

This chapter discusses the potential visual impacts the proposed Graspan PV Power Facility may have on the landscape of the proposed site, surrounding area, its characteristic features and on the people who view it. ERM appointed Bernard Oberholzer Landscape Architects in association with MLB Architects and Urban Designers to undertake the required visual specialist study for the proposed development, whose report is appended as *Annex H*. The potential impacts are assessed and mitigation measures to reduce the impacts are outlined below.

10.1

LANDSCAPE CHARACTER

The site is situated on the remaining extent of Farm Graspan (No. 172), approximately 40 km north east of Hopetown in the Northern Cape. Road access is via the N12 National Road and gravel farm roads. The site is about 1.5 km south of the Graspan railway siding.

The area is covered by reddish soils and scattered boulders derived from the Karoo dolerites, with lighter coloured soils of the Ecca shales to the west. There are a number of open calcrete borrow pits near the Graspan railway siding and along the N12 National Road. These give an indication of the substrate in the area. The topography is generally flat with a gentle slope up towards the dolerite hills (referred to as 'koppies') around Klein Kareelaagte to the southeast. A small boulder-strewn dolerite koppie, typical of the region, lies on the northern edge of the site adjacent to the N12. No major drainage features were noted on the site. The Driekops Pan about 1 km southeast of the site is, however, a major feature in the area.

The vegetation of the area typically consists of grassland with a few scattered trees. During the site visit in February the veld was reasonably green as a result of recent rains. The farm immediately to the east is grazed by sheep, and citrus fruit groves occur around the Klein Kareelaagte homestead. The grassland results in the site being visually exposed in terms of vegetation cover.

The study area has a rural character consisting mainly of open grassland, with clumps of trees around farmsteads, such as the Graspan homestead to the west. Farmsteads in the area tend to be 2 km or more apart. The Graspan and Enslin Battle Site, dating to the Boer War (1899), lies some 7 km to the north of the site. The rail line also has some heritage significance.

The N12 is an important visual corridor along the western boundary of the site, and the parallel rail line runs the length of the site. Except for scattered calcrete borrow pits, the rural character of the area is generally intact. Several homesteads, such as Graspan, Spes Bona West and Klein Kareelaagte are

within the viewshed, although distance is a mitigating factor. Railway sidings, such as Enslin and Grasper, have been neglected and are visually run-down.

Figure 10.1 *Landscape Characteristics of the Graspan Site*



Spes Bona West farmstead 2.9km from the proposed solar park. The house is partly screened by trees and oriented to the east.



Klein Kareelaagte farmstead is 1.9km from the proposed solar park. The homestead is partly screened by citrus orchards and trees.



Sheep farming and red termite mounds to the east of the site. The proposed energy facility would be in the middle distance.



Graspan farmstead is 0.5km west of the N12 and about 2km from the proposed solar park. The homestead is screened by trees.



Old calcrete borrow pit near Graspan railway siding. A number of these calcrete diggings occur along the N12 to the west of the site.

The visual impact will be largely limited to the operation phase. However, large machinery will be visible on site as soon as site preparation begins and aspects of the PV power facility will be visible during the construction phase.

The visual impacts will be perceived by two types of receptors, namely:

- receptors located at a fixed point, i.e. dwelling on the site and surrounding areas; and
- receptors who will temporarily come into contact with the PV power facility, such as passing motorists and tourists in the area.

The potential visual impacts are summarised in *Table 10.1*.

Table 10.1 *Impact Characteristics: Visual Impacts*

	Construction	Operation
Project Aspect/ activity	Construction of the PV power facility	Operation of the PV power facility
Impact Type	Direct negative	Direct negative
Stakeholders/ Receptors Affected	Fixed receptors, affected landowners, neighbouring land owners, road users, visitors to the area.	Fixed receptors, affected landowners, neighbouring land owners, road users, visitors to the area.

The potential visual impacts of the PV power facility are determined using a series of quantitative and qualitative criteria. These are rated to determine both the expected level and significance of the visual impacts (Oberholzer *et al*, 2012). *Table 10.2* below describes the visual assessment criteria in relation to the proposed Graspan PV Power Facility.

Table 10.2 *Criteria used to Assess Visual Impacts*

Criteria	Description	Comment
Viewpoint	Viewpoints were selected based on potentially prominent or sensitive viewing positions in the area, from where views of the proposed energy facilities may be obtained.	The proposed facility would be potentially visible from the N12, the rail line and a number of farmsteads. (See <i>Figure 10.3 - Figure 10.7</i>)
Visibility	Determined by distance between the proposed energy facilities and the viewer, as well as by the topography. The degrees of visibility of the key components of the PV power facility in relation to distance are given in <i>Table 10.3</i> .	Given the height and footprint of the proposed solar arrays and related infrastructure, visibility tends to be insignificant beyond 2 km. <i>Figure 10.2</i> shows the distance radii around the site.

Criteria	Description	Comment
Visual Exposure	Determined by the viewshed or view catchment, being the geographic area within which the proposed project would be visible. The viewshed boundary tends to follow ridgelines and high points in the landscape. Some areas within the view catchment area fall within a view shadow, and would therefore not be affected by the proposed energy facilities.	The zone of visual influence of the solar arrays at Graspan tends to fall away beyond a 2 km radius and the visual exposure of the project would therefore be fairly localised. See viewshed in <i>Figure 10.2</i> .
Visual Sensitivity	Determined by topographic features, steep slopes, protected areas, rivers or scenic routes.	Dolerite koppies can be seen as landscape features of importance, while the flattish, low-lying area identified for the proposed solar park would not be visually sensitive. Driekops Pan is 1 km away in a view shadow and would therefore not be visually affected. The N12 is an important National Road and view corridor, but is about 1.2 km away. The Graspan / Enslin battle site is about 7 km away, and the Mokala National Park about 14 km away, and would therefore not be visually affected.
Landscape Integrity	Visual quality is enhanced by intactness of the landscape, and lack of other visual intrusions.	A number of existing visual intrusions, including a rail line, power lines and calcrete borrow pits, reduce the rural intactness of the area. The project would further add to the industrialisation of the rural landscape, but over a fairly limited area within a 1 to 2 km radius.
Visual Absorption Capacity	This is the potential for the landscape to screen or absorb the PV power facility.	Landscape visually exposed, but given the modest height of the solar arrays (3.3 m), some screening by the topography and trees would occur. Would be partly obscured by existing railway and power line infrastructure.
Cumulative impacts	This is the accumulation of visual impacts in the area, particularly in relation to other existing or proposed power facilities and other industrial-type facilities.	There are no other known energy facilities, existing or proposed, within 30 km. (Another solar energy facility is proposed 55 km away at Ruimte on the R705 near Koffiefontein). The proposed solar park will add further industrial-type facilities and power lines to the existing rail and power line infrastructure.

Table 10.3 *Visibility of the PV Panels*

Degree of Visibility	Comments	Distance
Highly visible	Clearly noticeable within the observer's view frame	0 to 1 km
Moderately visible	Recognisable feature within observer's view frame	1 to 2 km
Marginally visible	Not particularly noticeable within observer's view frame	2 to 4 km
Hardly visible	Practically not visible unless pointed out to observer	4 km+

Although the proposed PV power facility is in the Northern Cape, a draft report prepared in 2006 by the Provincial Government of the Western Cape (PGWC), titled *A Strategic Initiative to Introduce Commercial and Land Based Wind Energy Development to the Western Cape*, may be helpful in providing some indicators for solar energy facilities.

No formal guidelines have been published to assist in the design and assessment of solar energy development at the local scale. However, using the guidelines for wind farms as a yardstick, the proposed solar energy facility meets the following criteria:

- The facility is not located in an area of high aesthetic landscape value, or a protected or wilderness area;
- The facility is not located in an area where technical and safety considerations apply;
- The facility is undergoing an assessment in relation to visual impact and other criteria;
- The facility is in large concentrated clusters of solar arrays rather than small, dispersed locations; and
- The facility is located in an area where some visual disturbance to the landscape has already occurred, including farm settlements, quarries, rail lines and power lines.

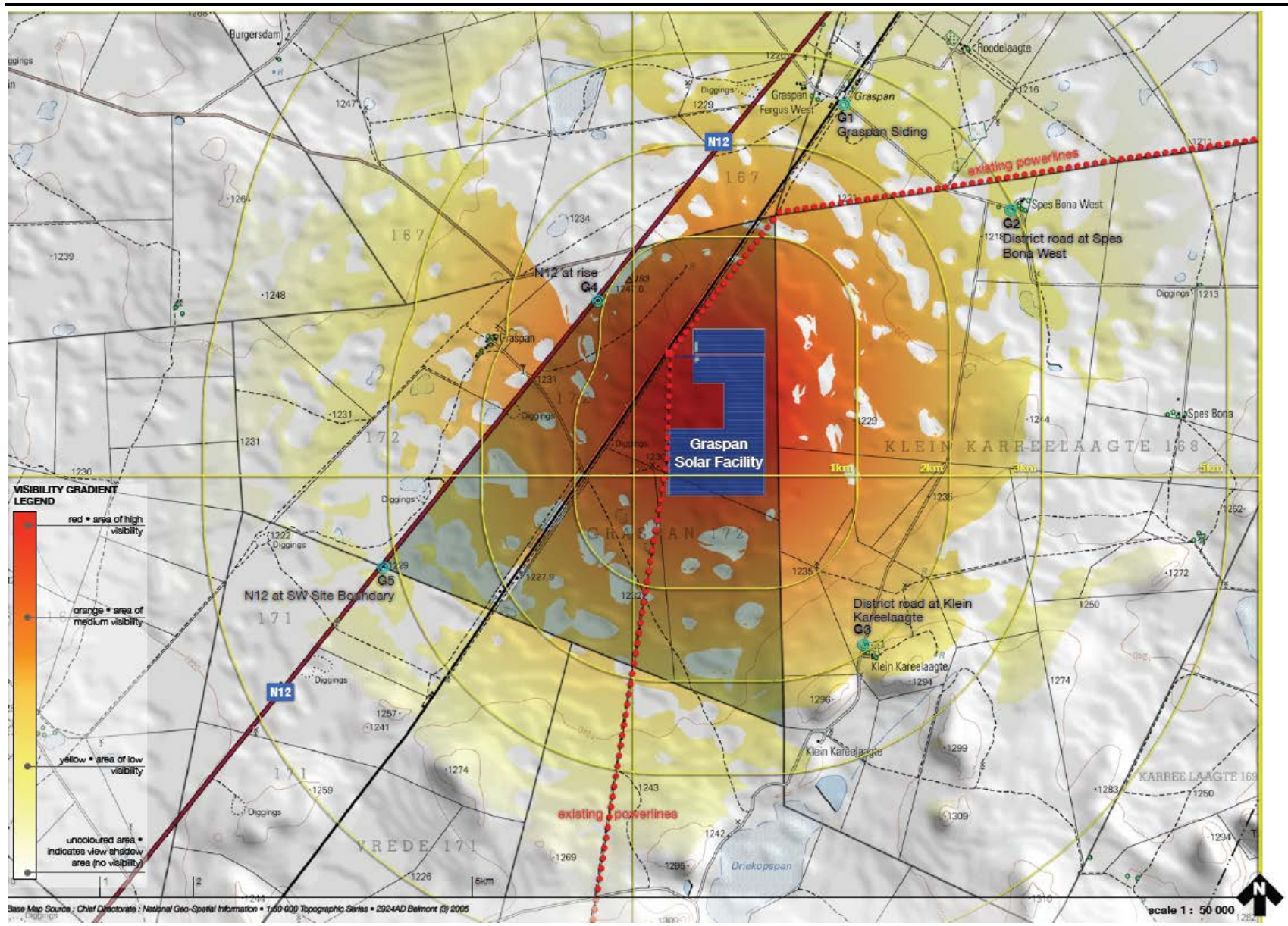
Table 10.4 provides a list of regional criteria, including key criteria to be mapped at a local project level, for proposed wind farms, together with suggested criteria for the proposed solar energy development at Graspan. These criteria have not been legislated, and only serve as guidelines or as possible site constraints.

Table 10.4 *Criteria for Visual Buffers at the Graspan Site*

Criteria	PGWC Regional Level Mapping : Recommended Buffers (2006)	Local Project Level Mapping for the Graspan Site: Suggested Buffers
Urban Areas	800 m	N/a at the Graspan site.
Residential Areas, including rural dwellings	400 m	100 m buffer recommended from homesteads, except where indicated.

Criteria	PGWC Regional Level Mapping : Recommended Buffers (2006)	Local Project Level Mapping for the Graspan Site: Suggested Buffers
National Roads	13 km buffer. Depends on scenic value.	1 km buffer, depending on topography. (The N12 runs along the western boundary of the farm about 1.2 km from the proposed project).
Main Arterial Roads	No indication.	N/a at Graspan.
Local District Roads	500 m (review if high scenic value).	100 m buffer.
Provincial Tourist Route	4 km buffer. Statutory scenic drives.	N/a at Graspan
Local Tourist Route	2.5 km (can be reduced).	N/a at Graspan
Railway lines	250 m.	100 m buffer. A goods railway line runs the length of the site.
Local airfield	To be confirmed with agency.	A landing strip at Hopetown 45 km away, as well as at Oranja, Luckoff and Koffiefontein, all 50 km or more away.
National Parks, Provincial Nature Reserves	2 km. Should be eliminated at regional level.	N/a at Graspan (Mokala National Park is about 14 km to the northwest).
Private Nature Reserves	500 m. To be negotiated at local level.	N/a at Graspan.
Rivers	500 m for perennial rivers.	Hydrologist or ecologist to determine buffers for drainage courses and wetlands. The Driekops Pan is about 1 km away.
External farm boundaries	No indication.	50 m visual buffer recommended. A 30 m building line usually applies.

Figure 10.2 Viewshed for the Proposed Graspan PV Power Facility, including View Points and Distance Radii



The following discussion and integrated assessment of the visual impacts associated with the proposed Graspan PV Power Facility is based on the detailed specialist visual impacts assessment contained in *Annex H* of this report. The visual assessment has been undertaken based on Layout Alternative 2, the preferred and final layout. This layout has taken into account visual aspects and there is therefore inbuilt design phase mitigation already included.

Cumulative visual impacts are not considered to be significant as no other energy facilities are proposed in the general area, and no future expansion of the Graspan PV Power Facility is planned at this stage. However, the addition of inverters, two substations and additional power lines would result in some cumulative visual impacts. The construction of the PV power facility at Graspan may alter the visual character of the landscape, as these features are in contrast to the rural surrounding landscape.

Given that there are no important scenic or tourist resources, that the area is sparsely populated, that there is already a substation on the site and that there are already Eskom power lines and a railway line across the site, it is not believed that the proposed PV power facility would constitute a fatal flaw in terms of visual and landscape considerations, provided that the recommended mitigation measures are adopted.

10.4.1

Construction Phase Impacts

The construction phase impacts are associated with the following aspects:

- Large machinery will be visible on site as soon as site preparation begins;
- Construction activity involves site works (which will create dust);
- Stockpiles of spoil and materials on site; and
- Aspects of the PV power facility will be visible during the construction phase.

Box 10.1 **Construction Impact: Visual**

Nature: Construction would result in a **negative direct** impact on the visual landscape in the area surrounding the site.

Impact Magnitude: Medium

- **Extent:** The extent of the impact is **local**, as the construction activities will be hardly visible beyond 15 km from the site.
- **Duration:** The duration would be **short-term** since it will occur during the construction phase.
- **Intensity:** The intensity will be **medium**, as the activities will be marginally or moderately visible from the national road and from surrounding dwellings.

Likelihood - It is **likely** that this impact will occur.

IMPACT SIGNIFICANCE (PRE-MITIGATION) MODERATE (-VE)

Degree of Confidence: The degree of confidence is **high**.

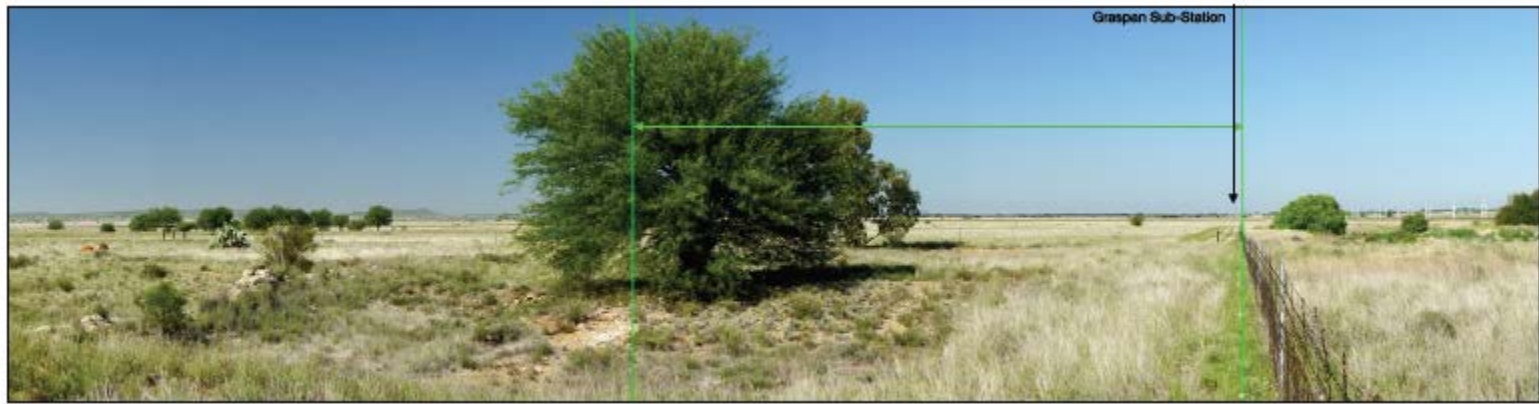
10.4.2 **Operational Phase Impact**

The visibility of the PV power facility influences the intensity and therefore significance of the visual impact associated with the proposed facility. Please see *Table 10.5* and associated *Figure 10.3 - Figure 10.7* for the potential visibility of the facility from specific viewpoints.

Table 10.5 **Potential Visibility of the PV Power Facility from Surrounding View points**

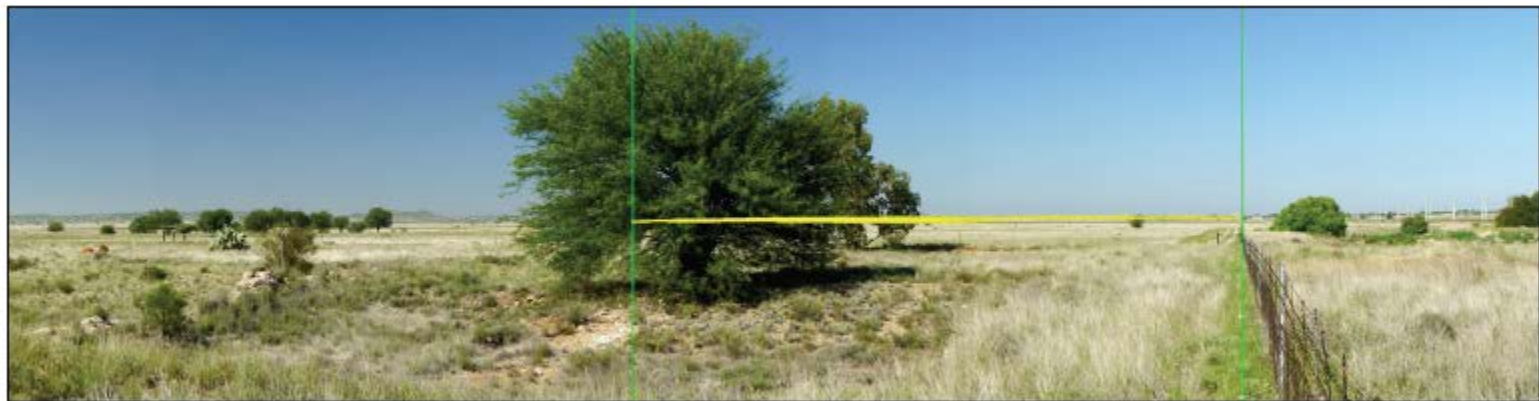
View Point	Location	Distance	Comments
G1	Graspan rail siding	2.5 km	The facility would be marginally visible to the southwest across open grassland. Existing Eskom power lines across the site are in the middle foreground.
G2	Spes Bona West farmstead	2.9 km	The facility would be marginally visible to the southwest across open grassland. The farm house tends to be orientated towards the east, and is surrounded by trees. The existing rail line is 2.2 km from the farmstead.
G3	Klein Kareelaagte farmstead	1.9 km (80 MW) 3.3 km (10 MW)	The facility would be moderately to marginally visible to the northwest across open grassland. The farmstead is partly screened by trees and orchards.
G4	N12 near low koppie on the western edge of the site	1.2km	The facility would be moderately visible to the east across open grassland. The rail line and power line in the middle distance would partly obscure the proposed PV power facility.
G5	N12 on the western corner of the site	3.2 km (80 MW) 4.1 km (10 MW)	The facility would be hardly visible in the distance to the northeast. The rail line and power line in the middle distance would partly obscure the proposed PV power facility.

Figure 10.3 Viewpoint G1 Panoramas



Viewpoint G1 • looking south-west from Graspen railway siding

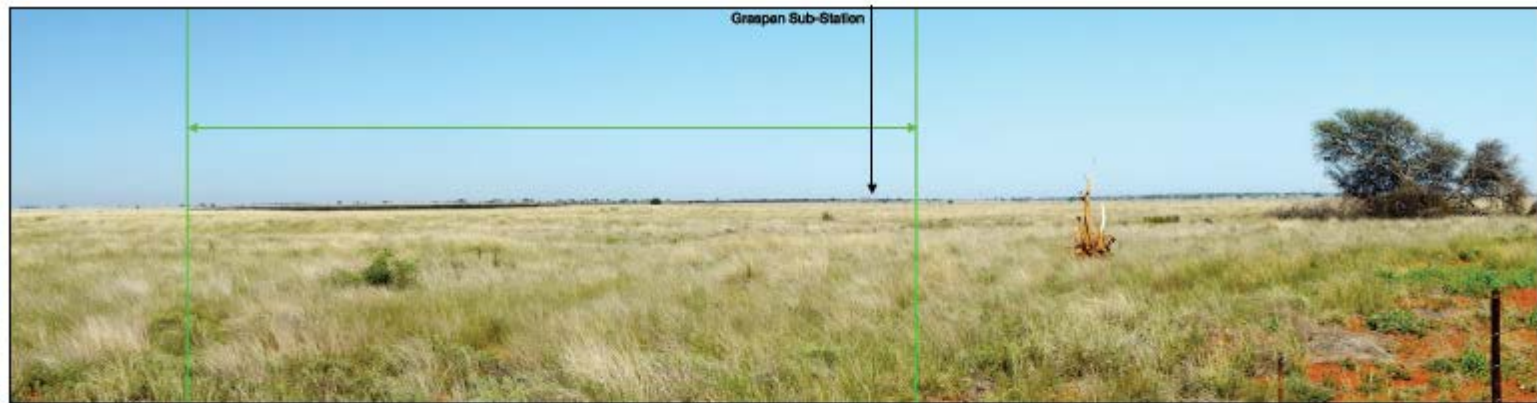
29.3186S, 24.4490E • 24/02/2012 • 09h50



Viewpoint G1 • with solar arrays highlighted in yellow to indicate position

2.5km to closest arrays

Figure 10.4 Viewpoint G2 Panoramas



Viewpoint G2 • looking south-west from district road at Spes Bona West

29.3286S, 24.4669E • 24/02/2012 • 09h59



Viewpoint G2 • with solar arrays highlighted in yellow to indicate position

2.9km to closest arrays

Figure 10.5 Viewpoint G3 Panorama



Viewpoint G3 • looking north-west from district road at Klein Kareelaagte

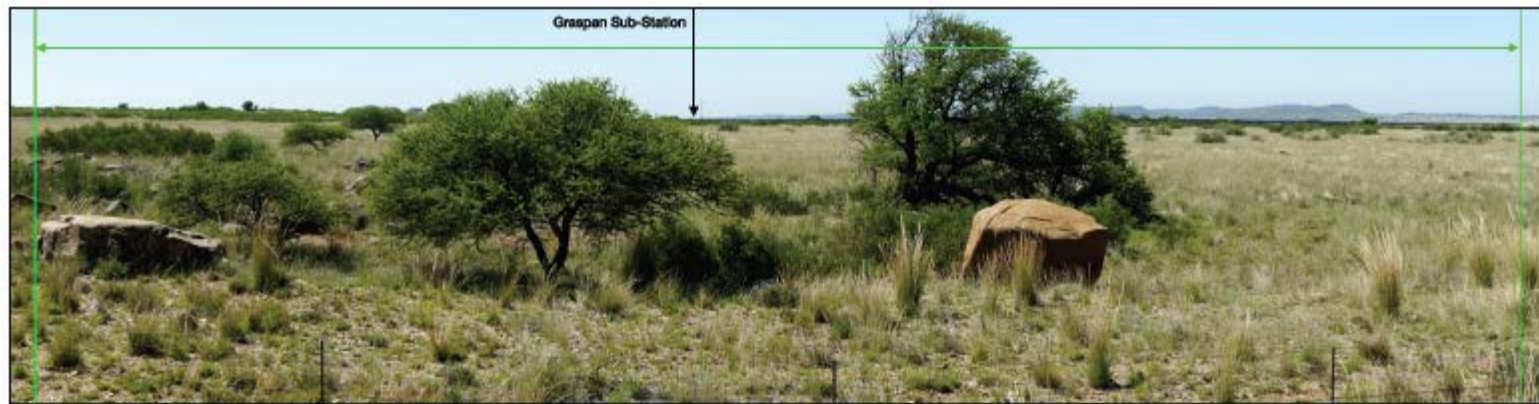
29.3606S, 24.4515E • 24/02/2012 • 10h12



Viewpoint G3 • with solar arrays highlighted in yellow to indicate position

1.9km to closest arrays

Figure 10.6 Viewpoint G4 Panoramas



Viewpoint G4 • looking east from N12 toward Sub-Station

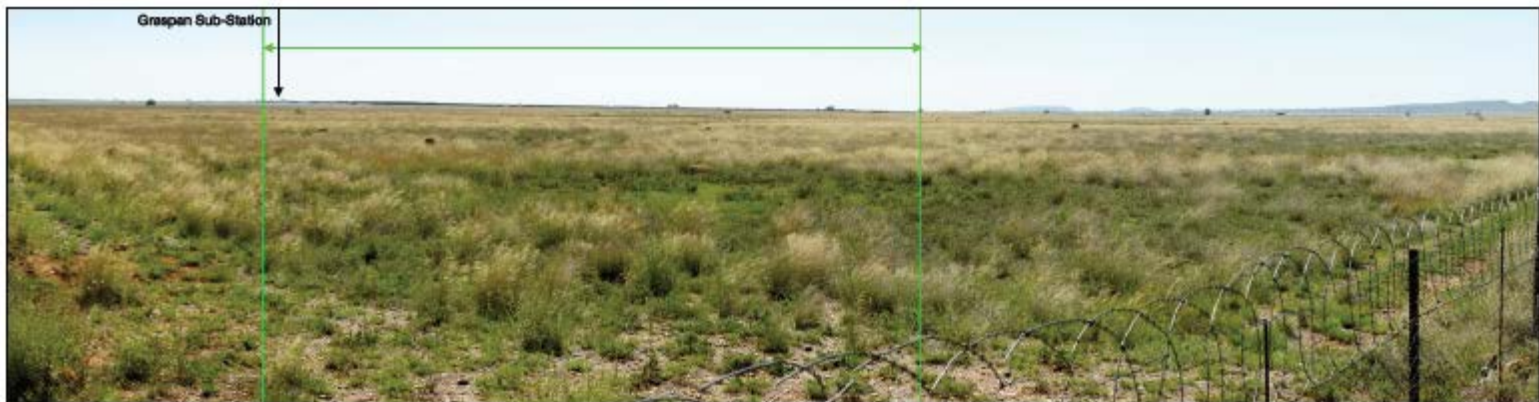
29.3378S, 24.4211E • 24/02/2012 • 10h40



Viewpoint G4 • with solar arrays highlighted in yellow to indicate position

1.2km to closest arrays

Figure 10.7 Viewpoint G5 Panoramas



Viewpoint G5 • looking north-east from N10 at SW boundary

29.3632S, 24.3976E • 24/02/2012 • 10h47



Viewpoint G5 • with solar arrays highlighted in yellow to indicate position

3.2km to closest arrays

Nature: Operational activities would result in a **negative direct** impact on the visual landscape in the area surrounding the site.

Impact Magnitude: Medium

- **Extent:** The extent of the impact is **local**, as the facility will be hardly visible beyond 15 km from the site.
- **Duration:** The duration would be **long-term** since it will persist for as long as the facility remains operational.
- **Intensity:** The intensity will be **medium**, as the PV solar facility will be marginally or moderately visible from the national road and from surrounding dwellings.

Likelihood - It is **likely** that this impact will occur.

IMPACT SIGNIFICANCE (PRE-MITIGATION) MODERATE (-VE)

Degree of Confidence: The degree of confidence is **high**.

10.4.3

*Mitigation**Design Phase*

- Visual buffer zones from the N12, district roads, the rail line and farm boundaries have been recommended in *Table 10.4*, and applied to the layout.
- All cables and power lines should be located underground as far as possible.
- The substations, gatehouses and maintenance and storage buildings should be grouped as far as possible to avoid the scatter of buildings in the open landscape.
- The design of the buildings should be compatible in scale and form with rural buildings, such as farm barns, in the surrounding area.
- All yards and storage areas to be enclosed by masonry walls or screens.
- The colour of the solar array structures, such as the supports and the rear of the panels, should be carefully selected, and to be in the dark grey or green range, to minimise visibility and avoid reflectivity.
- External lighting should be confined to the substation and maintenance areas. Lights should be low-level and fitted with reflectors to avoid light spillage.
- Signage related to the enterprise are to be discrete and confined to the entrance gates. No other corporate or advertising signage, particularly billboards or flags, to be permitted.

Construction Phase

- The construction camp, material stores and lay-down area should be kept tidy.
- The extent of the construction camp and stores should be limited in area to only that which is essential.
- Disturbed areas rather than pristine or intact landscape areas should preferably be used for the construction camp.
- The construction area should be cordoned off to avoid unnecessary damage to the surrounding veld, and penalties applied for unauthorised disturbance or damage.
- Measures to control wastes and litter should be included in the contract specification documents.
- Provision should be made for rehabilitation/ re-vegetation of areas damaged by construction activities, according to the botanist's recommendations and reflected in the Environmental Management Programme (EMPr).

Operation Phase

- The footprint of the operations and maintenance facilities, as well as parking and vehicular circulation, should be clearly defined, and not be allowed to spill over into other areas of the site.
- The operations and maintenance areas should be screened by buildings, walls or tree planting where possible, and should be kept in a tidy state to minimise further visual impact.

10.4.4

Residual

The residual impact significance for the construction phase remains Moderate, and the impact significance remains Moderate for the operational phase as the major mitigation measures had already been taken into consideration prior to the pre-mitigation assessment rating.

Table 10.6 *Pre- and Post-Mitigation Significance: Visual*

Phase	Significance (Pre-mitigation)	Residual Significance (Post-mitigation)
Construction	MODERATE(-VE)	MODERATE(-VE)
Operation	MODERATE(-VE)	MODERATE(-VE)