

Figure 6-26: Existing view towards proposed solar farm from the Mitchell Highway



Figure 6-27: Photomontage of proposed solar farm from the Mitchell Highway



Figure 6-28: Photomontage of proposed solar farm from the Mitchell Highway with screen planting

6.3.5 Visual Impact Assessment

Overview of visual impact

The nature and scale of the project will create a new landscape and visual environment. This part of the report will assess the source and magnitude of development effects on the existing landscape elements, character and quality in the context of the site and its environs.

Overall the proposed Nyngan Solar Farm will result in impacts on the existing surrounding environment in terms of landscape and scenic values. The visual impacts associated with the proposal will vary depending on the viewing location. The potential visual impacts associated with the proposed development are assessed in this section of the report.

Character of the proposal

The solar panels are relatively low lying, reaching a height of approximately 2 to 3m above the existing ground level. In the context of the existing landscape the solar farm will have a low visual impact.

The solar farm is arranged as an array of panels arranged in an east-west direction, facing approximately north on an angle of 30 degrees. The highest visual effect of the PV panels is likely to be seen from the north and south, where the most surface area is visible. Visibility of the solar farm from the east and west will be significantly lower. The visual impact is mostly likely to be at its highest during the construction phase.

Visual impact assessment

The proposed Site of the Nyngan Solar Farm is concealed from most surrounding areas as a result of a combination of flat topography, dense existing vegetation and the levee wall surrounding Nyngan. The existing landscape features of Nyngan and its surrounds have been illustrated in Figure 6-29.

Dense Mallee Scrubland vegetation surrounds the site, completely blocking views from the west, north east and south east. The vegetation thins to the west of the site and glimpse views of the proposed solar farm may occur along the Mitchell Highway. Views to the site would be fleeting due to the speed of travel along the highway and the distance from the proposed solar farm.

Views from Nyngan and associated residential development are obstructed by the height of the Levee Wall which surrounds the extent of the town. To the north of the site, a combination of the levee wall and dense vegetation impedes views to the proposed Solar Farm. An isolated homestead is located approximately 400m to the north east of the site. The site will be visible from this property, however existing vegetation on the boundary of the proposal site and foreground planting associated with the homestead will obstruct the views, and reduce the visual impact.

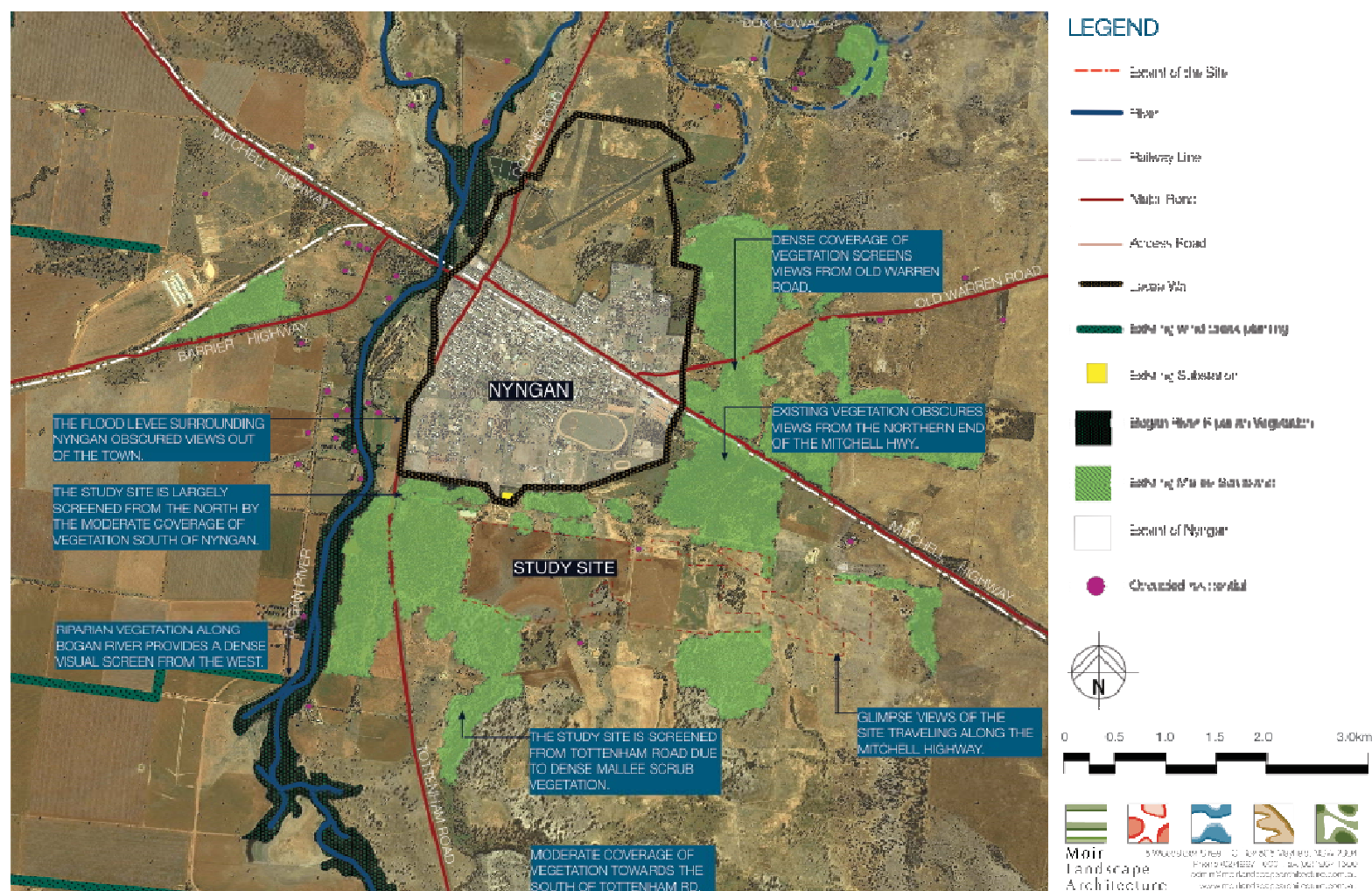


Figure 6-29: Visual Impact Analysis

Review of visibility surrounding the site

Views to the site from the north:

It is unlikely the Solar Farm will be visible from north of the proposal site. Views to the north of the site are largely limited by the change in topography associated with the town levee wall and dense Mallee Scrub vegetation.

A number of rural residential properties are located to the north of the proposal site. Viewpoints NSF2, NSF4 and NSF5 included in this report illustrate the existing visual buffering created by the levee wall and remnant vegetation. To the north east of the Site, the Mallee Scrub is dense and screens views from the Mitchell Highway and Main Western Railway.

Views to the site from the east:

To the east of the proposal site, the landscape consists of cleared paddocks and a sparse coverage of remnant vegetation. A homestead is located to the east of the Site, approximately 1.7km from the Site. Views to the Site from this homestead are impeded by a combination of the existing vegetation to the east of the Site and vegetation associated with the homestead. Viewpoint NSF09 was taken close to this homestead.

Views to the site from the Mitchell Highway and Main Western Railway:

Travelling in a north west direction along the Mitchell Highway the proposal site is mostly screened from view by existing vegetation. Some glimpse views of the Site may be visible for vehicles traveling in a north west direction towards Nyngan, however the speed at which cars travel along the highway and distance from the site suggests it would be unlikely the solar farm will be clearly visible.

The Main Western railway runs in alignment with the Mitchell Highway. Views from the railway to the proposed solar farm would be minimal due to the vegetation on the eastern edge of the Site.

Views to the site from the south:

South of the proposal site, the landscape is generally an uninhabited expanse of paddocks with a sparse to moderate coverage of vegetation. A homestead sits on the perimeter of the proposal site, however they are associated with the Solar Farm development.

Views to the site from the west and Tottenham Road:

Travelling in a northerly direction along Tottenham Road, the proposal site is located in a north easterly direction. Land to the east of Tottenham Road is typified by a moderate to dense coverage of Mallee Scrubland. The proposal site would be largely screened from this point due to the flat topography and coverage of vegetation.

Views from the west of the Bogan River are screened as a result of the dense riparian vegetation associated with the Bogan River system. In addition to the vegetation along the Bogan River, Mallee Scrub encloses the western perimeter of the proposal site.

The closest residence to the west of the proposal site is located approximately 1.8km to the south west. Viewpoint NSF1 is taken from Tottenham Road to the east of the residence and illustrates the effectiveness of existing vegetation in screening the site from view.

Viewpoint Analysis

Of the nine viewpoints assessed the solar farm would be visible from only 3 of these locations: NSF6, NSF7 and NSF9. Of these three viewpoints the highest visual impact occurs at viewpoints NSF9 and NSF7, being moderate. The visual impact of viewpoints NSF6 has been assessed as low.

Table 6-3: Visual impact summary

Viewpoint	Location	Visual sensitivity	Visual effect	Visual impact
NSF01	Tottenham Road	-	-	-
NSF02	Southern end of Terangion St	-	-	-
NSF03	Nyngan Substation	-	-	-
NSF04	Dandaloo & Oatley Street	-	-	-
NSF05	East Nyngan Road	-	-	-
NSF06	East Nyngan Road	Low	Low	Low
NSF07	East Nyngan Road	Moderate	Moderate	Moderate
NSF08	Mitchell Highway	-	-	-
NSF09	Mitchell Highway	Moderate	Moderate	Moderate

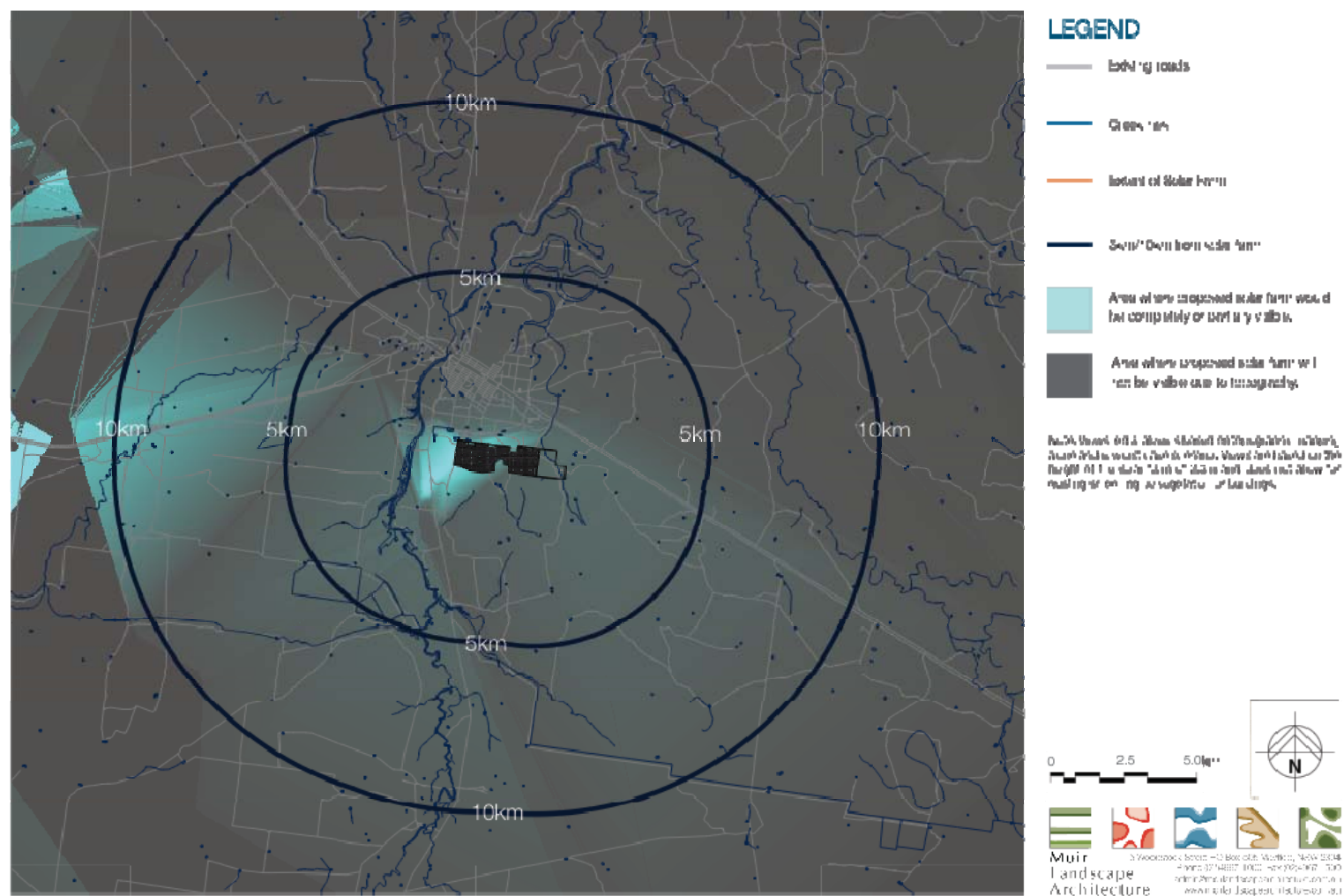


Figure 6-30: Zone of Visual Influence (based on topography)

6.3.6 Reflectivity

There is a perceived issue of glint and glare surrounding the reflectivity of the proposed PV solar panels. As a result of the perceived reflection levels, there is a concern of possible distractions to motorists, aircraft and the hazard of eye damage.

The Poly-Crystalline Solar Panels proposed for the installation are designed to absorb the sun's energy and directly convert it to electricity. The PV modules being used in the installation for the Nyngan Solar Farm absorb approximately 82-90% of the light received. The SunTech Solar Panels proposed for the Nyngan Solar Farm have been designed using two anti-reflective coatings which significantly reduce the reflectivity. Thin slivers of metal stripping on the face of the panels further reduce any potential glare issues that may occur.

A number of landing grounds are located within close proximity to the proposal site, including the Nyngan Airport located approximately 3km north of the proposed solar farm. PV Solar Panels have been installed at a number of airports in the USA, including Denver and the Oakland FedEx International Airport Hub. These precedents and further studies have found that the reflection created would not cause problems for aircraft, particularly at the critical take off and landing stage.

The level of glare and reflectance from the PV solar panels are considerably lower than the level of glare and reflectance of common land surfaces including those surrounding the proposed Solar Farm. The PV panels would reflect approximately 10-18% of energy which is less than typical rural environments which have a reflectivity of approximately 15-30%. Figure 6-31, Figure 6-32 and Figure 6-33 compare the percentage of reflected energy from common reflective surfaces to that of the SunTech PV Solar Panels.

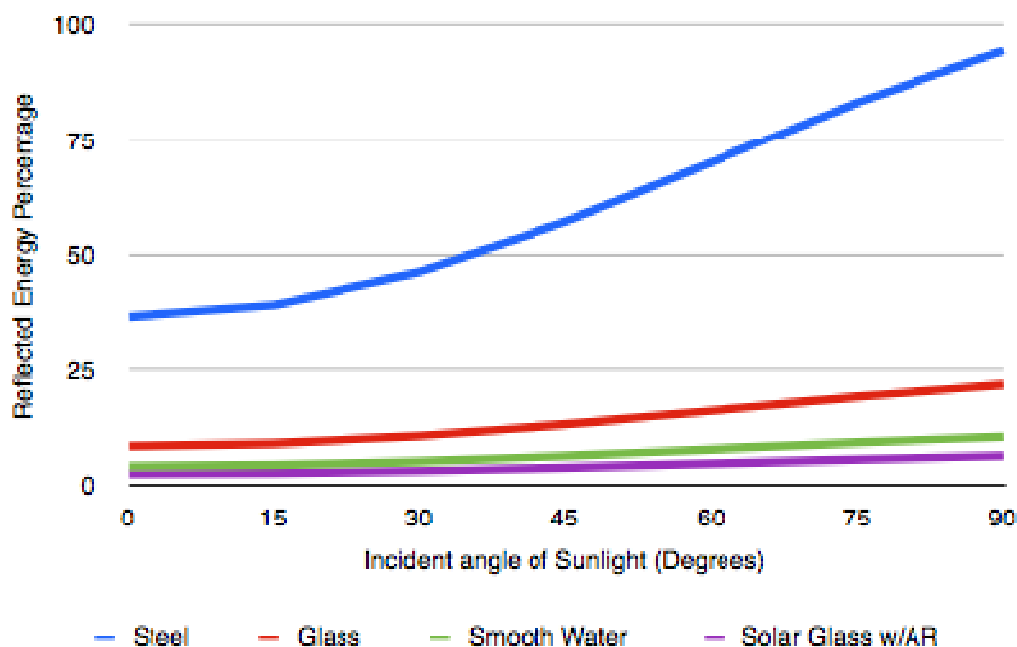


Figure 6-31: Analysis of typical material reflectivity (sunpower)

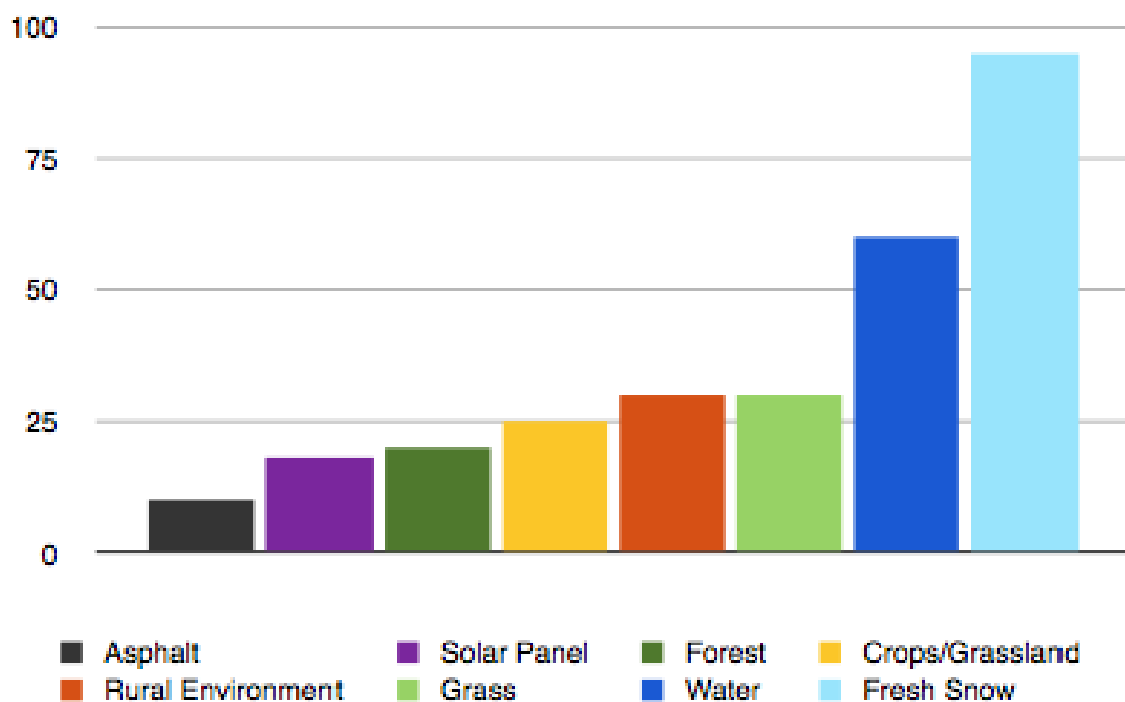


Figure 6-32: Comparative reflection analysis

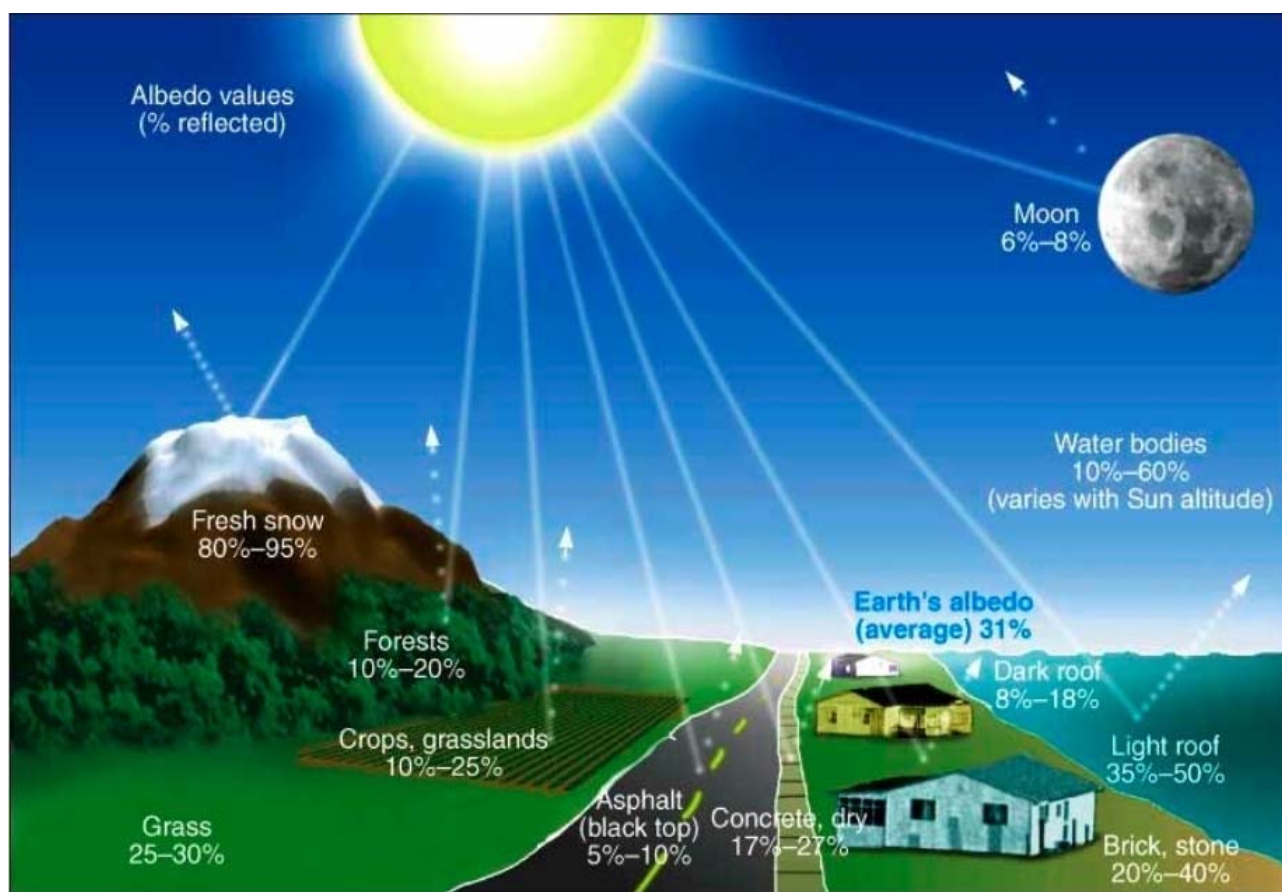


Figure 6-33: Comparative reflection diagram

6.3.7 Overview of the visual issues

Overall the proposed Nyngan Solar Farm would result in impacts on the existing surrounding environment in terms of landscape and scenic values. The proposed solar farm would contrast with the existing landscape character of the region which is typically agricultural fringed with natural scrubland. For many, solar panels are a symbol of sustainability through technology and subsequently are considered to be a positive and interesting addition to the landscape regardless of the fact they contrast with the agricultural setting.

The site is situated upon currently uninhabited, flat, cleared, grazing land. Visibility of the site would be limited to the cleared grazing land to the east of the site, which is typically uninhabited with the exception of an isolated homestead. Visual impacts to the homestead are manageable through a combination of existing mallee scrub vegetation and mitigation measures outlined below. The solar farm would be obscured from view of the nearest residential development, the rural residential precinct of Nyngan located approximately 600m north of the site, by the intervening flood levee.

The proposed development of a solar farm at the proposal site would have a low impact on the existing landscape character of the area. The only visual impact would be apparent within the immediate vicinity of the solar farm however this would be further reduced with boundary and screen planting as proposed in section 7 of the VIA (Appendix F).

6.3.8 Environmental safeguards

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
33	Deterioration of visual amenity during construction	Mitigate impacts	Measures to reduce visual impacts during construction, including but not limited to the following: - Dust reduction throughout the construction process - Prompt restoration of any earthworks required for the construction - Clearing of existing vegetation would be kept to a minimum	Construction	CEMP
34	Deterioration of visual amenity by solar panels and associated infrastructure	Mitigate impacts	Measures include but are not limited to the following: - Colour of above ground infrastructure to be sympathetic to the landscape character - Underground cabling to be utilised if practical - The design and location of ancillary works are to incorporate measures which would reduce the visual impact	Construction Operation	CEMP OEMP
35	Deterioration of visual amenity at surrounding residences	Mitigate impacts	- Visual screen planting is to be undertaken in the form of boundary planting around the solar farm, foreground planting at affected viewpoints and residential tree planting - Tree planting would be undertaken in consultation with relevant landowners to achieve screening for homesteads with a high visual impact to strategically block parts of the development - Species typical of the area (mallee scrub) would be selected to enhance the existing	Post construction	OEMP

SoC	Impact	Objective	Mitigation tasks	Project phase	Auditing
landscape character					
36	Creation of a visual attraction	Maximise visual opportunities	A designated viewing area may be provided where visitors would be able to safely view the solar farm and surrounding landscape.	Construction Operation	CEMP OEMP

6.4 NOISE

6.4.1 Construction noise guidelines

Construction noise is one of the major environmental noise issues in NSW. In July 2009 the NSW Department of Environment, Climate Change and Water released the Interim Construction Noise Guideline, which is specifically aimed at managing noise from construction works regulated by DECCW (DECCW 2009). The construction noise guidelines are intended to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

The guidelines identify sensitive receivers, which include residences, classrooms, hospitals, places of worship and recreational areas such as parks and sports grounds. The guidelines also contain recommended standard work hours for construction activities to minimise potential noise impacts:

- Monday to Friday 7 am to 6 pm
- Saturday 8 am to 1 pm
- No work Sundays or public holidays.

Recommended maximum levels for construction noise at noise sensitive locations are based on the Rating Background Level or RBL, as defined in Section 3.1 of the NSW *Industrial Noise Policy*, 2009. For construction activities with an anticipated duration of more than three weeks, the Guideline provides the following recommended Management Levels:

Table 6-4: Recommended Management Levels for Construction Noise

Time of Day		Management Level, dBA $L_{eq, 15 \text{ min}}$	Comment / Classification
Recommended standard hours	Monday to Friday 7 am to 6 pm	RBL + 10	Noise affected
	Saturday 8 am to 1 pm	75	Highly noise affected
Outside recommended hours	All other times and public holidays	RBL + 5	Noise affected

6.4.2 Existing environment

The proposal site is located in a semi-rural environment on the southern edge of Nyngan. Background noise is generally low. Intermittent noise would currently be emitted from a variety of sources, including farm vehicles and machinery, animals, and traffic noise from the Mitchell Highway, particularly trucks.

Background noise monitoring was carried out by Heggies Pty Ltd at the nearby property 'Springdale' (refer Appendix J). A Rating Background Level (RBL) was calculated, the results of which are outlined in Table 6-5

Table 6-5: Rating Background Levels Relative to Nyngan solar farm site

Location	Rating Background Level (RBL) dBA		
	Day	Evening	Night
'Springdale', Mitchell Highway, Nyngan	32	40	31

Unusually high background noise levels were measured during the evenings on most days. The source of the raised levels is not apparent from the statistical data, however it is suspected to be due to insect activity. This type of noise can be seasonal. For this reason, it is considered prudent to adopt the lower daytime RBL instead of the measured evening level, for the evening period.

Sensitive receivers

Noise sensitive receivers in the vicinity of the proposed solar farm are both commercial and residential. The closest noise sensitive receivers to the proposal site include a horse ranch, 85 m from the site (Targets Lodge), and a residential property located 160 m from the site. Several other residences are within 1 km of the site and a race track is located 900 m to the north. Nyngan Cemetery lies adjacent to the race course. There is a joint landscaping and transport business to the north east of the site. Local schools and churches are located within the township, more than 1 km from the site. A map showing the locations of noise sensitive receivers within 1 km of the site is provided in Figure 6-34. Details of distances between sensitive receivers and the proposal site are provided in Table 2-2.