Year 15 to Year 25)

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Plate 20-16 Visual Representation of Proposed Mine Site from Viewpoint M14, Matthews Road near Groecke's Hill (present to Year 10)

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Year 15



Year 20



Year 25



Plate 20-17 Visual Representation of Proposed Mine Site from Viewpoint M14, Matthews Road near Groecke's Hill (Year 15 to Year 25)

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20.7.6 Summary of Impacts and Risks

With the implementation of management measures, all residual impacts have been categorised as medium or lower. Similarly, all risks have been reduced to a level of low. The impacts and risks were considered to be as low as reasonably practicable and not warrant further control measures, other than the environmental management controls outlined here. A summary of each of the identified impacts and risks associated with visual amenity at the proposed mine site are presented in Table 20-4.

Table 20-4 Impact and Risk Summary

Impact ID	Impact Event	Level of Impact ¹	Level of Risk ²
IM_20_01 – IM_20_06	Visual impact of proposed mine during construction	Low	-
IM_20_01 – IM_20_06	Visual impact of proposed mine during operation	Medium	Low
IM_20_01 – IM_20_06	Visual impact of proposed mine post closure	Medium	Low
IM_20_07	Light spill from proposed mine during construction and operation	Medium	Low

¹ Impact events are expected to occur as part of the project. Level of impact is assessed post control strategies, as per the impact assessment methodology provided in Chapter 6.

² Level of risk reflects the risk that the assessment of impact is incorrect due to uncertainties in the assessment method, the control strategies, or in assumptions uses. Risk is assessed post control strategies, as per the risk assessment methodology provided in Chapter 6.

Justification and Acceptance of Residual Impact and Risk

With the implementation of design and operational management measures, all impacts associated with visual amenity are considered to be **low** or **medium**. Similarly, all risks have been reduced to a level of **low**. The impacts and risks are considered as low as reasonably practicable (ALARP) and therefore acceptable.

20.8 Proposed Outcomes and Criteria

In accordance with the methodology presented in Chapter 6, outcomes have been developed for all impact events with a confirmed linkage between source, pathway and receptor. Each outcome is supported by measurable assessment criteria that will be used to assess compliance against the proposed outcomes during the relevant phases (construction, operation, closure) of the proposed mine. Proposed outcomes and measurement criteria have been developed for each of the impact events identified with a confirmed linkage and these are presented in Table 20-5.

Table 20-5 Outcomes and Assessment Criteria: Visual Amenity

Proposed Outcome	Impact ID	Impact Event	Draft Outcome Measurement Criteria	Draft Leading Indicator Criteria
The form, contrasting aspects and reflective aspects of mining structures are visually softened to blend in with the surrounding landscape and, where the mine is visually dominant from a surrounding road, township or residence, the view is softened through the use of screening vegetation.	IM_20_01	Reduced visual amenity from surrounding roads as a result of the mine development.	Post construction audits of buildings and annual audits of the IWL, confirm they comply with the design parameters in the PEPR.	None proposed
	IM_20_02	Reduced visual amenity from nearby townships as a result of the mine development.		None proposed
	IM_20_03	Reduced visual amenity from private properties as a result of the mine development.	Annual monitoring of screening vegetation confirms it has been established in accordance with the design parameters in the PEPR.	None proposed
	IM_20_04	Reduced visual amenity from surrounding roads as a result of loss of vegetation from the Mine.		None proposed
	IM_20_05	Reduced visual amenity from nearby townships as a result of loss of vegetation from the Mine.	Ecosystem Function Analysis at representative sites on rehabilitated areas demonstrates that rehabilitation will achieve sustainability thresholds.	None proposed
	IM_20_06	Reduced visual amenity from private properties as a result of loss of vegetation from the Mine.		None proposed
Must in construction and operation ensure that there are no public nuisance impacts from light spill generated by mining operations.	IM_20_07	Lighting during operation (e.g. stacking) impacts local residents.	Post construction site inspections show that fixed lighting meets the requirements of AS 4282-1997 Control of the obtrusive effects of outdoor lighting.	None proposed

20.9 Findings and Conclusion

The LVIA conducted for the proposed mine identified that it will not generally be located within areas providing unique vistas being of significant scenic or aesthetic value. The LVIA study area is characterised by dryland farming, with sparse clumps of vegetation scattered throughout the landscape, predominately along road reserves and within townships. Large areas of vegetation are restricted to conservation parks or isolated to prominent ranges or dune crests within agricultural paddocks.

The key receptors in the area considered most sensitive to visual change include:

- Major roads
 - Tod Highway
 - Eyre Highway
- Conservation areas
 - Hambidge WPA
 - Darke Range
 - Mount Wudinna
- Townships
 - Warrambo
 - Wudinna
 - Kyancutta
 - Lock

Individual landowners and dwellings on private property located outside of townships were also identified as key receptors in determining the level of visual impact. As part of Iron Road's ongoing stakeholder engagement activities, a digital representation of the proposed mine as viewed from private dwellings will be prepared upon request from the individual landowner.

It is acknowledged that establishment of the proposed mine will result in a significant visual impact to the surrounding landscape. Infrastructure within the mine site (in particular the IWL) will be visible in the surrounding area. That said, the proposed mine is largely screened by existing vegetation and topographic variation when viewed by the key receptors and highly trafficked areas in the surrounding region. Beyond key receptors and highly trafficked areas, the remaining landscape is not commonly valued for aesthetic purposes, nor is it highly exposed or subject to high volumes of visitation.

Artificial lighting will be required for way finding, security purposes and for lighting areas to support the 24 hour operation of the proposed mine. Lighting at the proposed mine will be designed to support safe and efficient operation of the site, avoiding light spill through the use of directional lighting as much as practicable. Through the implementation of design and management controls, all visual impacts are considered to be medium or lower.

As the most prominent visual element, the IWL will be progressively vegetated as soon as practicable to blend into the surrounding landscape. Visual impact may be increased in the event of unsuccessful landscaping for screening purposes, or if the vegetation of the IWL is delayed due to unforeseen circumstances.



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