Annex F

Visual Specialist Study

Proposed Groenwater Solar Power Farm
Near Postmasburg in the Northern Cape by Intikon Energy

Visual Impact Assessment

Draft
25 January 2011

Prepared for
Environmental Resources Management (ERM)
Prepared by
Bernard Oberholzer
Landscape Architect and Environmental Planner
In association with
Quinton Lawson, MLB Architects and Urban Designers

EXECUTIVE SUMMARY

This report is a visual assessment of the proposed solar energy farm by Intikon at the Groenwater site, 30km from Postmasburg, the other Intikon site being Southdrift near Bloemfontein in the Free State .

The **Groenwater** site is in a rural area of the Northern Cape, with mainly farming activities, including cattle, sheep, horses and some game. The solar energy facility, together with the electrical substation, would create an industrial-type feature in the semi-open bushveld landscape. The solar arrays, used for generating solar power, would be visible from the R385 arterial road and the D3381 local district road, as well as from several farmsteads.

Given the relatively flat topography and exposed landscape at Groenwater, and the rural character of the area, it is anticipated that the proposed facility would have a medium-high visual impact before mitigation. The visual impact can, however, be reduced by means of selective screen planting along the external roads and other visual mitigation measures, including setbacks from the local roads.

The potential visual impact of the large substation is also a consideration, the impact ratings being medium before mitigation, and medium for the maintenance and storage building complex. Little mitigation is possible for the substation, while visual impacts of the maintenance complex could be partly reduced by means of visual mitigation measures.

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

The visual impacts of the proposed solar farm on the Groenwater site would tend to be slightly lower than at the Southdrift site, because of the smaller viewshed (approx. 2km radius), and the disturbed nature of the regional landscape resulting from the mining activities and power lines.

CONTENTS

Tables

Figures

SECTION 1: INTRODUCTION

1.1 SCOPE OF THE STUDY

The terms of reference for the visual specialist study relating to the Intikon project are outlined below (ERM, Sept. 2010):

- Collate all available spatial data for 10km radius around the site, including farms, roads, rivers, wetlands, informal settlements, towns, land use data and elevation.
- Develop a 3D model of the study area using available aerial photos and 5m contour data.
- Create a viewshed analysis of the proposed development. The increase in view area to be calculated and shown.
- Identify farms / neighbouring properties affected by the new viewshed.
- Identify sensitive receptors in the viewshed including towns, lodges, tourist routes etc.
- Determine the visual absorption capacity by means of photomontages of the proposed development taken from key locations.
- Describe relevant, implementable mitigation measures to reduce, avoid or minimize negative impacts and enhance positive impacts.
- Identify all relevant legislation, permits and standards that would apply to the development.

1.2 LIMITATIONS AND ASSUMPTIONS

The layouts and size of the various energy facilities are only indicative at this stage, and may change in the detailed design phase. No detailed information about building finishes and colours, as well as lighting were available during the visual assessment, and assumptions had to be made regarding these elements. Similarly, no information on the size and nature of the construction camp and equipment, or the location of borrow pits was available.

1.3 LOCATION OF THE GROENWATER SITE

The site location is indicated on Fig. 1. The Groenwater site is located on the Humansrus Farm about 30km east of Postmasburg in the Northern Cape on the R385.

SECTION 2: APPROACH AND METHODOLOGY

The methodology used for the VIA included the following steps:

- Collection of landscape-related information, and photographic survey of the site and surroundings during a field trip during November 2010;

- Mapping of the proposed energy facilities, including distance circles and critical viewpoints, particularly those relating to intersections of major roads, arterial and scenic routes, as well as settlements and farmsteads;
- Determination of the viewshed, using a digital terrain model (DTM) to determine the area that would be visually affected;
- Preparation of photomontages using panoramic photographs to determine the degree of visibility of the proposed energy facilities;
- Assessment of potential visual impacts, using quantitative criteria, such as visibility and exposure, as well as qualitative criteria such as compatibility and effect on landscape integrity.
- Finally, significance of visual impacts is assessed based on extent, magnitude, duration and probability of the impacts occurring, both before and after mitigation.

SECTION 3: DESCRIPTION OF THE PROJECT IN TERMS OF VISUAL CONSIDERATIONS

Key aspects of the proposed energy facilities that have visual implications are summarised in Table 1 below. It is intended that the proposed development would consist of photovoltaic solar panels with a projected output of up to 160MW, and would occupy a maximum of 450ha (4.5km^2). The north-facing panels would be mounted on metal frames supported by pile foundations. The implementation would involve the removal of any tall vegetation and the construction of access roads between the solar arrays for maintenance.

The proposed facility would require the construction of an electrical substation on the site. In addition, maintenance buildings, offices and some parking would be required on site. The solar panels, together with the substation, which includes large transformers and connections to the grid, would have visual implications for the immediately surrounding area.

Table 1 : List of Energy Facilities at the Groenwater Site

Facility	***Footprint***	***Height***	***Comments***
Solar energy facility	Up to 160MW	n/a	Implemented in 20 to 30 MW phases over approx. 4 years.
Area covered by the solar energy farm	424ha (4.24km^2)	n/a	
Solar arrays	Panel size 16m^2 Arrays 4 x 100m Rows approx. 1km length	3m max.	8m spacing between arrays to allow vehicular access. (See Fig. 3)
Internal access roads	Refer to layout Fig. 2	n/a	6m wide, gravel surface + side drains
Electrical substation	100 x 100m	Single storey building. Transformers various ht.	Plastered and painted masonry buildings. (See Fig. 3).
Electrical pylons	n/a	Ht. unknown	Additional pylons between substation and Eskom power line.
Maintenance and storage buildings	50 x 50m site	Single storey	Probably portal frame structures and container storage. (See Fig. 3)
Parking area	30 x 20m	n/a	Approx. 24 parking bays
Security fencing	n/a	3m	Galv. weldmesh with razor wire top
Security Lighting	Localised	5m	Lighting at entrances and substation. No floodlighting.
Construction Phase:			
Lay down area	10 000m^2	n/a	Temporary gravel hard standing
Construction camp	5 000m^2	Single storey	Temporary prefab structures
Borrow pits	unknown	n/a	To be determined - could be from existing sources in the area.

SECTION 4: DESCRIPTION OF THE AFFECTED ENVIRONMENT

The Groenwater site is briefly described in Table 2 below, including its visual/scenic significance, and visual opportunities and constraints in relation to the siting of energy facilities. Viewpoints and viewsheds are indicated on Figures 4 and 5, and photographic panoramas are given in Figures 6, 7, 8 and 9.

Table 2 : Landscape Description of the Groenwater Site

Location	The site is situated on Humansrus Farm near the small settlement of Groenwater, 30km east of Postmasburg. Road access is via the main R385 Route and D3381 local district road.
Geology	The underlying geology of the area is reported to consist of the Ongeluk Formation, which forms part of the Transvaal Supergroup. This formation consists of andesitic lava with zones of Jasper and agglomerate, as described in the Final Scoping Report (ERM, Nov. 2010). Jasper diggings were noted in the western portion of the site.
Physical Landscape	The topography is gently undulating with low hills, the landforms being a reflection of the weathered geological formations. The site itself lies in a broad, flattish valley, with a small seasonal stream flowing through the southwest portion of the site.
Vegetation Cover	The vegetation of the area is classified as Eastern Kalahari Bushveld, which forms part of the Savanna Biome. The vegetation on the site is dominated by grasses, mainly in the lower lying areas, with scattered trees, mainly Acacias, on the hill slopes.
Visual Significance of the area	The study area has a rural character with pastoral grazing by sheep, cattle and a few horses, as well as game, including springbok, gemsbok and free-roaming kudu. It is an arid landscape, with scattered farmsteads and limited cultivation where irrigation is available. Besides the Jasper diggings, asbestos and diamonds are mined in the general area, resulting in visual disturbance to the landscape.
Opportunities and Constraints	Most of the site sits in a low-lying, flat valley, and therefore has a contained viewshed, which means that the proposed solar energy farm would not be particularly visible beyond a 2km radius. Besides roads, a railway line and Eskom power lines run across the southern portion of the site. There are no important scenic or tourist resources in the vicinity of the site.

SECTION 5: IDENTIFICATION OF APPLICABLE POLICIES, LEGISLATION, STANDARDS AND GUIDELINES

At the national level the following legislation could apply to visual assessments:

The National Environmental Management Act (NEMA) and the Regulations in terms of Chapter 5 of NEMA. (Act No. 107 of 1998).

The Protected Areas Act (PAA) (Act 57 of 2003, Section 17), intended to, inter alia, protect natural landscapes.

The National Heritage Resources Act (NHRA) (Act No. 25 of 1999) and the associated provincial regulations provide legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes.

At the provincial level, the Provincial Government of the Western Cape's Department of Environment and Planning (DEA&DP) is the principal authority involved in the Environmental Impact Assessment (EIA) process and is the authorizing agency in terms of the NEMA regulations. The regulations require a full scoping and EIA Report for electricity generation projects of this size.

In terms of a report by the Provincial Government of the Western Cape on the "Guideline for Involving Visual and Aesthetic Specialists in EIA Processes" (B. Oberholzer, 2005), a full 'Level 4' visual assessment is required.

A draft report has been prepared by the Provincial Government of the Western Cape (PGWC), of 2006, called "A Strategic Initiative to Introduce Commercial and Land Based Wind Energy Development to the Western Cape", which may be helpful in providing some indicators for solar energy facilities.

The PGWC Report of 2006 provides a broad guiding framework for the location of wind energy development in both urban and rural areas, based on the sensitivity and capacity of landscape types and the scale of the project. The Report indicates that, in the rural context, where most commercial wind farms will be located, large scale 'open' landscapes and/or 'disturbed' rural landscapes are preferred for the siting of wind farms. The Report further states the following in the Executive Summary:

A. Commercial Wind Energy development should be **excluded** from:

- Areas of high aesthetic landscape value, particularly national parks and provincial nature reserves and other wilderness areas.
- Areas where technical and safety considerations apply.

B. Wind energy should be **encouraged**:

- At strategic locations identified in a Regional Wind Plan (RWP) to be prepared by the relevant planning authority.
- Where they are well located in terms of visual impact, technical and safety criteria and landscape, environmental and planning criteria.
- In large concentrated wind farms rather than small dispersed locations where the distance between large wind farms is at least 30km, and ideally exceeding 50km.
- In appropriate urban and industrial "brownfield" sites.
- Where visual disturbance to the landscape has already occurred (e.g. power transmission lines).
- At the local scale where individual turbines (not exceeding 50m in total height) could provide power to small users.

Table 7 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 Groenwater. These criteria have not been legislated, and only serve as guidelines.

No formal guidelines have been published for solar energy 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 Groenwater Solar Energy Facility meets the following criteria:

- The facility is not located in an area of high aesthetic landscape value, national parks and provincial nature reserves and other wilderness areas;
- 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, technical, landscape, environmental and planning criteria.
- The facility is in a large concentrated solar farm rather than small, dispersed locations. The distance between large wind or solar farms is at least 30km.
- The facility is located in an area where visual disturbance to the landscape has already occurred (e.g. power transmission lines).

SECTION 6: SPECIFICATION OF RELEVANT VISUAL THRESHOLDS

A visual assessment involves both qualitative, as well as quantitative criteria, to determine changes and possible adverse effects on the environment and the sense of place of the particular location. There are no prescribed thresholds for visual impacts relating to solar energy facilities at the present time. It is therefore suggested that the criteria for wind and solar energy farms given in Table 7 be used as a guide.

SECTION 7: IDENTIFICATION OF KEY VISUAL ISSUES

The public participation process (PPP) to date has provided a number of visual issues (ERM, 2010a). These have been incorporated with issues identified by the visual specialists, and are summarised in Table 3 below. The issues are not seen as impacts, but merely as concerns that will need to be addressed in the visual impact assessment.

Table 3: Key Visual Issues

Potential visual intrusion on sense of place	The rural farmland character, typical of the Northern Cape landscape, would potentially be altered by industrial-type energy facilities, such as the solar arrays, substation, transformers and maintenance buildings. There are, however existing power lines, railway line and roads on and adjacent to the site.
Potential effect on landscape features and scenic resources	The R385 Route, which runs along the northern boundary of the site, is an important arterial road in a rural landscape, but is not a proclaimed scenic route. Cultural and heritage features in the area are being reported on separately.
Potential effect on local inhabitants, visitors to the area and on tourism	The area is sparsely populated, with only a small settlement at Groenwater and a number of scattered farmsteads that could be affected by the proposed solar farm. There are no known tourist facilities in the immediate area. The low height of the solar arrays means that these are not generally visible beyond 2km.
Potential effect of the scale of the project	The scale of the proposed energy facilities, covering some 4.2km^2, along with an electrical substation and maintenance buildings, could have significant visual implications for the immediate surrounding area.
Potential effect of lights at night	There would be an increase in the amount of lights in the area required by the project for safety and security. These would, however be concentrated around the substation and maintenance buildings.
Potential effect of construction and de-commissioning	The scale of the project could result in visual effects relating to the construction of the solar facilities, buildings and access roads. At the end of the life of the project, many of the foundations and roads may remain visible in the relatively open landscape.

SECTION 8: ALTERNATIVES CONSIDERED IN THE IMPACT ASSESSMENT

The selection of Groenwater as a potential site for a solar energy farm was the result of an earlier more extensive site selection process conducted by Intikon, as described in the Final Scoping Report, (ERM, 2010a). A preliminary site layout has also been prepared by Intikon based on a number of criteria, such as site conditions. Alternative site layouts will be developed, based on the results of the specialist studies, including the visual impact assessment, and these will be further assessed in the Environmental Impact Report (EIR). The final selection and design of the solar arrays, as well as related infrastructure, will be informed by technical considerations and the mitigation measures recommended in the specialist studies.

SECTION 9: VISUAL ASSESSMENT CRITERIA

A series of both quantitative and qualitative criteria are used to determine potential visual impacts. These are rated to determine both the expected level and significance of the visual impacts.

(1) Viewpoints (Fig. 4 Table 4)

Viewpoints were selected based on prominent viewing positions in the area, where uninterrupted views of the proposed energy facilities could be obtained.

The proposed facilities would be potentially visible from the R385 arterial road, and a number of surrounding farmsteads.

(2) Visibility (Fig. 4)

Visibility tends to be determined by distance between the proposed energy facilities and the viewer, as well as by the topography. Given the height and footprint of the proposed solar arrays and related infrastructure, and the relatively flat terrain, visibility tends to be significant up to distances of about 2km. Distance radii are shown in Fig. 4 to assist in quantifying visibility of the proposed facilities.

Degrees of visibility in relation to distance tend to be as follows for the solar arrays, based on field observations and photographic panoramas, (see Table 4):

Highly visible:	Clearly noticeable within the observer's viewframe 0 to 1km
Moderately visible:	Recognisable feature within observer's viewframe 1 to 2km
Marginally visible:	Not particularly noticeable within observer's viewframe 2 to 4km
Hardly visible:	Practically not visible unless pointed out to observer 4km+

(3) Visual Exposure (Fig. 5)

Visual exposure is determined by the 'viewshed' or 'view catchment', being the geographic area within which the 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 Groenwater tends to fall mainly within a 2km radius.

(4) Visual Sensitivity

Visual sensitivity is determined by topographic features, steep slopes, protected areas, rivers or scenic routes. At Groenwater, there do not seem to be any landscape features of importance, except for the small stream in the base of the valley.

(5) Landscape Integrity

Visual quality is enhanced by intactness of the landscape, and lack of other visual intrusions. The Groenwater site has an existing Eskom power line, a railway line and some excavations as visual intrusions in the rural landscape.

(6) Visual Absorption Capacity

This is the potential to screen the project. Given the modest height of the solar arrays (±3m), some screening by trees along roads or farm boundaries would be possible.

(7) Potential Visual Impact (Tables 5 and 6)

When the criteria above are considered in combination, an indication of the potential visual impacts can be determined, together with an indication of mitigation measures required.

Table 4 : Potential Visibility (see Fig. 4)

View Pt	Location	Distance	Comments
G1	R385 northern approach	2.0km	Moderately visible from main arterial road. Partly obscured by ridge.
G2	R385 opp. Humansrus Farm	0.8km	Highly visible from main arterial road.
G3	Groenwater settlement	3.0km	In view shadow. Obscured by ridge
G4	D3381 minor road	0.3km	Highly visible in foreground.
G5	D3381 opp. Sunnyside Farm	0.3km	Highly visible in foreground.
G6	D3381 opp. SE corner of the site	0.8km	Highly visible. Partly obscured by ridge.
G7	D3381 at Clifton rail crossing	1.3km	Largely obscured by ridge.

Table 5 : Assessment Criteria and Potential Visual Impacts / Benefits

Criteria	Comments	Solar Arrays	Substation	Maintenance / Storage Bldgs.
Visibility of facilities Distance from selected viewpoints	Views from the R385 arterial road are the most significant, and the D3381 secondary road to a lesser extent.	Medium-high	Medium	Medium
Visibility of lights at night	Visibility, particularly at night, relates to amount of security lighting.	Low	Medium	Medium
Visual exposure Zone of visual influence or view catchment	Determined by topography. Most of the viewshed is within a 2km radius of the site.	Medium	Medium-low	Medium-low
Visual sensitivity Landscape features	Fairly open, visually exposed rural landscape. The solar arrays are fairly low, but cover a large area.	Medium-high	Medium	Medium
Landscape Integrity Effect on character of the area	Contrasts with rural landscape. Existing power lines and railway line are an existing visual intrusion.	High	Medium	Medium
Visual absorption capacity (VAC) Lack of concealment	Low potential of the open landscape to visually absorb structures.	Poor	Poor	Poor
Cumulative visual impact	There are no other energy facilities known in the general area. There will be additional infrastructure in the form of power lines and a substation.	Low	Medium	Medium
Overall impact rating		**Medium-high**	**Medium**	**Medium**

Table 6 : Synthesis of Visual Impacts / Benefits

Criteria	Comments	Solar Arrays	Substation	Maintenance / storage bldgs.
Intensity or magnitude of impact Degree of visual impact.	See ratings in Table 6.	Medium-high	Medium	Medium
Spatial extent Degree of influence over a geographic area - local, district, regional or national.	Little visual effect beyond 5km.	Local	Local	Local
Duration Projected life-span of the proposed project.	Potentially longer than 15 years. (Projected to be ±25 years).	Long-term	Long-term	Long-term
Probability Degree of possibility of the impact occurring.	Little or no opportunity for screening.	Highly probable	Highly probable	Highly probable
Confidence Degree of confidence in predictions.	Based on available information and photo-montages.	High	High	High
Overall significance	Synthesis of criteria	**Medium-high**	**Medium**	**Medium**

SECTION 10: VISUAL MITIGATION MEASURES

The purpose of this section is to recommend practical management actions and alternatives to the project design, which will avoid, minimise, mitigate or compensate for potential negative impacts and enhance benefits. These mitigation measures should be incorporated in the final design and layout of the solar energy facility.

10.1 ESSENTIAL MITIGATION MEASURES

The following are recommended as essential mitigation measures to reduce the visual impact ratings, based on criteria listed in Table 7 below:

1) Visual buffers of 500m for the solar arrays, substation and maintenance buildings from the R385 arterial road, 200m from the D3381 secondary road, and 100m from external farm boundaries.
2) Cables to be located underground as far as possible, particularly where these cross the D3381 secondary road.
3) The substation, which has a high degree of visual intrusion, to be screened from roads by the related buildings and/or tree planting.
4) The maintenance and storage buildings to be clustered as far as possible, with one complex in the northern portion of the site and another, if necessary, in the southern portion. These should be located in low-lying areas and not on the hill slopes.
5) The design of the buildings to be compatible in scale and form with rural buildings of the surrounding area. All yards and storage areas to be enclosed by masonry walls.
6) The colour of the solar array structures, such as the supports and the rear of the panels, to be carefully selected, and to be in the dark grey or green range, to minimise visibility and avoid reflectivity.
7) Signage related to the development to be discrete and confined to the entrance gates. No other corporate or advertising signage, particularly billboards, to be permitted.
8) External lighting should be confined to the substation and maintenance buildings. Lights should be low-level and fitted with reflectors to avoid light spillage.

10.2 CONSTRUCTION MITIGATION MEASURES

1) The construction camp, material stores and lay-down area should be screened as far as possible from the local roads, possibly in the vicinity of the proposed substation and maintenance buildings.
2) The extent of the construction camp and stores should be limited in area to only that which is essential.
3) Disturbed areas rather than pristine or intact landscape areas should preferably be used for the construction camp.
4) Measures to control wastes and litter should be included in the EMP and contract specification documents.
5) Provision should be made for rehabilitation/ re-vegetation of areas damaged by construction activities.

6) Borrow pits for the construction (which have not been identified), would be subject to permits from the relevant authorities.

10.3 OPERATIONAL MITIGATION MEASURES

1) The footprint of the 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.

2) The maintenance and storage areas should be screened by buildings, walls, hedges and/or tree planting, and should be kept in a tidy state to minimise further visual impact.

Table 7 : Criteria for Visual Buffers

Criteria	**PGWC Regional Level Mapping: Recommended Buffers for Wind Farms (2006)**	**Local Project Level Mapping: Groenwater solar energy site**
Urban Areas	800m	n/a at Groenwater site
Residential Areas, including rural dwellings	400m	100m Solar arrays are smaller than wind turbines and require a smaller visual buffer.
National Roads	13km buffer. Depends on scenic value. Can be reduced.	n/a at Groenwater site
Main Arterial Roads	No indication	500m for the R385
Local Roads (district or secondary roads)	500m Review if high scenic value.	200m. (Can be reduced depending on site conditions, such as foreground trees). Solar arrays are smaller than wind turbines and require a smaller visual buffer.
Provincial Tourist Route	4km buffer. Statutory scenic drives.	n/a at Groenwater site
Local Tourist Route	2.5km Assumption. Can be reduced.	n/a at Groenwater site
Railway lines	250m	50m
Local airfield	To be confirmed with agency.	n/a at Groenwater site
National Parks, Provincial Nature Reserves	2km Should be eliminated at regional l evel.	2km
Private Nature Reserves	500m Could be negotiated at local level.	500m
Rivers	500m For perennial rivers at regional level.	Hydrologist to determine site level buffers for perennial and seasonal rivers and wetlands.
External farm boundaries	No indication	100m visual buffer.

Table 8 : Significance of Visual Impacts before and after Mitigation

	Comments	Significance before mitigation	Significance after mitigation
Significance: solar arrays	Significance is increased by the large footprint of the arrays, the open, exposed landscape and proximity to local roads.	Medium-high significance	Medium significance Significance reduced with buffers and screen planting.
Significance: substation	Significance is increased by the size and industrial nature of the substation.	Medium significance	Medium significance Limited opportunity for mitigation.
Significance: Maintenance buildings, parking, roads	Significance is increased by the size and incremental dispersal of the maintenance facilities.	Medium significance	Medium-low significance
Significance: Lights at night	Significance is increased by the open landscape.	Medium significance	Medium-low significance
Significance: Construction phase	Solar panels are manufactured off-site. Prolonged construction period over 4 years.	Medium-high significance	Medium significance
Status		Negative	Negative

SECTION 11: RECOMMENDATIONS FOR MONITORING

This visual impact assessment has identified the need for mitigations in order to reduce potential visual impacts arising from the project. It is therefore recommended that final layouts of the energy facilities, as well as designs for the various buildings be reviewed by ERM and the visual specialists, before construction commences.

Any future additional infrastructure, such as buildings, lighting, masts, or other elements, which could visually intrude on the landscape, should first be reviewed by ERM, or their subconsultants, before being included in the EIA permit.

SECTION 12: CONCLUSION AND RECOMMENDATION

The visual assessment indicates that the potential visual impacts for the proposed solar energy facility would be medium to high before mitigation, and medium after mitigation. Visual impacts for associated infrastructure and the substation would be medium before mitigation, and medium to low after mitigation for the buildings, but remain medium for the substation (see Table 8). Given the large footprint of the proposed solar energy facility, (4.2km^2), it would be difficult to mitigate. However, a number of mitigations have been recommended, which could slightly reduce the visual impact significance.

In conclusion, it is doubtful if the visual impacts on their own would constitute a fatal flaw. However, the solar energy facility should be subject to the visual mitigation measures, described in Section 10 above, in order to reduce the potential visual impacts at the Groenwater site. Because of the smaller viewshed, (approx. 2km radius), the visual impacts would tend to be slightly less than at the Southdrift site.

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 Intikon solar energy facility is planned at this stage. However, the addition of a substation and power lines would result in some cumulative visual impacts.

References

ERM, Sept. 2010. Specialist Terms of Reference for Proposed Solar Power Farms, Northern Cape and Free State. Prepared for Intikon Energy.

ERM, Nov. 2010a. Final Scoping Report: proposed Groenwater Solar Power Farm, Northern Cape. Prepared for Intikon Energy.

Mucina L. and Rutherford MC, (eds), 2006. The Vegetation of South Africa, Lesotho and Swaziland. *Strelitzia 19*. South African National Biodiversity Institute, Pretoria.

Oberholzer, B. 2005. Guideline for Involving Visual and Aesthetic Specialists in EIA Processes. Edition 1. CSIR Report No. ENV-S-C 2005 053 F. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.

Provincial Government of the Western Cape and CNdV Africa, 2006. Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape. Issued by Provincial Government of the W. Cape.

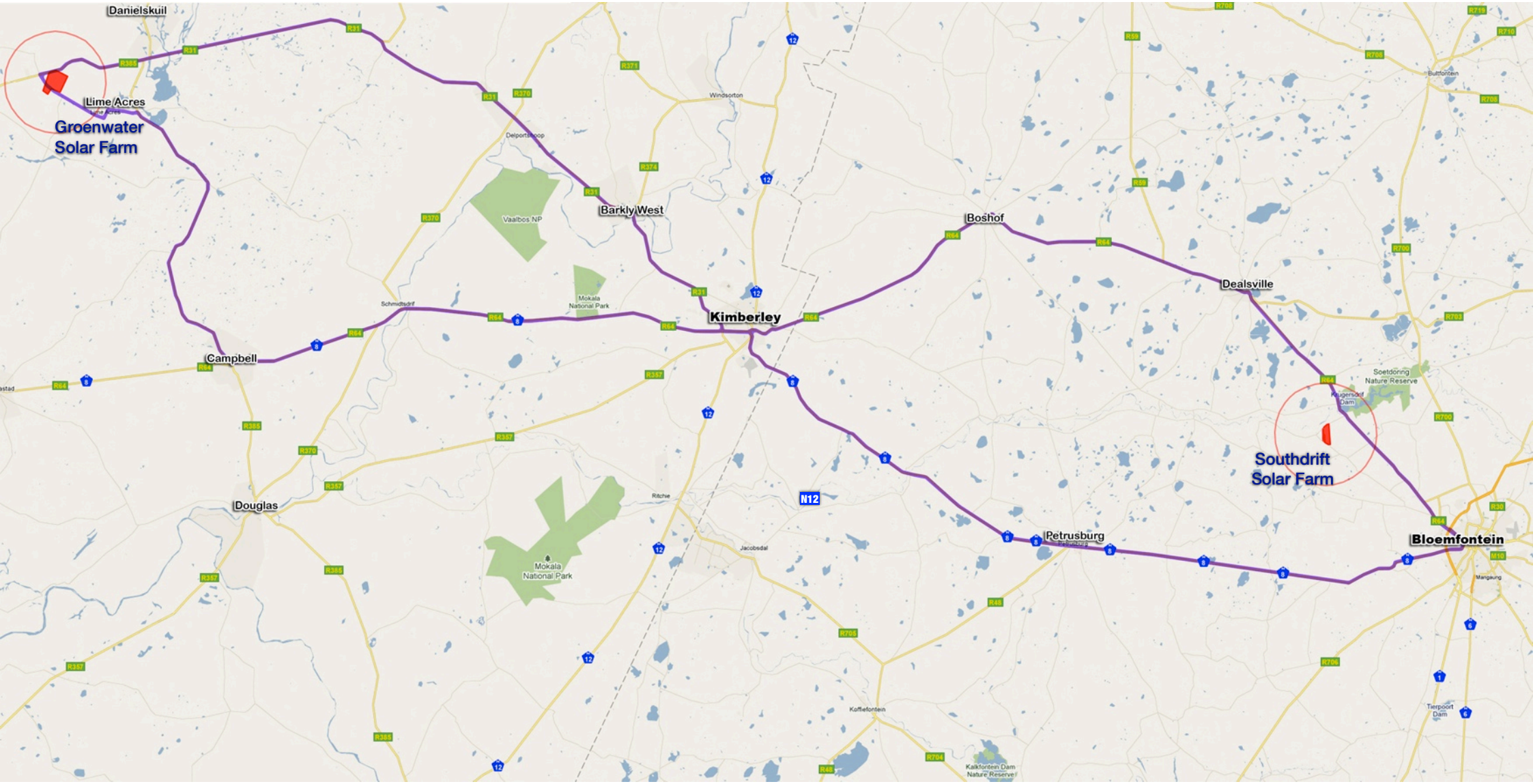


Figure 1 • Intikon Solar Locality Map

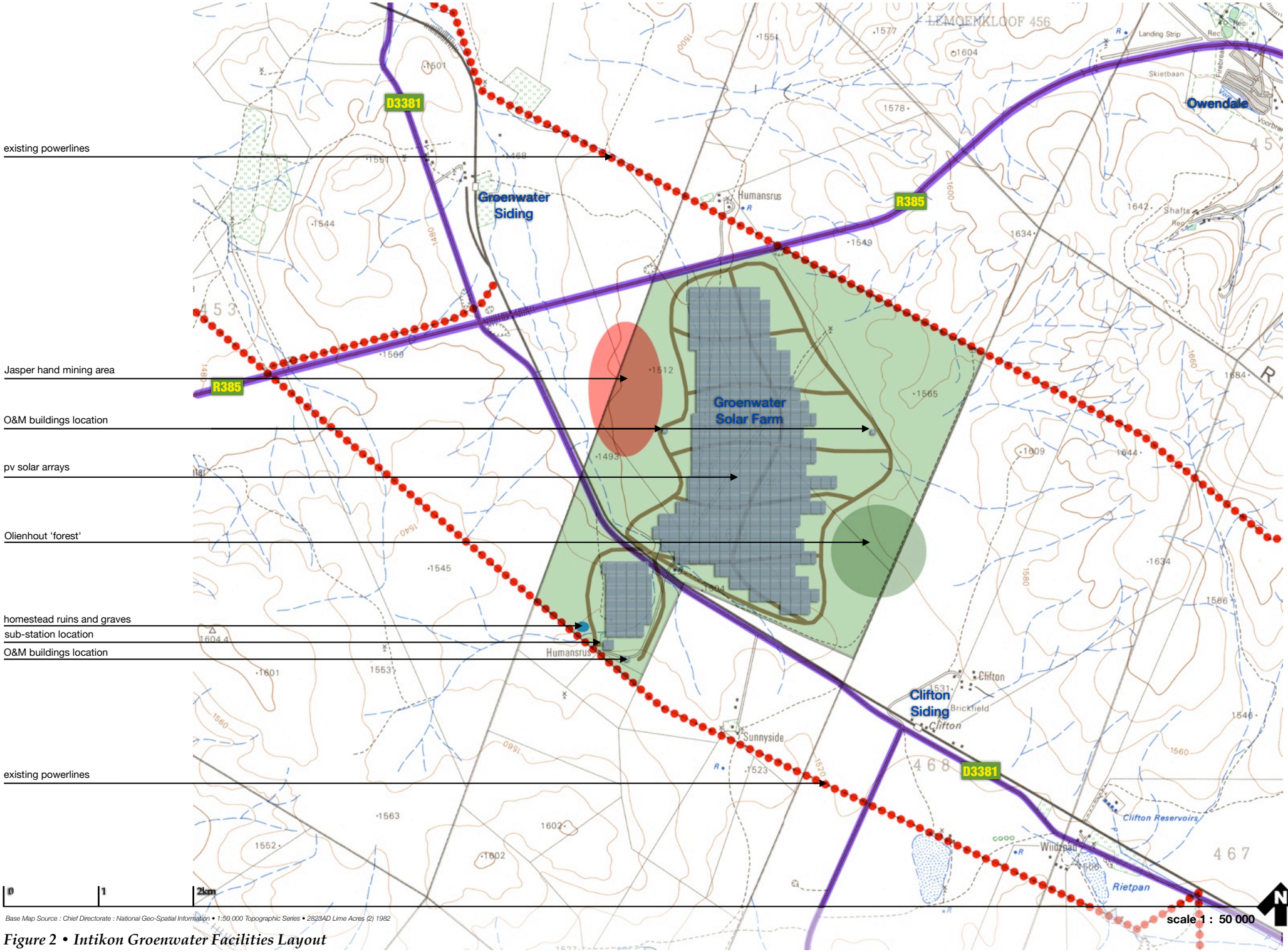
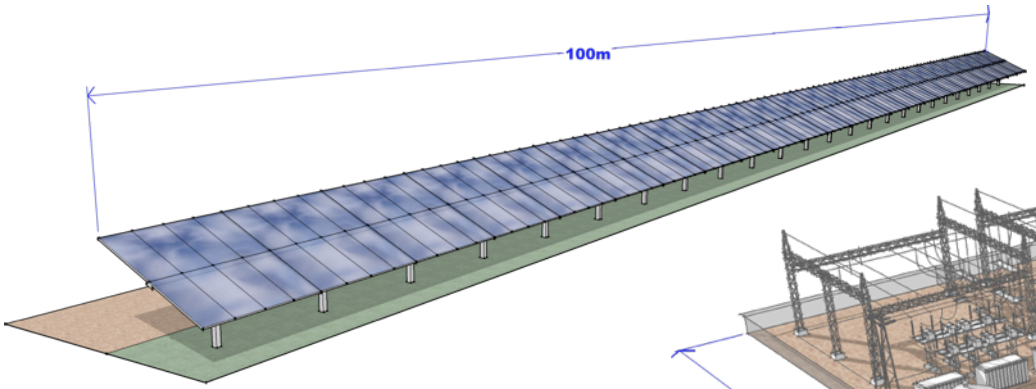
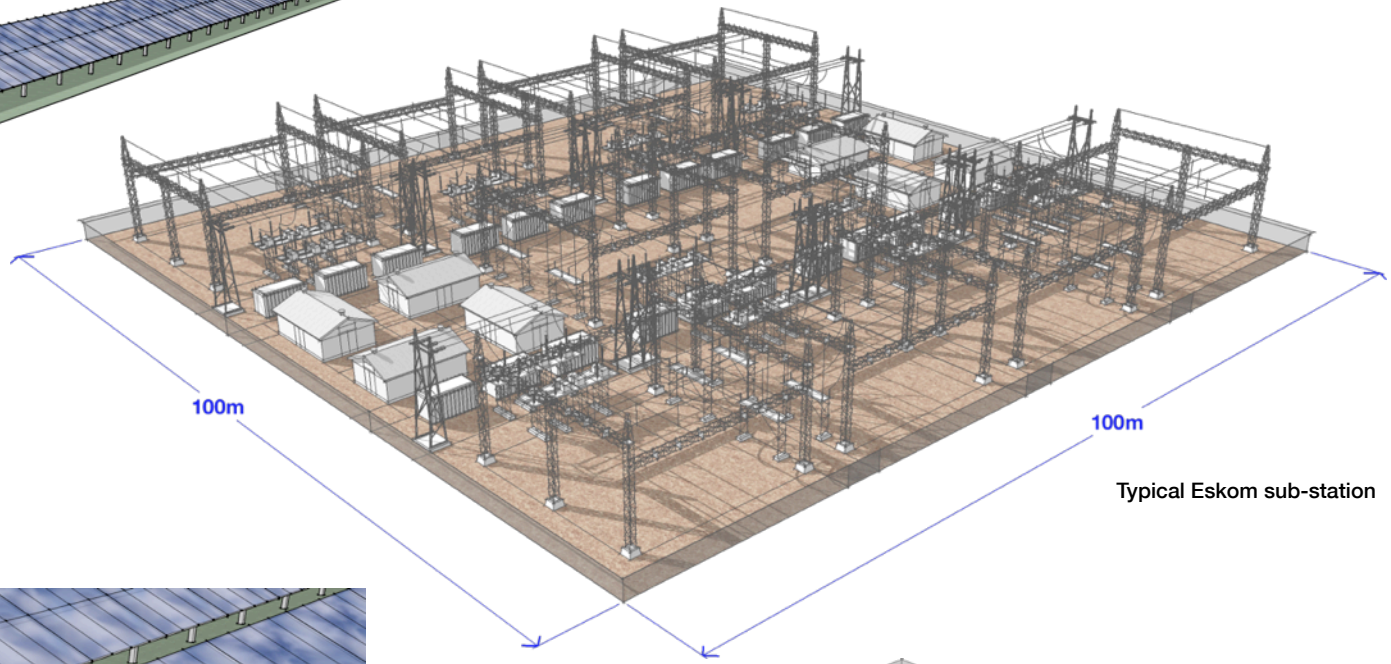


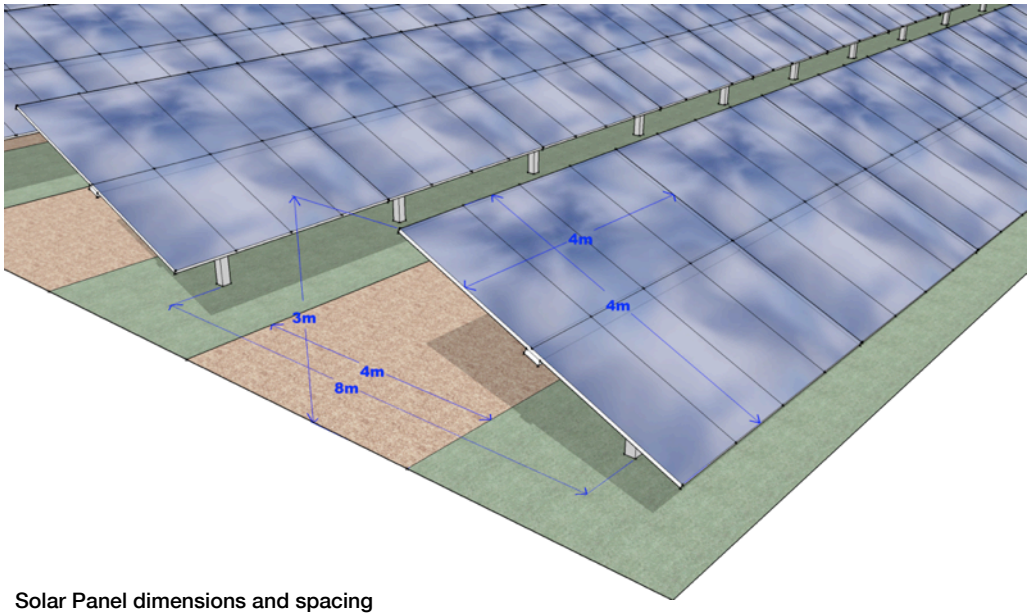
Figure 2 • Intikon Groenwater Facilities Layout



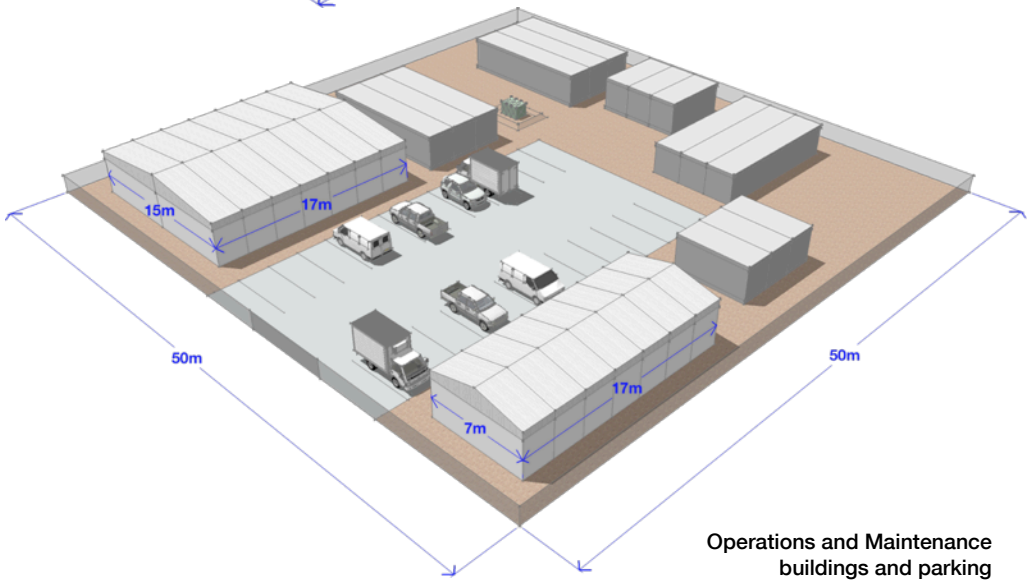
Solar Panel 100m array



Typical Eskom sub-station



Solar Panel dimensions and spacing



Operations and Maintenance buildings and parking

Based on information provided by ERM/Intikon, 3D models by mlb

no scale

Figure 3 • Intikon Groenwater 3D Models of Facilities

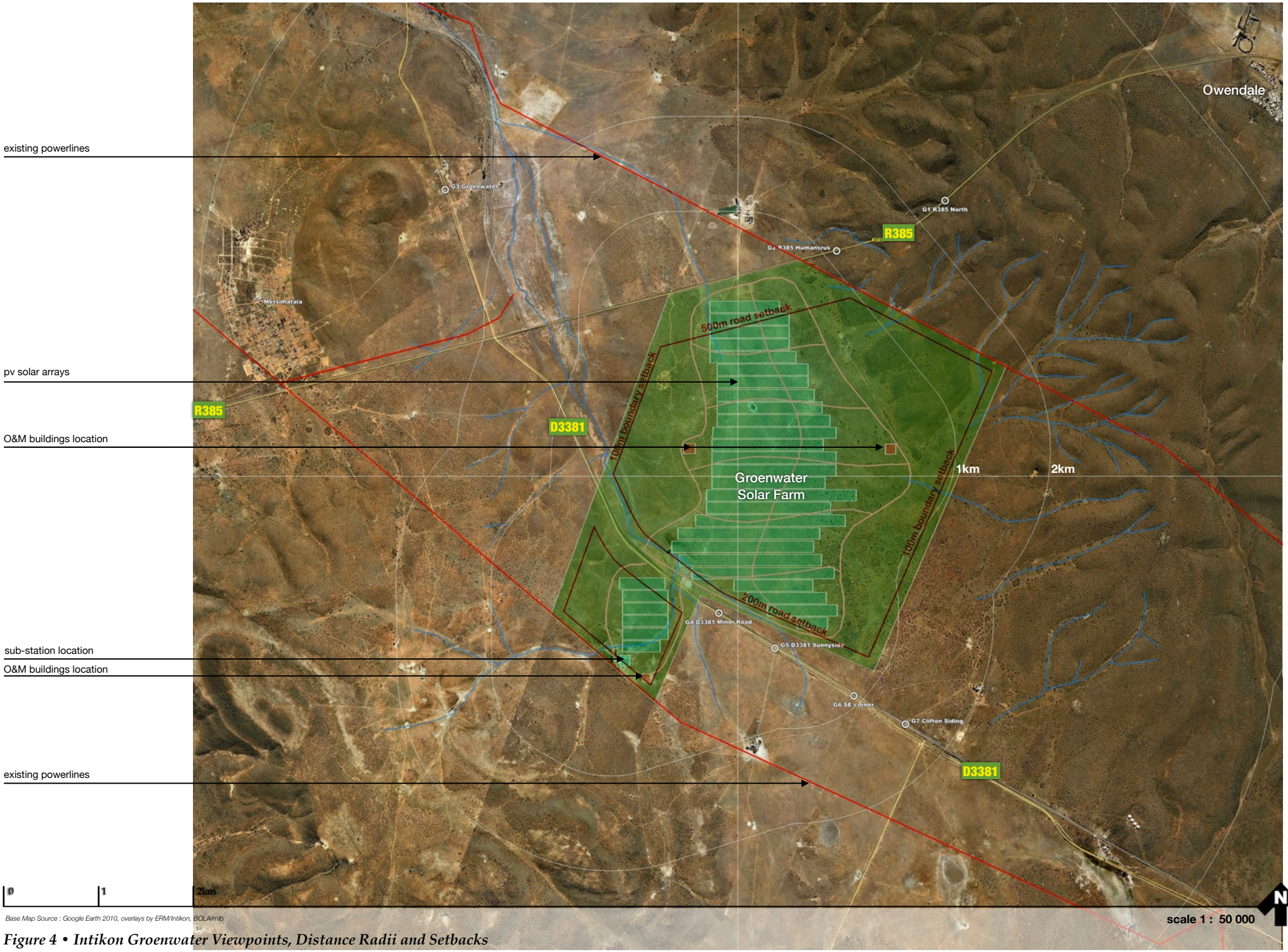


Figure 4 • Intikon Groenwater Viewpoints, Distance Radii and Setbacks

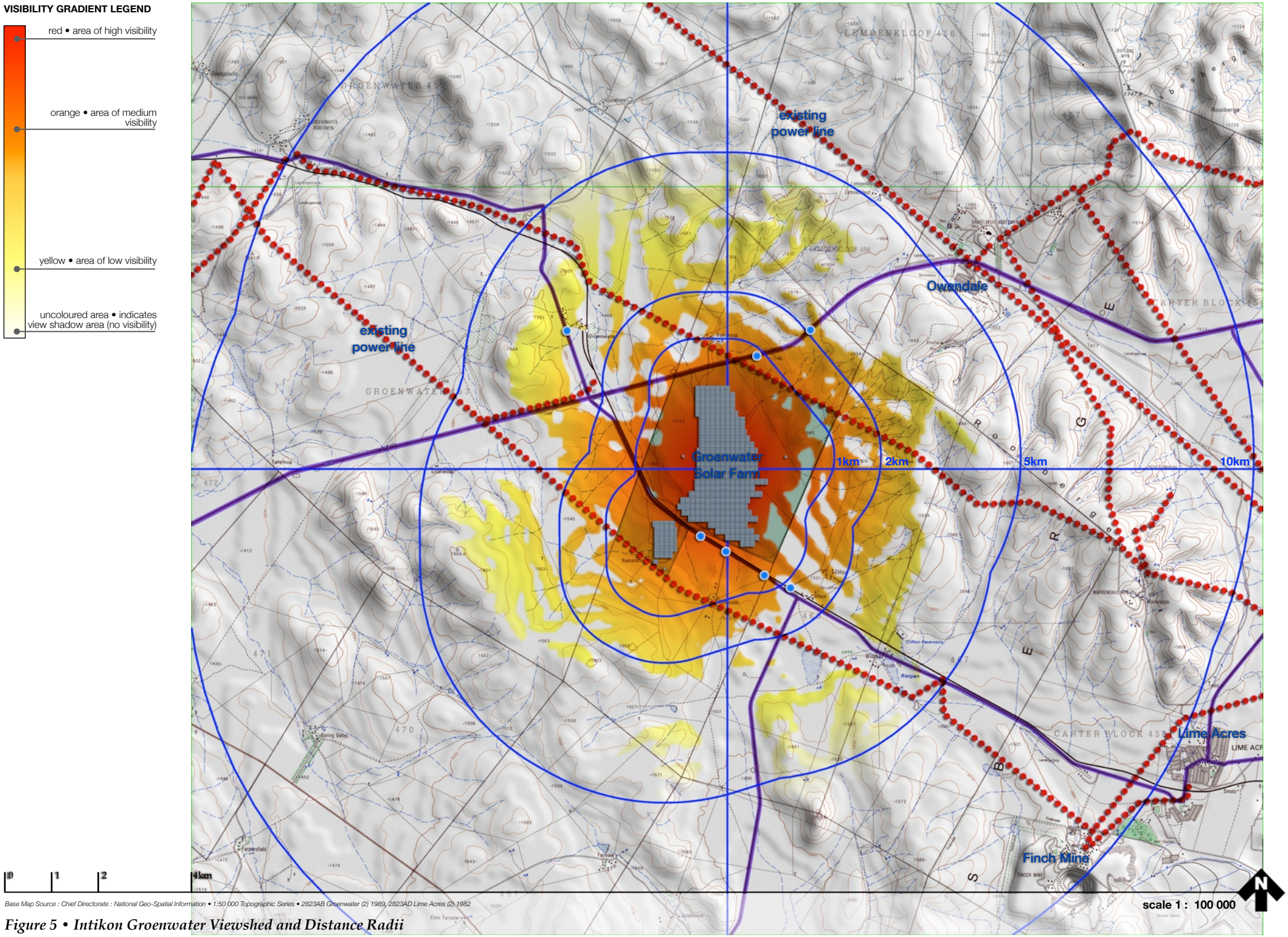


Figure 5 • Intikon Groenwater Viewshed and Distance Radii

Viewpoint G1 Before • looking south-west from the **R385**

28.2782S, 23.3862E • 21/11/2010 • 08h28

Viewpoint S1 After • looking south-west from the **R385**

distance to nearest pv array : 2.03km

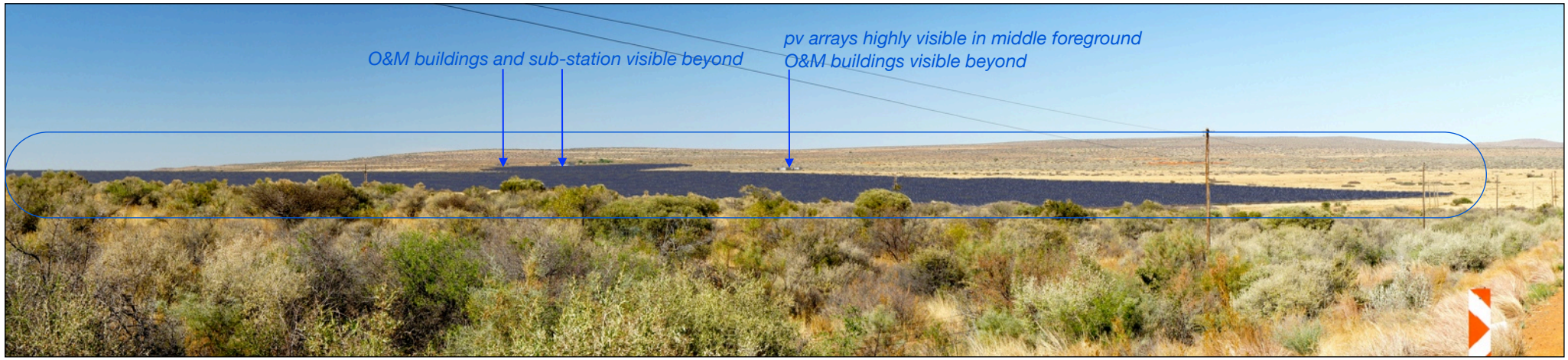
Photomontages by mlb/BOLA : January 2011

no scale

Figure 6 • Intikon Groenwater Photomontage • Viewpoint G1 : North approach from R385

Viewpoint G2 Before • looking south-west from **R385**

28.2829S, 23.3750E • 21/11/2010 • 08h33



Viewpoint G2 After • looking south-west from **R385**

distance to nearest pv array : 845m

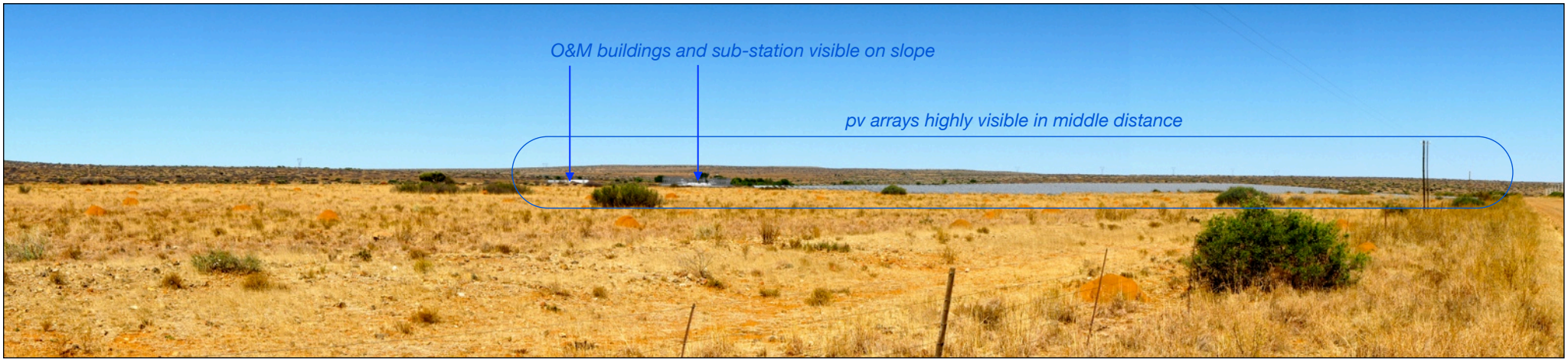
Photomontages by mlb/BOLA : January 2011

no scale

Figure 7 • Intikon Groenwater Photomontage • Viewpoint G2 : R385 opposite Humansrus

Viewpoint G5 Before • looking west from **D3381 at Sunnyside turnoff**

28.3208S, 23.3678E • 21/11/2010 • 08h53



Viewpoint G5 After • looking west from **D3381 at Sunnyside turnoff**

distance to nearest pv array : 1.13km

Viewpoint G5 Before • looking north-west from **D3381 at Sunnyside turnoff**

28.3208S, 23.3678E • 21/11/2010 • 08h58

Viewpoint G5 After • looking north-west from **D3381 at Sunnyside turnoff**

distance to nearest array : 336m

Photomontages by mlb/BOLA : January 2011

no scale

Figure 9 • Intikon Groenwater Photomontage • Viewpoint G5 : D3381 at Sunnyside turnoff