MOEDING SOLAR (PTY) LTD

THE PROPOSED MOEDING SOLAR PV FACILITY, NEAR VRYBURG IN THE NORTH WEST PROVINCE

VISUAL IMPACT ASSESSMENT REPORT

DECEMBER 2018

Prepared by:
Environmental Planning and Design
P.O. Box 50910,
Musgrave Road,
4062

Tel: 083 559 3766
Email: jon@enviroconsult.co.za

Prepared for:
Savannah Environmental (Pty) Ltd
1st Floor, Block 2, 5 Woodlands Drive
Office Park
Cnr Woodlands Drive & Western Service
Road
Woodmead

2191
Tel: 011 656 3237
Fax: 086 684 0547
Email: thalita@savannahsa.com

PREPARED BY

ENVIRONMENTAL PLANNING AND DESIGN

TABLE OF CONTENTS

9 RESIDENTIAL DEVELOPMENT – SEMI NATURAL LCA
10 FARMSTEAD IN THE VICINITY OF THE PROJECT
11 RESIDENTIAL USE ON SMALLHOLDING TO THE WEST OF THE PROPOSED DEVELOPMENT
12 HOMESTEAD CLOSE TO THE N18 TO THE NORTH EAST OF THE PROPOSED DEVELOPMENT
13 THE HUHUDI TOWNSHIP TO THE NORTH OF THE PROPOSED DEVELOPMENT
14 TIGER KLOOF COMBINED SCHOOLS
15 ROADS INCLUDING THE N18 AND THE R34
16 EXISTING MV OVERHEAD CABLES ON THE WESTERN SIDE OF THE N18 APPROACHING THE PROPOSED SITE
17 PV ARRAY VIEWED FROM ABOVE
18 PV ARRAY VIEWED FROM BEHIND AND THE SIDE
19 PV ARRAY SCREENED BY LOW VEGETATION
20 EXISTING SOLAR ARRAYS AT UPINGTON AIRPORT AS SEEN FROM THE AIR
21 EXISTING ARRAY SEENIN A FLAT LANDSCAPE FROM APPROXIMATELY 700M
22 EXISTING ARRAY SEENIN A FLAT LANDSCAPE FROM APPROXIMATELY 1500M
23 EXISTING ARRAY SEENIN A FLAT LANDSCAPE FROM APPROXIMATELY 5000M
24 VIEW OF A 132KV OVERHEAD POWER LINE SIMILAR LINE TO THAT PROPOSED

1 INTRODUCTION

1.1 GENERAL

This visual impact assessment (VIA) study forms part of the Basic Assessment process that is being undertaken for the proposed Moeding PV Facility (Moeding Solar)by Savannah Environmental (Pty) Ltd on behalf of Moeding Solar (Pty) Ltd.

In terms of the amended National Environmental Management Act (NEMA) Act No. 107 of 1998, the proposed development requires Environmental Authorisation (EA). A key impact to be assessed comprises the visual impact that the facility will have on surrounding areas.

This Visual Impact Assessment Report has been prepared for inclusion in the project Basic Assessment Report.

1.2 PROJECT LOCATION

The proposed Solar Photovoltaic PV Facility will be located on the following properties

- Portion 1 of the farm Champions Kloof 731,
- Portion 4 of the farm Waterloo 730,
- Remaining Extent of Portion 3 of the farm Waterloo 730.

The site is located approximately 10 km south of Vryburg. **(Map 1: Site Location Map).**

No site alternatives are under consideration for the proposed development.

1.3 BACKGROUND OF SPECIALIST

Jon Marshall qualified as a Landscape Architect in 1978. He has also worked as an Environmental Impact Assessment Practitioner within South Africa. He has been involved in Visual Impact Assessment over a period of approximately 30 years. He has developed the necessary computer skills to prepare viewshed analysis and three dimensional modelling to illustrate impact assessments. He has undertaken visual impact assessments for tourism development, major buildings, mining projects, industrial development, infrastructure and renewable energy projects. He has been involved in the preparation of visual guidelines for large scale developments.

A brief Curriculum Vitae outlining relevant projects is included as **Appendix I.**

1.4 BRIEF AND RELEVANT GUIDELINES

The brief is to assess the visual impact that the facility will have on surrounding areas.

Work was undertaken in accordance with the following guideline documents;

a. The Government of the Western Cape Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Western Cape Guideline), which is the only local relevant guideline, setting various levels of assessment subject to the nature of the proposed development and surrounding landscape, and

b. The Landscape Institute and Institute of Environmental Management and Assessment (UK) Guidelines for Landscape and Visual Impact Assessment which provides detail of international best practice (UK Guidelines).

Refer to **Appendix III** for the Western Cape Guideline.

Together these documents provide a basis for the level and approach of a VIA as well as the necessary tools for assessment and making an assessment legible to stakeholders.

1.5 LIMITATIONS AND ASSUMPTIONS

The following limitations and assumptions should be noted:

In the assessment tables the subjective judgement as to whether an impact is negative or positive is based on the assumption that the majority of people are likely to prefer to view a natural or a rural landscape than an industrial landscape.

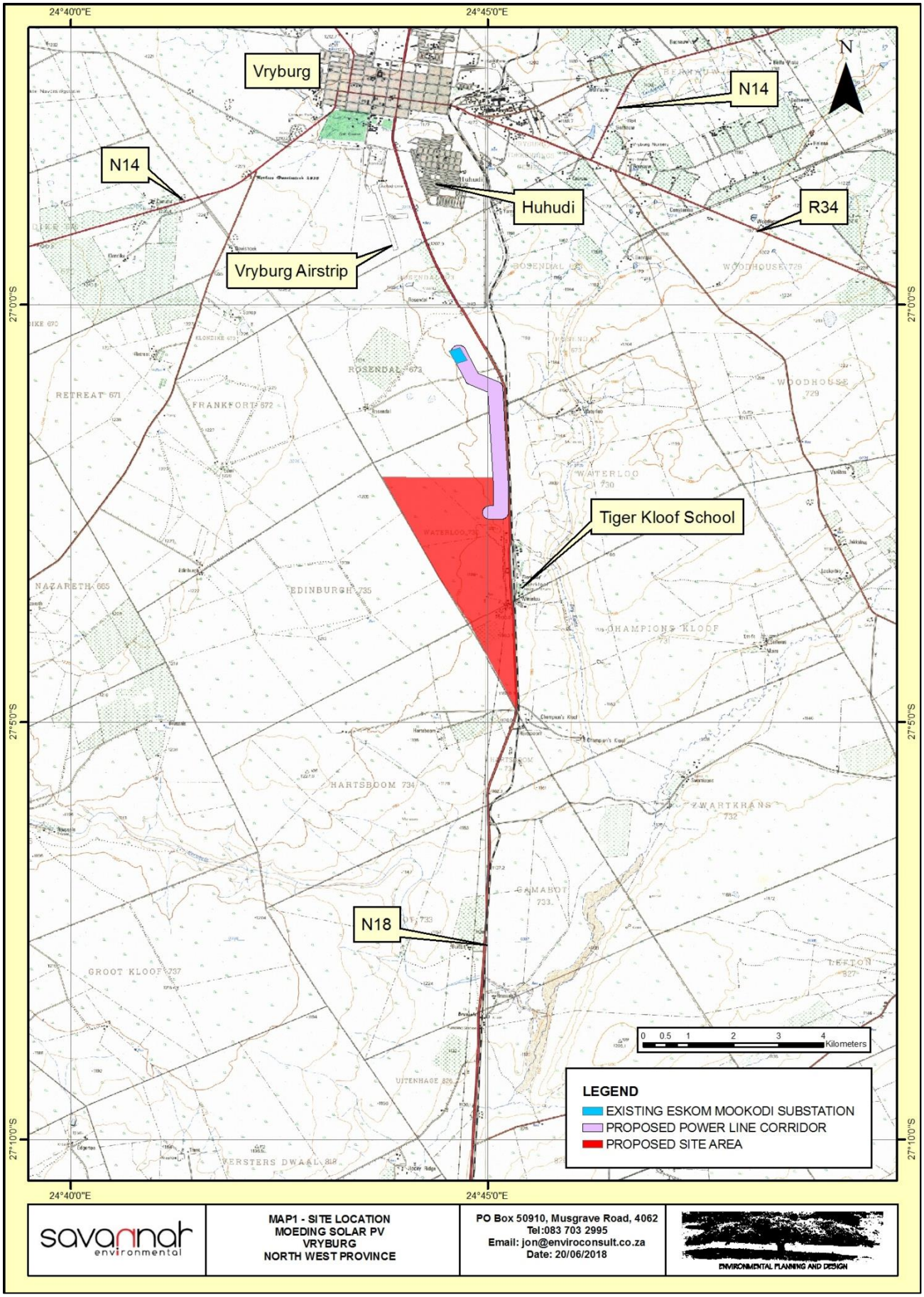
A site visit was undertaken on a single day (24th June 2018) to verify the likely visibility of the proposed development, the nature of the affected landscape and affected receptors.

The site visit was planned to ensure that weather conditions were clear ensuring maximum visibility.

The timing of photography was planned to ensure that the sun was as far as possible behind the photographer to ensure that as much detail as possible was recorded in the photographs.

The approximate extent of the development visible from each viewpoint as indicated in Section 5.6 has been has been approximated by measuring on plan the angle of the view that the development occupies given that each view was taken with a 28mm lens which has an approximate angle of vision of just over 74°. This has been cross referenced with known land marks.

MAP 1, SITE LOCATION



2. PROJECT DESCRIPTION

2.1 MOTIVATION AND CONTEXT

In response to the Department of Energy's requirement for new base load generation, the applicant is proposing the establishment of a photovoltaic (PV) solar energy generation facility with a generating capacity of up to 100MW to generate electricity for input into the national grid to augment Eskom's power supply.

Considering the impact that carbon emissions from existing coal-fired power stations have on the environment, PV panels are designed to operate with low maintenance and no ongoing carbon emissions for more than 20 years.

The project is proposed to be part of the Department of Energy's (DoE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme.

The area within which the project is proposed has been identified as a key area for renewable energy generation by the South African Department of Environmental Affairs in their strategic assessment which identifies seven Renewable Energy Development Zones (REDZ). The area in which this project is located is the Vryburg REDZ 6.

The objective of this strategic assessment is to focus renewable energy projects within the most suitable areas. This also has the benefit of ensuring that less suitable areas are likely to be relatively undeveloped.

Map 2 (Project Context) indicates all currently proposed renewable energy projects within REDZ 6. From reference to this map and the DEA's Renewable Energy Database, there are 23 similar projects proposed within 30km of Moeding Solar. The proposed project is located in an area where there is a cluster of twelve other PV solar projects as listed below. Because these projects are located in close proximity to each other, there is potential for a cumulative visual impact as they may either be seen in the same view or in relatively rapid succession for travellers on roads passing through the area.

Due to the distance from other projects in the REDZ6, there is no potential for them to contribute to a cumulative visual impact associated with Moeding Solar.

Map Key	Project Description
A	AMDA Klondike (3x PV)
B	ABO Wind Vryburg Solar 2 & 3 (2x PV)
C	Subsolar Sonbesie (1x PV)
D	ABO Wind Vryburg Solar 1 (1x PV)
E	Biotherm Sedawo (3x PV)
F	Subsolar Protea (1x PV)
G	Kabi Solar Tiger Kloof (1x PV)
H	Subsolar Rosendal (1x PV)
I	Subsolar Waterloo (1x PV)
J	Subsolar Kubu (1x PV)
K	Subsolar Gamma (1x PV)

L	Genesis Eco-Energy Woodhouse (2x PV)

refer to Map 2, Project Context.

2.2 DESCRIPTION

Refer to Map 3, Site Location

The application is for construction of a commercial photovoltaic (PV) solar energy facility as well as all associated infrastructure. The contracted capacity of the proposed solar energy facility will be up to 100 MW.

The proposed project will cover an approximate area of 3040ha.

The solar PV array will be comprised of the following components namely:

- Arrays of PV panels (either a static or tracking PV system) with a capacity of up to 100MW;
- Mounting structures to support the PV panels. The applicant has confirmed that the structures including PV panels will be a maximum 5m high;
- On-site inverters to convert the power from a direct current to an alternating current and an on-site substation to facilitate the connection between the solar energy facility and the Eskom electricity grid;
- A new 132kV power line between the on-site substation and the Eskom grid connection point (two alternatives will be assessed);
- Battery storage with up to 6 hours of storage capacity;
- Cabling between the project components, to be laid underground where practical;
- Offices and workshop areas for maintenance and storage;
- Temporary laydown areas;
- Permanent laydown area; and
- Internal access roads and fencing.

It is possible that the facilities could either be developed as static, fixed mounted PV systems or tracking PV systems.

Tracking systems can utilize single axis of duel access trackers. A 'single axis tracker' will track the sun from east to west, while a dual axis tracker will in addition be equipped to account for the seasonal waning of the sun. These systems utilise moving parts and complex technology, including solar irradiation sensors to optimise the exposure of PV panels to sunlight.

2.3 MAIN PROJECT COMPONENTS

A solar energy facility typically uses the following primary components:

2.3.1 Photovoltaic Panels

Solar photovoltaic (PV) panels consist primarily of glass and various semiconductor materials and in a typical solar PV project, will be arranged in rows to form solar arrays. The PV panels are designed to operate continuously for more than 25 years with minimal maintenance required. It is envisaged that the plant will operate after this design lifetime.

2.3.2 Support Structure

The photovoltaic (PV) modules will be mounted to steel support structures. These can either be mounted at a fixed tilt angle, optimised to receive the maximum amount of solar radiation and dependent on the latitude of the proposed facility, or a tracking mechanism where at a maximum tilt angle of 45°.

2.3.3 Inverters

The photovoltaic effect produces electricity in direct current (DC). Inverters must be used to change DC to alternating current (AC) for transmission in the national grid. The PV combining switchgear (PVCS), which is dispersed among the arrays, collects the power from the arrays for transmission to the project's substation.

The inverters have a height of approximately 2.81m.

It is estimated that 19 inverters will be distributed within the project. It is likely that the inverters will be bolted to concrete pads that are similar in footprint size to the inverters.

2.3.4 Transformer

The inverters feed AC current to the on-site substation which steps it up for transmission of the power to the national grid.

2.3.5 Grid Connection

Two grid connection alternatives are being considered:

1. Direct connection to the existing Mookodi Substation located approximately 4.5km north of the project site, a 300m wide corridor has been identified for this; and
2. A turn-in turn-out connection into the future Mookodi - Magopela 132kV power line.

The height of the gantries of a 132kV power line is approximately 25M - 28m.

Monopole or lattice towers might be used for Alternative 1.

The Mookodi - Magopela 132kV power line is proposed along the eastern boundary of the project site. This possible use of this alternative is subject to timing of construction. The project has been authorised.

2.3.6 Other Infrastructure

Other infrastructure will include a small office building and control room, a work shop a 2m to 3m high fence and a permanent access road linking directly to the N18.

2.3.7 Temporary Works

A lay down area of 10ha will be required during the construction phase of which 2ha will be permanent.

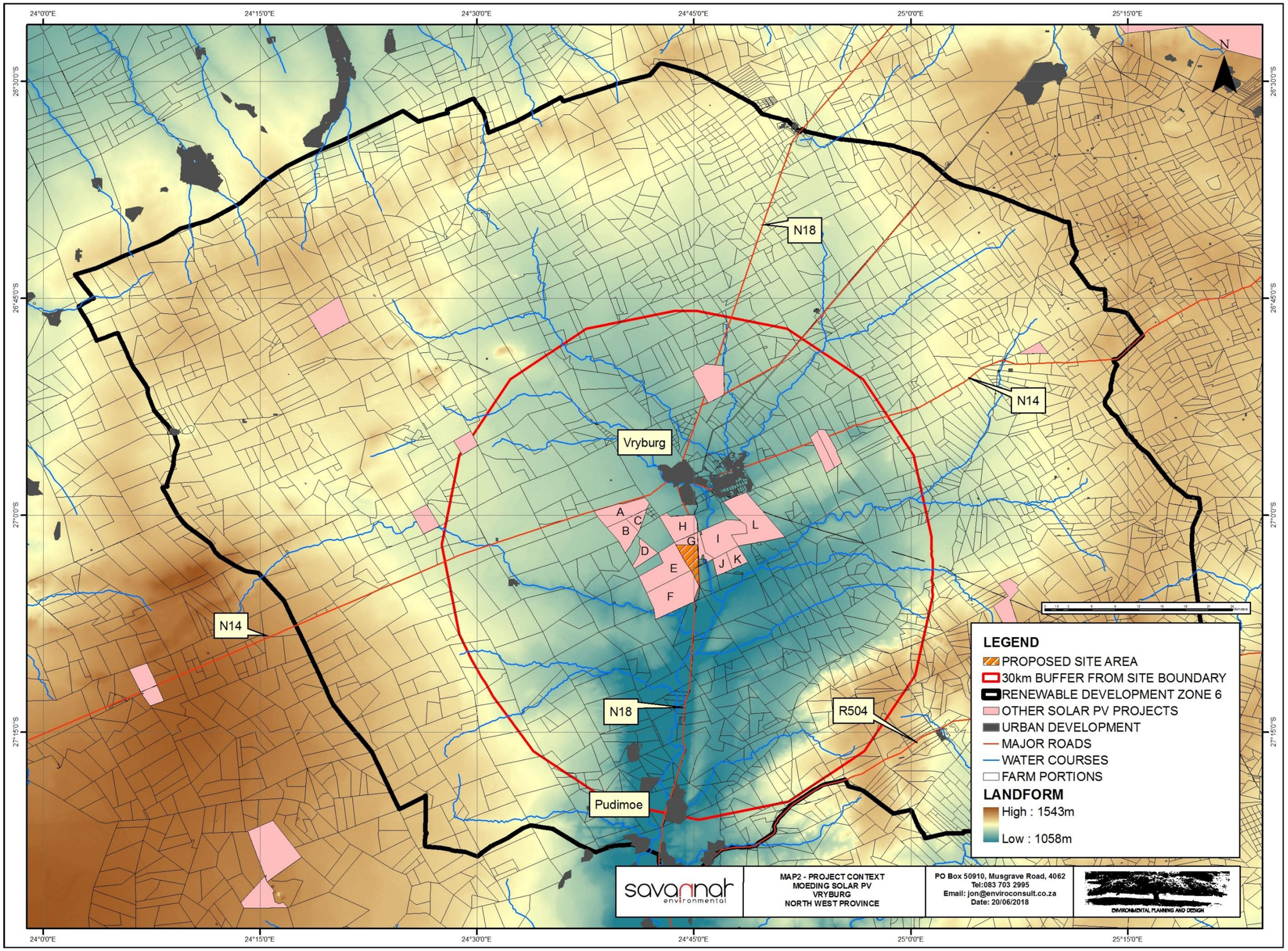
Refer to **Map 3** for the proposed site layout.

Plate 1, Existing Mookodi 400/132kV Substation.

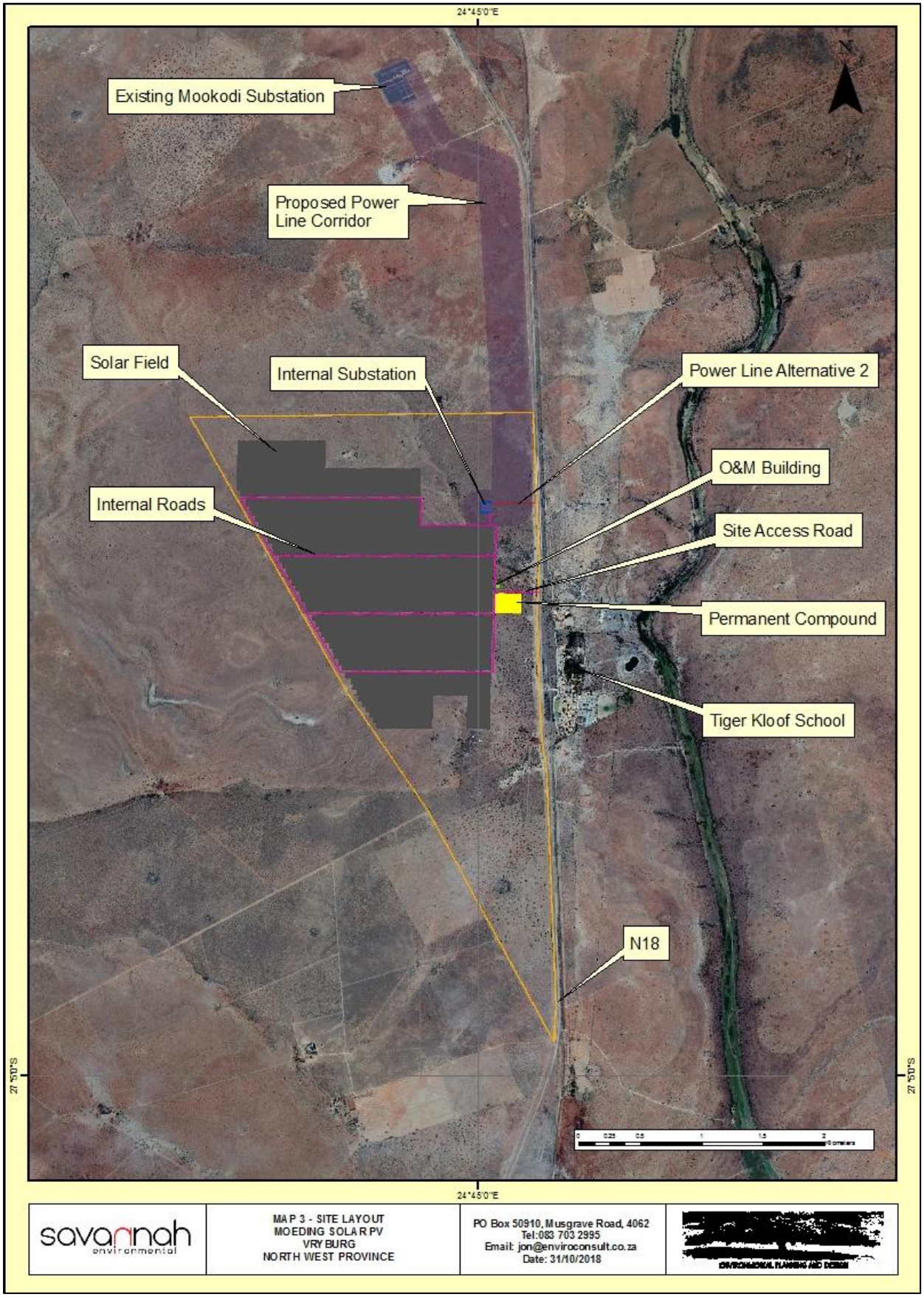
Plate 2, Eskom 132kV Lattice Tower 25-28m high. 132kV structures will be slightly higher than existing and will follow the existing power line servitude.

Plate 3, Eskom 132kV Monopole.

MAP 2, PROJECT CONTEXT



MAP 3, SITE LAYOUT



3 DESCRIPTION OF RECEIVING ENVIRONMENT AND RECEPTORS

3.1 LANDSCAPE CHARACTER

Landscape character is defined as "a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another".

Landscape character is a composite of influencing factors including;

- Landform and drainage
- Nature and density of development
- Vegetation patterns

3.1.1 Landform and Drainage

From the Landscape Context Map (**Map 2**) it is obvious that the REDZ 6 boundary roughly follows a band of hills and ridgelines that enclose Vryburg on its northern eastern and western sides. A series of minor watercourses drain from this watershed in a general southerly direction and through the opening in the surrounding higher land.

The proposed site is located on a relatively flat area close to the western edge of the main drainage line. Land immediately to the south of the site falls relatively steeply towards the south. Land immediately to the north of the proposed site also falls towards the Mookodi Main Transmission Substation (MTS) (**Refer to Map 4, Landform and Drainage**).

A number of non-perennial streams flow through side valleys into this water course.

The topography can be described as gently undulating with the head of the valley being approximately 60m above the valley floor. Minor ridgelines that extend into the valley in the vicinity of the site are approximately 20 – 30m above the valley floor.

Given the relatively low nature of the proposed development and the fact that it is located on a relatively flat plateau with land falling away from the site boundary on both its northern and southern edges, it is likely that these small changes in landform could play a significant role in helping to screen the development.

3.1.2 Nature and Density of Existing Development

The general development pattern is evident on **Map 5, Landcover**, this includes;

The urban area of Vryburg is highlighted in grey. This is a dense urban area which, typically of many towns, is set out on a grid pattern with roads running north/south and east/west. The two closest areas of the town to the proposed development site include;

- A commercial and light industrial area that extends south of the settlement; and
- The residential township of Huhudi that extends along the N18 to the north of the proposed site.

In terms of visual implications, the following conclusions may be drawn;

- The area of dense development which includes the Huhudi suburb is likely to result in views of the surrounding landscape from the town only being possible from the urban edges and possibly along the straight roads that are likely to channel narrow views of surrounding rural area into the urban area.
- The commercial and light industrial area to south of Vryburg is unlikely to be sensitive to the proposed development.

An area of small holdings directly to the east of Vryburg. These are indicated by the grey area on Map 5 to the east of Vryburg that is keyed "Built-up" and broken by areas of cultivation that is marked in brown. From reference to online aerial photograph and the site visit, it is evident that this area is comprised of smallholdings. Development in this area is mixed and includes;

- Social facilities including a local church;
- Semi-industrial uses associated with transportation; and
- Residential uses.

In terms of visual implications, the openness of this development means that views of the surrounding landscape are likely to be possible from within the area. It should be noted however that this area is close to the Approximate Limit of Visibility of the proposed development and that there are other areas of solar development that are closer to the area of smallholdings. Both distance and planned intervening landuse is therefore likely to mitigate impact on this area.

The rural area surrounding Vryburg. This is highlighted on the Map 4 as "natural". The majority of this area is used for cattle grazing. The area is well known for cattle rearing and is referred to as the Texas of South Africa having some of the largest cattle herds in the world. Within the agricultural area there are numerous farmsteads that are comprised of farm houses, agricultural buildings and farm worker's accommodation.

In terms of visual implications, the farmsteads could be sensitive to landscape change that might be associated with the proposed development particularly if secondary uses include tourism related activities such as guest houses.

In addition to general uses that are evident on the Landcover map, there are a number of service and urban fringe uses that also have an influence on localised landscape character including:

- Adjacent roads;
- A railway line runs immediately to the east of the proposed project site;
- Agri-industrial areas including areas of stock pens;
- Existing electrical infrastructure including overhead power lines that run close to the N18 and along the proposed route of the overhead power line connection to the existing Mookodi MTS; and
- Isolated transportation uses within the rural area.
- The Tiger Kloof Combined School which is located on the opposite side of the N18 and adjacent to the proposed site. This provides a relatively large urban element within an otherwise mainly rural setting.

These elements all have the effect of eroding the natural character of the area. From the site visit it is obvious that these elements have greatest impact on the area immediately around Vryburg and along the N18 extending towards the proposed site.

To the south of the town a minor ridgeline breaks views of the proposed site from the majority of the urban area. It is only from close to the southern section of Huhudi that views towards the proposed site start to open up.

3.1.3 Vegetation Patterns

The following vegetation types are evident within the study area;

a) Natural vegetation that is generally associated with the rural landscape; and
b) Ornamental vegetation and street planting that is generally associated with the urban area as well as the homesteads that occur within the rural area.

a) Natural Vegetation

Mucina and Rutherford[1] indicate that the natural vegetation of the area is Kalahari Plateau Bushveld.

This is a fairly dense bushveld composed of shrubs and sometimes small trees in a mixed grassland mosaic.

This natural vegetation is recorded as being under pressure from grazing. However, it is evident that the general pattern of small trees and shrubs in grassland exists over much of the area surrounding Vryburg.

Whilst the density of taller shrubs and small trees is relatively sparse, in relatively flat topography and over distance, these elements can combine to provide significant screening of low structures such as the proposed solar arrays.

b) Ornamental vegetation

Ornamental trees and shrubs are generally located within gardens in the urban area of Vryburg and surrounding farmsteads in the rural area. This has the following visual effects;

- It makes the location of farmsteads obvious in the landscape.
- It helps to screen views of the surrounding landscape from both farmsteads and from within the urban area.

3.2 LANDSCAPE CHARACTER AREAS

3.2.1 Landscape Character Area and Visual Absorption Capacity

Landscape Character Areas (LCAs) are defined as "single unique areas which are the discrete geographical areas of a particular landscape type[2]".

Visual Absorption Capacity (VAC) is *defined* as the landscape's ability to absorb physical changes without transformation in its visual character and quality[3]. Where elements that contrast with existing landscape character are proposed, VAC is dependent on elements such as landform, vegetation and other development to provide screening of a new element. The scale and texture of a landscape is also

[1] The Vegetation of South Africa, Losotho and Swaziland
[2] UK Guidelines
[3] Western Cape Guidelines

critical in providing VAC, for example; a new large scale industrial development located within a rural small scale field pattern is likely to be all the more obvious due to its scale.

The affected landscape can generally be divided into the following LCAs that are largely defined by vegetation and drainage patterns.

- **Rural areas surrounding Vryburg**. These areas are generally used for cattle grazing and appear relatively natural. The flatness of the landscape combined with scattered shrubs and small trees are likely to help provide screening for low elements within the landscape. With relatively low vegetation and a shallow undulating topography, the height of the PV units is likely to be critical in maximising the little absorption capacity that exists. Vegetation is unlikely to provide complete screening for views over development from adjacent low ridgelines however. This LCA is influenced to a degree by urban fringe, particularly infrastructure development that erodes the purity of the rural character particularly along the N18 and in close proximity to the urban area.
- **The urban area of Vryburg**. This area is generally inward looking drawing little character influence from external areas. It is unlikely that the proposed development will have any influence on this LCA.
- **The semi-rural area** that is comprised of the smallholdings to the east of Vryburg. This is a relatively open developed area from which views into the surrounding rural landscape are likely to be possible. VAC is generally therefore likely to be limited but will depend on localised features such as ornamental vegetation particularly around residential properties that could provide significant VAC for small areas. This LCA is close to the Approximate Limit of Visibility. There are also significant areas of future solar power development located between the LCA and the proposed project. It is therefore unlikely that there will be significant visual impacts on this LCA.

These LCAs are indicated on **Map 6** and have been ground truthed during the site visit.

3.2.2 Future Solar Projects

As indicated previously, the proposed project is located within an area that has been identified by the Department of Environmental Affairs for renewable energy development (REDZ 6). The properties within the Approximate Limit of Visibility that will be affected by projects that were authorised at the time of reporting are indicated on **Map 7**. From this map it is clear that the proposed project occurs in an area that is surrounded by other authorised solar projects. It is therefore highly likely that as these are developed around the proposed project that they will both industrialise the landscape and provide a degree of screening for the proposed project.

3.3 LIKELY SIGNIFICANCE OF THE LANDSCAPE

From review of existing mapping and the site visit, there are no protected landscape areas that are likely to be affected.

3.3.1 Rural Landscape Character Area.

The majority of the affected area falls into the Rural LCA.

Whilst this LCA is predominantly rural in character, it has been affected by urban fringe and infrastructure elements that have been developed particularly north of the proposed site and in close proximity to the urban area of Vryburg along the N18 corridor. These elements have eroded the purity of the LCA to varying degrees.

It is also noted that within the area closer to Vryburg, there are a number of guesthouses, the outlook from which is likely to be important to owners and visitors.

In pure landscape terms however, the area immediately to the south of the proposed site is relatively free of urban influence and appears near natural.

Currently, the prime importance of the LCA is agricultural production and particularly livestock rearing. However, this is likely to change in the near future, particularly in the vicinity of the proposed project, as more solar projects are developed.

3.3.2 Semi- Rural LCA

This is a low density mixed use area. It is indicated as semi-rural due to the low density of development and the extent of green space.

In itself it is not a landscape of high value.

Sensitivities will depend on specific uses. It is possible that the relatively upmarket homes that occur within the area could depend on their natural outlook for their value. It is also likely that the more agri-industrial uses will not be sensitive to change in view. However, due to distance and the fact that extensive areas of solar PV development is planned in the intervening area, it is highly unlikely that the proposed project will have any significant impact on this LCA.

3.3.3 Urban LCA

Whilst the quality of the urban area is important for residents and people who work or visit Vryburg, due to the largely inward looking nature of the area, the proposed development is unlikely to significantly impact on this.

3.4 VISUAL RECEPTORS

Visual Receptors are defined as "individuals and / or defined groups of people who have the potential to be affected by the proposal[4]".

3.4.1 Identified visual receptors

It is possible that an area might be sensitive due to an existing use. The nature of an outlook is generally more critical to areas that are associated with recreation, tourism and in areas where outlook is critical to land values.

This section highlights possible Receptors within the landscape which due to use could be sensitive to landscape change. They include;

- Area Receptors which include;
    - The Semi Rural LCA.
    - The Urban LCA and particularly the southern edges of Vryburg that overlook the study area.

[4] UK Guidelines

- Tiger Kloof Combined Schools is comprised of a small area of development that includes a high school, a pre-primary school, various sports facilities, administration and accommodation blocks. The facility is located on the opposite side of the N18 to the proposed site.
- Linear Receptors or routes through the area that include the N14, the N18, the R34 as well as two un-surfaced local roads. Both national roads (N14 & N18) are likely to carry a proportion of recreational and tourism related traffic. This elevates the importance of the landscape and particularly natural landscape areas as they are viewed from the road. The Regional Road (R34) is likely to carry less recreational and tourism related traffic so may not be as significant. The N18 runs directly adjacent to the eastern boundary of the site. Whereas all other roads are situated in excess of 5km from the site. This is likely to mean that the N18 will be subject to the greatest level of visual impact.
- In addition to a change in the character of existing views as seen from roads, it is possible that the closest road, the N18 could be impacted by glare reflecting from the face of PV panels.

- Point Receptors that include isolated and small groups of farmsteads that are generally associated with and located within the Rural LCA.

Possible visual receptors or areas, places and routes that may be sensitive to landscape change are indicated on **Map 6.**

3.4.2 Likely significance of visual receptors

The significance of a change in a view for a visual receptor is likely to relate to use.

Uses such as guest houses, recreation and tourism related areas are likely to rely on the maintenance of an outlook for successfully attracting guests and users. Housing areas could depend on outlook for the enjoyment of the area by residents and for maintaining perceived property values. A route that is particularly important for tourism such as the N18 may also be dependent on outlook for the maintenance of a suitable experience for users.

LANDSCAPE CHARACTER AREAS

Plate 4, Huhudi - Urban LCA
Views along roads to surrounding landscape are largely blocked.

Plate 5, Vryburg South - Urban LCA
Largely industrial / retail uses that are unlikely to be sensitive.

Plate 6, Natural LCA
The natural character along the N18 and close to the urban area is generally degraded by infrastructure.

Plate 7, Natural LCA
Away from the N18 and the Urban area the character is generally more intact.

Plate 8, Transport Business – Semi Natural LCA
Some smallholdings have been developed for semi industrial uses.

Plate 9, Residential Development – Semi Natural LCA
Residential development largely surrounded by vegetation.

POSSIBLE SENSITIVE RECEIVERS

Plate 10, Farmsteads in the vicinity particularly those with secondary tourism uses.

Plate 11, Residential use on smallholding to the east of Vryburg.

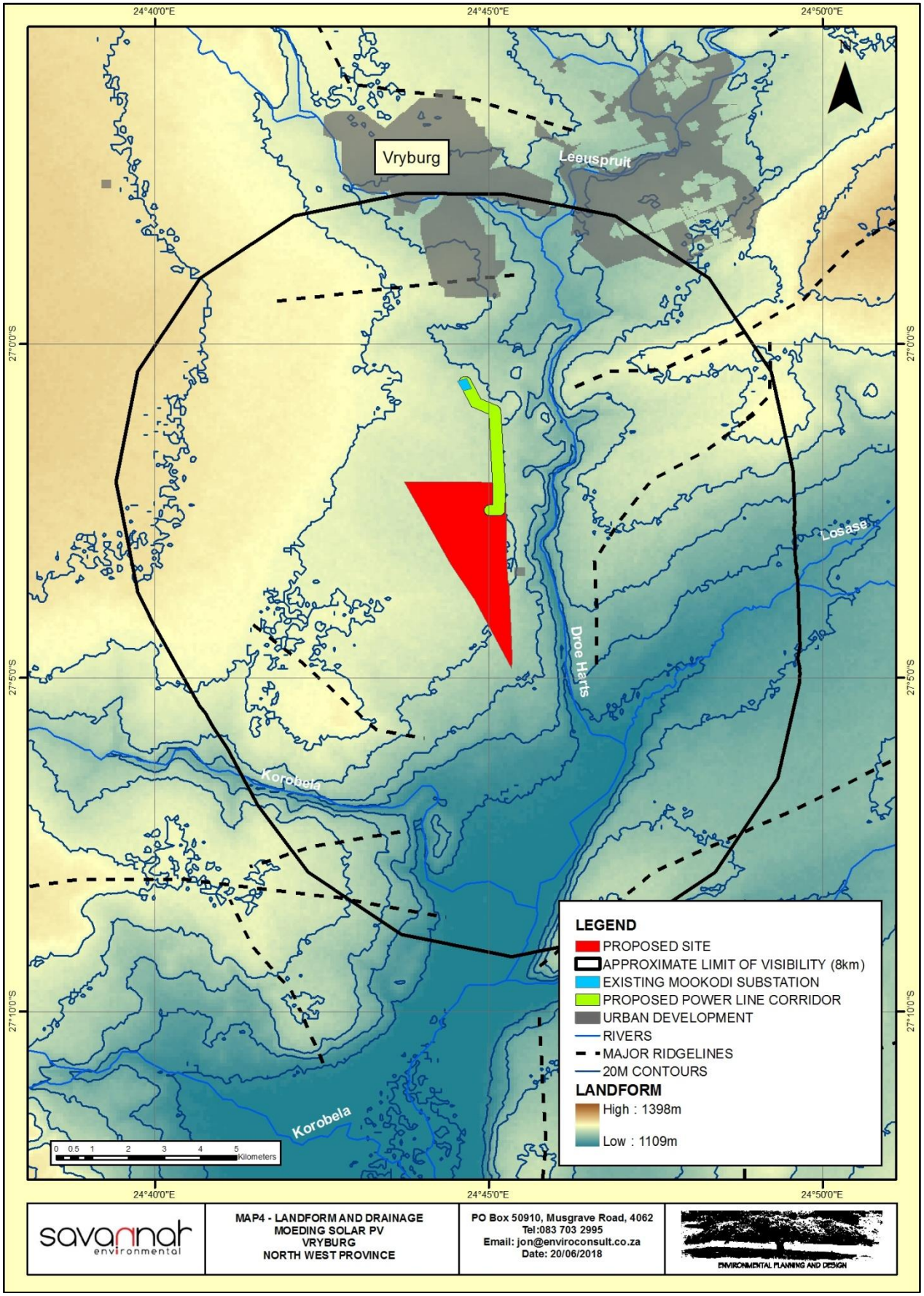
Plate 12, Homestead close to the N18 to the north east of the proposed development.

Plate 13, The Huhudi township to the north west of the proposed development.

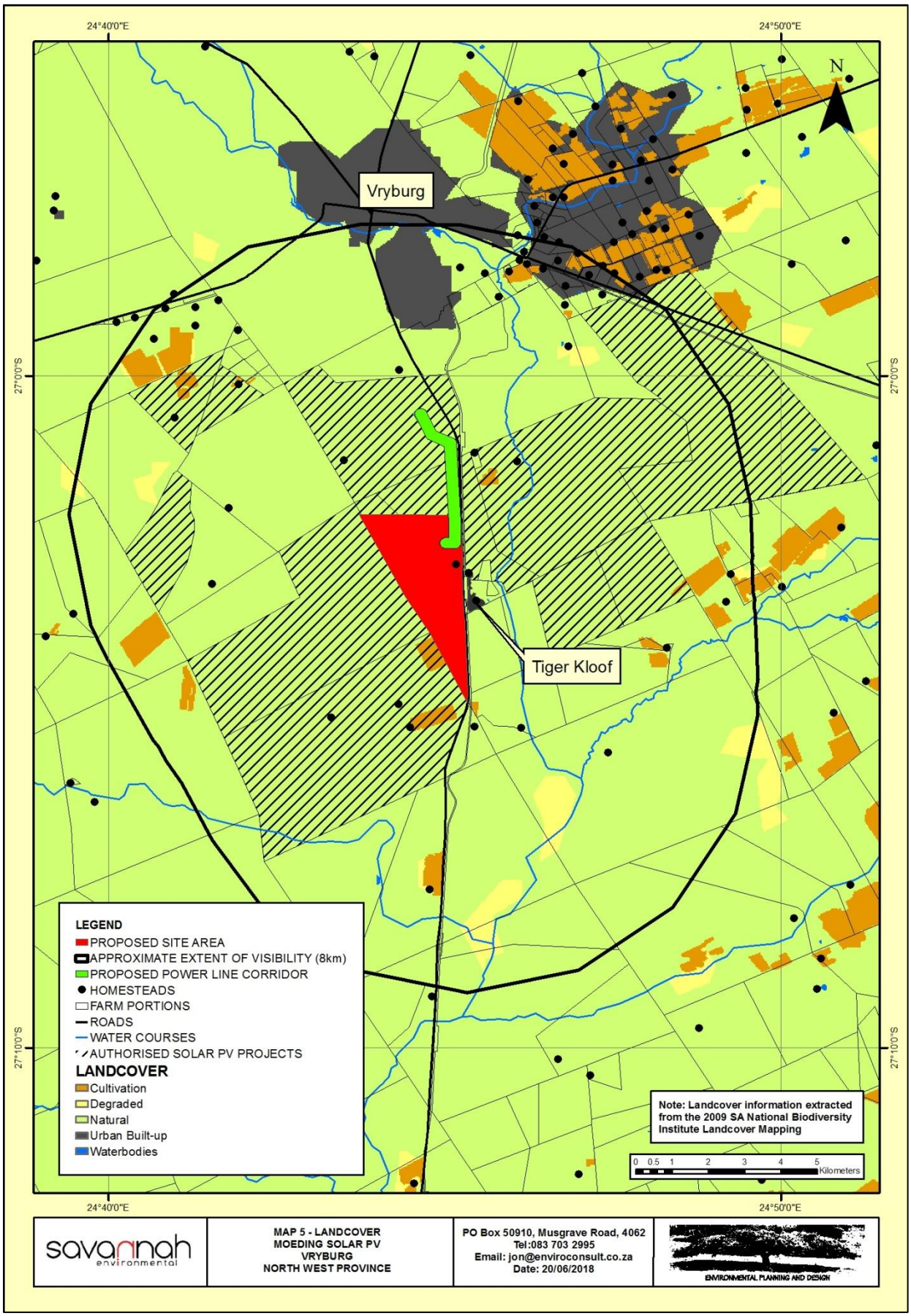
Plate 14, Tiger Kloof Combined Schools located on the opposite side of the N18 to the proposed development site.

Plate 15, Roads particularly the N18 which runs past the eastern boundary of the proposed site.

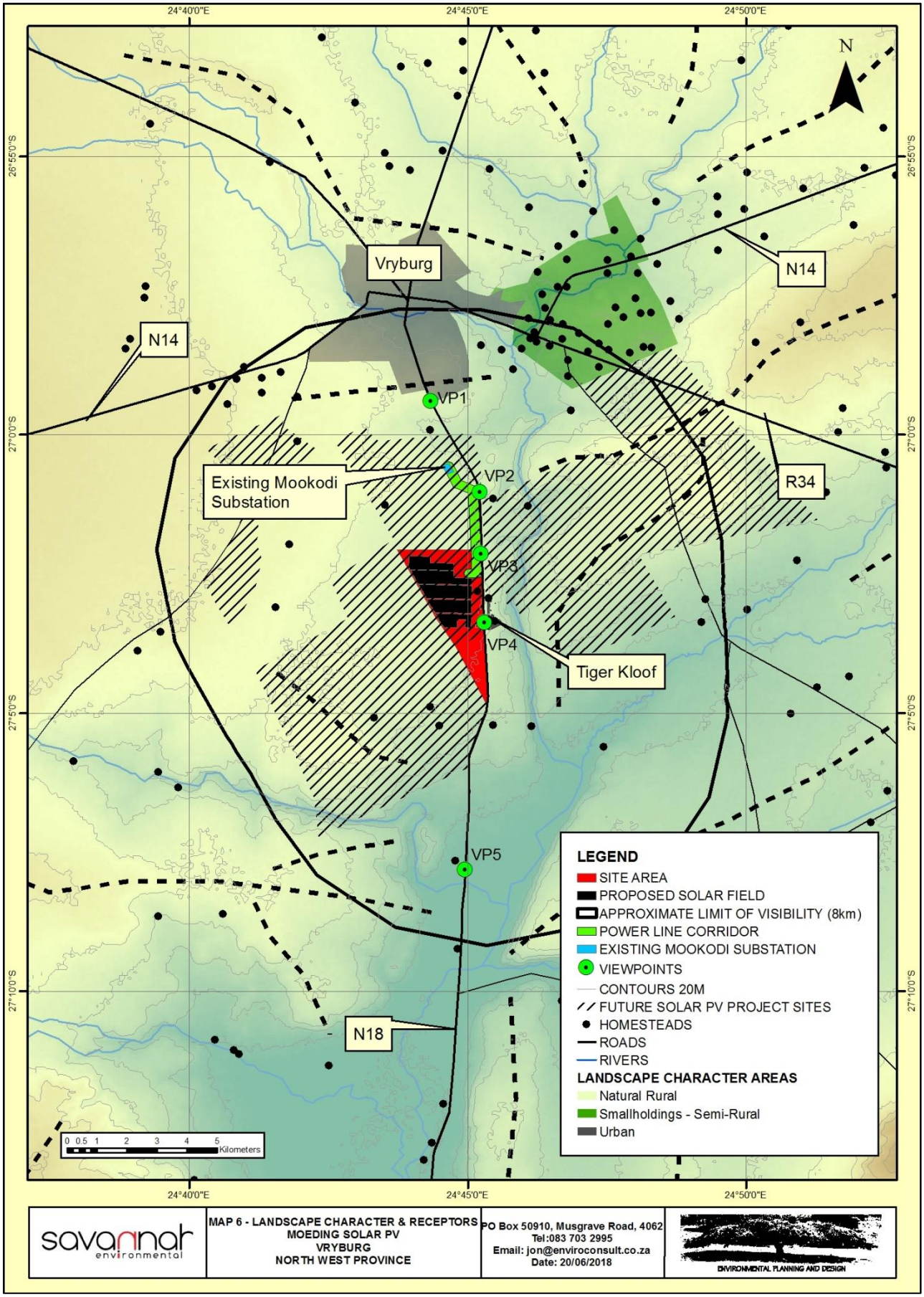
MAP 4, LANDFORM AND DRAINAGE



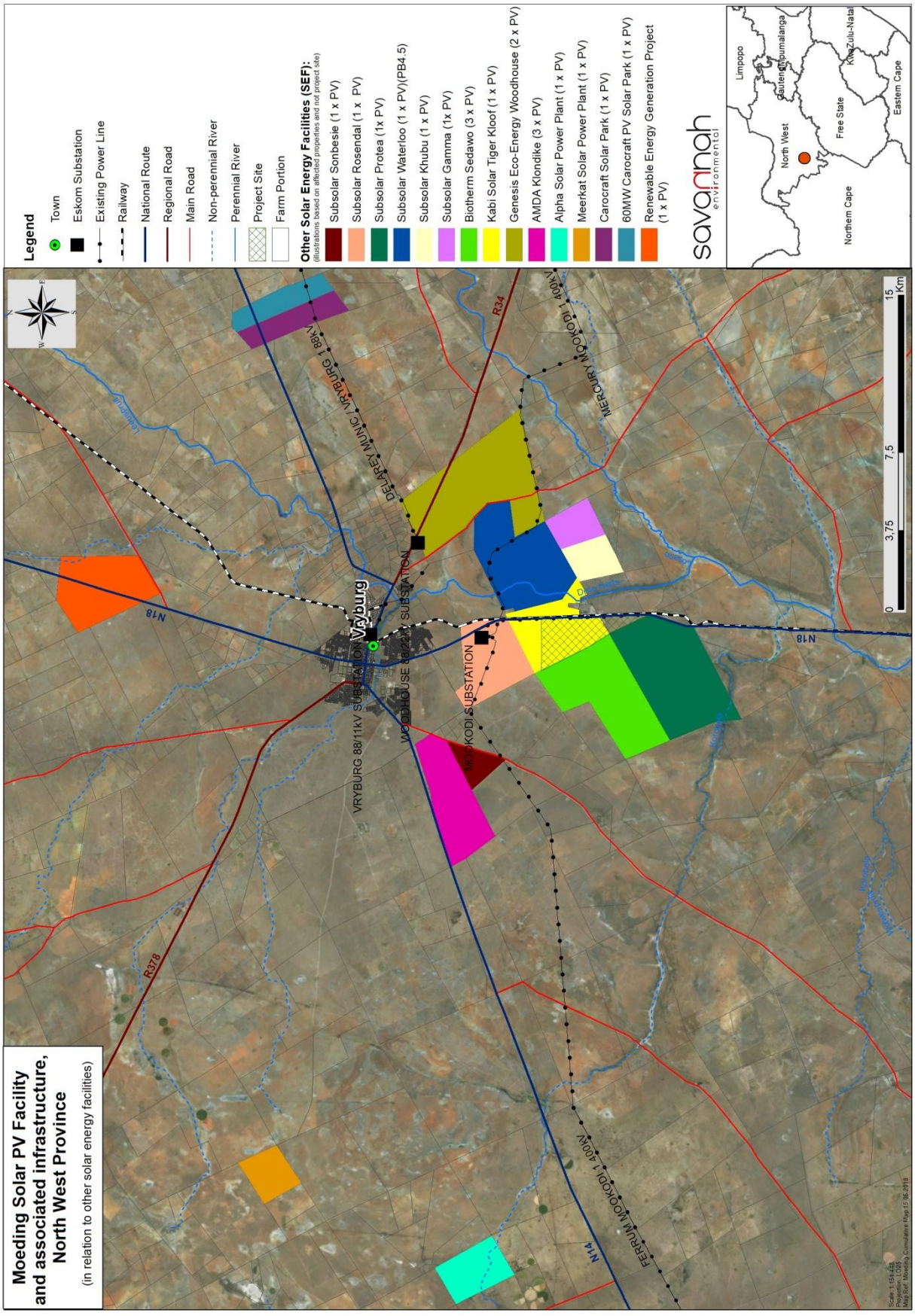
MAP 5, LANDCOVER



MAP 6, LANDSCAPE CHARACTER AREAS



MAP 7, AUTHORISED SOLAR PV PROJECTS



4 THE NATURE OF POTENTIAL VISUAL IMPACTS

4.1 GENERAL

Impacts could include general degradation of the relatively natural landscape in which the development is proposed as well as change of view for affected people and / or activities;

a. Generally landscape change or degradation. This is particularly important for protected areas where the landscape character might be deemed to be exceptional or rare. However it can also be important in non-protected areas particularly where landscape character is critical to a specific broad scale use such as tourism areas or for general enjoyment of an area. This is generally assessed by the breaking down of a landscape into components that make up the overall character and understanding how proposed elements may change the balance of the various elements that are visible. The height, mass, form and colour of new elements all help to make new elements more or less obvious as does the structure of an existing landscape which can provide screening ability or texture that helps to assimilate new elements.
b. Change in specific views for specific receptors for which the character of a view may be important for a specific use or enjoyment of the area.
    - Visual intrusion is a change in a view of a landscape that reduces the quality of the view. This can be a highly subjective judgement. Subjectivity has however been removed as far as is possible by classifying the landscape character of each area and providing a description of the change in the landscape that will occur due to the proposed development. The subjective part of the assessment is to define whether the impact is negative or positive. Again to make the assessment as objective as possible, the judgement is based on the level of dependency of the use in question on existing landscape characteristics.
    - Visual obstruction is the blocking of views or foreshortening of views. This can generally be measured in terms of extent.

Due to the nature of the proposed development, visual impacts for receptors are expected to relate largely to intrusion.

4.2 THE NATURE OF LIKELY VIEWS OF THE DEVELOPMENT

During the construction phase, it is expected that traffic will be slightly higher than normal as trucks will be required to transport materials and equipment such as PV panels and frames to the site.

Site preparation will generally include the following activities:

- vegetation clearance – removal or cutting of any vegetation if present (bush cutting);

- levelling and grading of areas where the array will be sited would normally occur, the assessment indicates that the land is relatively flat so only minor grading should be required;
- levelling of hard-standing areas, e.g. for temporary laydown and storage areas, as indicated above only minor grading is likely to be necessary;
- erection of site fencing; and
- construction of a temporary construction camp which will occur within a laydown area within the overall site.

These activities are only likely to be visible from the immediate vicinity of the site and particularly from the adjacent N18.

As the site is developed, concrete bases will be constructed, the support structures will then be assembled and PV panels attached, ancillary structures and minor buildings will also be constructed.

The development will therefore appear on a progressive basis in the landscape, however once the concrete bases are constructed, the structures are likely to be assembled rapidly.

If not constructed by Eskom, the overhead power line that will link the facility to the grid will be constructed as part of the project. It is also likely to appear in the landscape progressively following the same pattern as the PV array, with concrete bases being constructed first followed by assembly of structures and finally stringing of overhead lines.

The construction phase is programmed to take approximately 12 to 18 months.

By the end of the construction process, the array will be assembled, minor buildings constructed and overhead lines strung between towers, the full visual impact of the project will be experienced.

The operational phase is highly unlikely to result in any significant additional impact. It is possible however, that crews will be visible from time to time undertaking maintenance within the facility.

The main visible elements therefore are likely to include;

1. A new 132kV overhead power line or turn in turn out lines into a future power line, and
2. The solar array located within a fence line with associated on-site substation minor buildings and structures.

4.2.1 Overhead Power Lines

At the time of reporting two alternative grid connection options were under consideration, including;

1. Direct connection to the existing Mookodi MT located approximately 4.5km north of the project site (Alternative 1); and
2. A turn-in turn-out connection into the Mookodi - Magopela 132kV power line (Alternative 2).

The direct connection to the existing Mookodi MTS will be located in a 300m wide corridor that has been identified adjacent to the western edge of the N18. There are currently two MV power lines that follow this route. The new overhead power line will be a 132kV line as described in section 2 and indicated on plate 17. It will be approximately twice the height of the existing lines.

The proposed Mookodi - Magopela 132kV overhead power line is authorised and will be developed in the future by Eskom. The project will also follow the N18 past the proposed site to the existing Mookodi MTS and will run parallel with the N18 between the project and the substation. There is however no clarity as to when this line will be constructed. If construction does not occur in time for the proposed development and subject to specialist findings, then the 132kV link between the site and the Mookodi Substation (Alternative 1) will be implemented and it will eventually run parallel with the Mookodi - Magopela 132kV overhead power line.

If Eskom's timing is appropriate then the loop in loop out option (Alternative 2) into the new power line is likely to be used.

Alternative 1 will therefore duplicate the Mookodi - Magopela 132kV overhead power line between the proposed solar project and the Mookodi MTS.

Refer to **Plates 3 and 4** for detail of likely standard Eskom structures to be utilised.

4.2.2 The Solar Array

The Proposed Moeding PV layout is indicated on **Map 2**. The PV panels will be mounted on continuous supports and orientated to face north towards Vryburg.

Continuous supports aligned in rows are generally used when the PV panels are fixed and are set at an angle and direction to maximise the average efficiency during the day or have a basic tracking set up that varies the angle of tilt of the unit in order to improve efficiency.

From areas to the north a solar array, whether constructed on individual supports or continuous rows, it is likely to appear as a continuous structure in the landscape.

The nature of the impact is also likely to vary with location and elevation;

- If the array is located on a hillside or if it is viewed from a higher level, the rows of PV units are likely to visually combine and will be read as a single unit. From a distance this results in a PV array having a similar appearance as a large industrial structure when viewed from above.
- From the south, east and west the dark face of the PV units are not obvious and subject to the colour of the undersides of the units, the supporting structures are likely to become more apparent. With distance however, the shadow cast by the structures is likely to be more obvious and the facility will probably appear much as the northern face, a long dark structure.
- If the landscape does not have significant Visual Absorption Capacity (VAC), because of the contrast in colour with the surrounding landscape, the array is likely to be obvious to the limit of visibility. Subject to the colour and reflectivity of the underside of the PV units and supporting structure, it is possible that a similar level of impact could also be experienced from the

south, east and west. It should be noted that the landscape surrounding the proposed development has varying degrees of VAC. This is due to the density of existing woody vegetation which is evident from comparing views from VP2 and VP3 with VP4. Because the height of the proposed solar array is relatively low (5m), this variation in vegetation cover is likely to mean that the project will be obvious from some close viewpoints but largely screened from others.

- Mitigation or screening of views is possible at least from close views. This can be achieved either by earthworks berms by planting or by a combination of both. From a distance and particularly from elevated view points, mitigation is likely to be less feasible as the height of any screen is likely to cast shadow over the PV units.
- In addition to the way that a solar array may change a landscape, the nuisance factor associated with resulting glare is often raised by stakeholders on similar projects. PV units, however, are designed to absorb as much energy as possible and are designed not to reflect light. This issue is generally more likely to be associated with a focussed array which tracks the sun's path during the day and uses reflective surfaces to focus energy onto receptors. It is therefore not expected that this will be a significant issue with a PV array such as the one proposed.

The site is very flat and is at approximately the same level as surrounding areas from which views are possible. This means that the array will be viewed in elevation and there will be no areas from which an overview of the facility will be possible.

To the south of the project the land falls away into a shallow valley. Because the project does not extend to the ridgeline from which the land falls away, it is likely to be largely screened from the south.

4.2.3 Security Lighting

The facility will be lit by security lights to a level sufficient to ensure that security cameras can operate at night. This is likely to result in the array being obvious at night from surrounding areas.

Plate 16, Existing MV overhead cables on the western side

of the N18 approaching the proposed site. The proposed Mookodi - Magopela 132kV will also run parallel with these existing power lines. The alternative 1 grid connection will result in a second 132kV power line also running parallel to this.

Plate 17, PV array viewed from above. Note the array rows are read as one and have a similar impact as the roof of a large industrial building might.

Plate 18, PV array viewed from behind and the side. The dark face of the PV units are not obvious and subject to the colour of the

undersides of the units, the supporting structures are likely to become more apparent. This might appear as a long industrial structure from close quarters. From a distance however, the shadow cast by the structure will be read and will probably appear similar in nature to the front view of the array.

Plate 19, PV array screened by low vegetation. It is possible to screen a PV array from close viewpoints at a similar level to ground level within the array.

5 VISIBILITY OF THE PROPOSED DEVELOPMENT

5.1 ZONES OF THEORETICAL VISIBILITY

Zones of Theoretical Visibility (ZTV) are defined as "a map usually digitally produced showing areas of land within which a development is theoretically visible".

ZVTs of the proposed development have been assessed using Arc Spatial Analyst GIS.

The assessment is based on terrain data that has been derived from satellite imagery. This data was originally prepared by NASSA and is freely available on the CIAT-CCAFS website (http://www.cgiar-csi.org). This data has been ground truthed using a GPS as well as an online mapping programme.

Whilst the ZTV has been calculated from terrain data only, existing vegetation could have a significant modifying effect on the areas indicated.

5.2 ASSESSMENT LIMIT

The GIS based assessment of Zones of Theoretical Visibility does not take the curvature of the earth or reduction in scale due to distance into account. In order to provide an indication of the likely limit of visibility due to this effect a universally accepted navigational calculation (**Appendix IV**) has been used to calculate the likely distance that the proposed structures might be visible over. This indicates that in a flat landscape that a solar array that is 5m high and a power line that is 28m high could be visible at a distance of approximately 8.0 km and 18.9km respectively.

Whilst the low ridgelines that surround the site could extend this range, due to the relatively flat nature of the topography, the 8.0 km buffer has been adopted as an indication of the approximate limit of visibility of the proposed solar array.

The visibility of the proposed power line is likely to be significantly less than 18.9km due to the relatively slender nature of structures. An assessment of the physical limit of visibility is included in 5.5.2. This indicates a likely Limit of Visibility of approximately 2.5km.

5.3 APPROACH TO THE ASSESSMENT

5.3.1 ZTV for Proposed Array

The detailed location of the proposed array has been provided by the developer **(Map 2)**. In order to generate the ZTV for the proposed array, it has been assumed that entire area of the array will be set at a uniform maximum height of 5m. Points have been set at each change in direction of the array boundary plus an additional point at the centre of the array all with 5m offsets for generation of the ZTV using the Viewshed option in Arc Spatial Analyst.

5.3.2 ZTV for Overhead Power Line

The Mookodi - Magopela 132kV power line is planned by Eskom to be constructed along the eastern boundary of the project site.

Should the planned Mookodi - Magopela 132kV power line not be constructed in time then a separate 132kV link to the Mookodi MT will be constructed to provide the necessary grid connection (Alternative 1).

Should the planned Mookodi - Magopela 132kV power line be constructed in time then a shorter loop in to the new power line is likely to be used (Alternative 2).

5.4 VISIBILITY

5.4.1 Zones of Theoretical Visibility (ZTV)

Map 8 indicates the ZTV for the proposed PV array and internal infrastructure.

Map 9 indicates the ZTV for the possible 132kV power line link to the Mookodi MT (Grid Connection Alternative 1).

Map 10 indicates the ZTV for the possible 132kV loop in to the authorised Mookodi - Magopela 132kV power line (Grid Connection Alternative 2).

The assessment indicates that;

i. The visibility of the proposed project is likely to be limited to areas to the north of the project and particularly to the area between Vryburg and the proposed development. This is an area where, even in open agricultural areas, the character of the area is influenced by urban and urban fringe development.
ii. The development will be screened by a minor ridgeline from areas to the south where the landscape character is relatively natural and there is little influence of development on landscape character.
iii. The ZTV indicates that areas to the east of the proposed development around the R34 and an area of small holdings could be impacted with a high degree of visual exposure. In reality however, existing vegetation, railway infrastructure as well as other authorised solar PV projects will help to screen the site.
iv. The comparative ZTV analysis of the alternative grid connections indicates that theoretically both alternatives might be visible over a similar area. However, when the Approximate Limit of Visibility of the two alternatives is considered, it is obvious that Alternative 2 will be less obvious than Alternative 1 as it will generally be seen from a larger area.

5.5 MODIFYING EFFECT DUE TO VAC OF THE LANDSCAPE AND THE NATURE OF THE DEVELOPMENT

The Visual Absorption Capacity (VAC) of the landscape is related to both vegetation and topography.

5.5.1 Views of the Array and on site infrastructure and buildings.

- Dense roadside vegetation and vegetation in valley lines to the south of Vryburg between the urban area and the proposed development is likely to soften views of the development from areas to the north.
- The low ridgeline immediately to the south of the proposed development area will screen the development from more cohesive rural areas to the south.

- Existing vegetation and landform will help to soften views of the development from the urban area and affected sections of the N18.
- Vegetation is likely to at least partially screen views of the development from the adjacent section of the N18 and Tiger Kloof Combined Schools.

5.5.2 Views of the Grid Connection.

As indicated previously, a new 132kV overhead power line along the line of an existing power line servitude running from the northern edge of the proposed site, along the N18 to the Mookodi MTS could be required (Alternative 1). This will be required if Eskom's planed power line along the same alignment is not constructed in sufficient time for the proposed project.

Plate 24 indicates an existing 132kV overhead power line. The view is taken during a period of good visibility along the line of towers which have a spacing of +/- 250m. In total 9 towers are visible along the line before it connects to a line running at right angles. The last tower in the line which is a solid pole structure is just visible at +/- 2.5km.

From the photograph and considering the backdrop, it can be concluded that the visual mass of the overhead power line is unlikely to be obvious from distances greater than 2.5km.

2.5km has therefore been adopted as the Approximate Limit of Visibility of the proposed power line alternatives.

Plate 20, Existing solar arrays at Upington Airport as seen from the air

Plate 21, Existing array seenin a flat landscape from approximately 700m. The array is clearly visible.

Plate 22, Existing array seenin a flat landscape from approximately 1500m. The array is visible but even with the minimal vegetation providing screening at the airport, the dark line of panels is starting to blend into the background. The array is clearly visible but might be missed by a casual viewer who was not aware of its existence.

Plate 23, **Existing array seenin a flat landscape from approximately 5000m**. The line of panels is barely distinguishable. The viewer would have to know where to look to be able to differentiate the array from surrounding landscape features.

Plate 24, View of a 132kV overhead power line similar line to that proposed. Note pylons on the horizon (approx 2.5km distance) are just visible.

5.6 KEY VIEWPOINTS

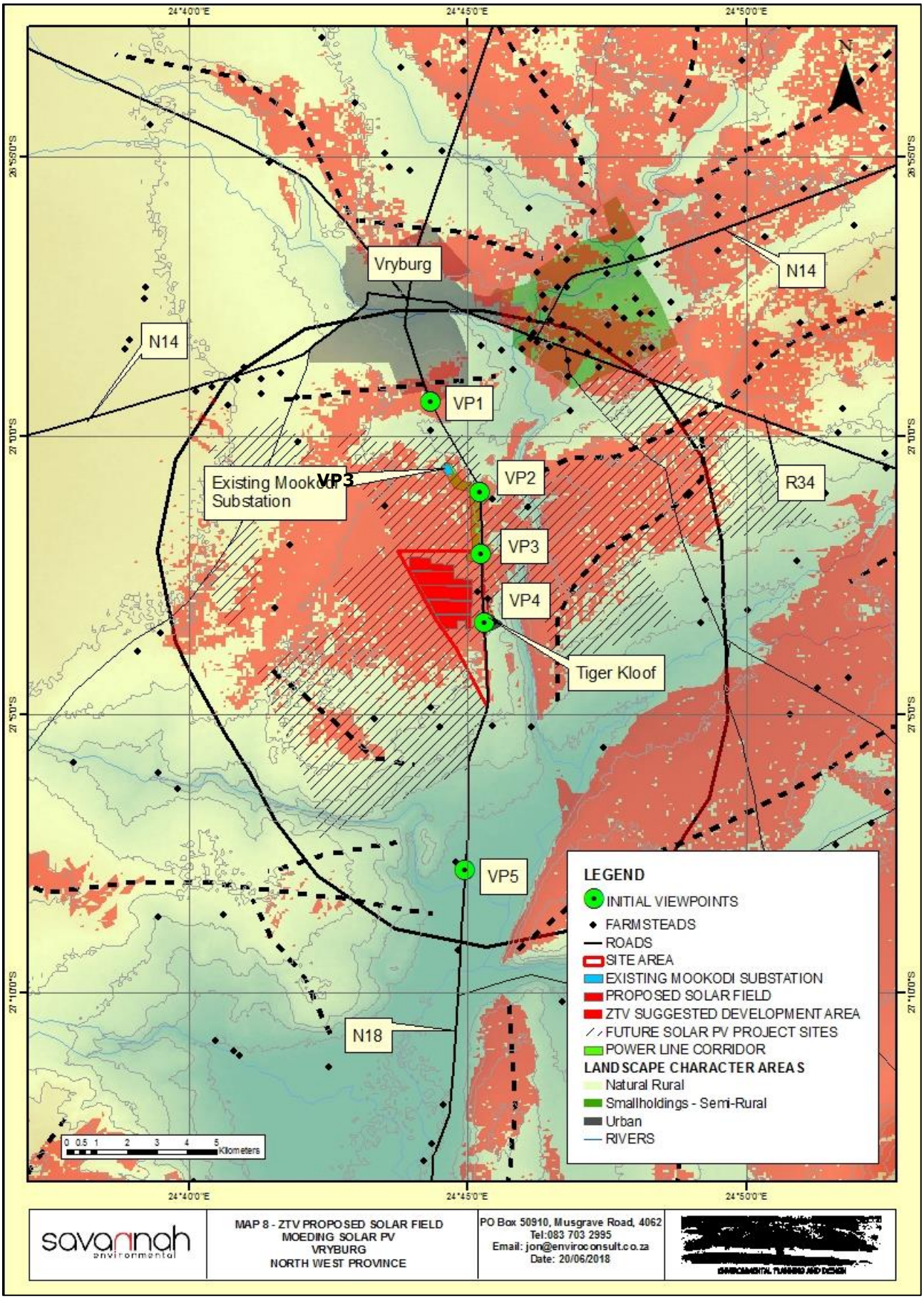
Key viewpoints that are adjudged to provide an indication of typical views towards the proposed development and are representative of views of the identified visual receptors / LCAs are located on **Map 8**. Photographs from these viewpoints on which the approximate extent of the proposed array have been marked are indicated in **Figures 1 to 5** inclusive.

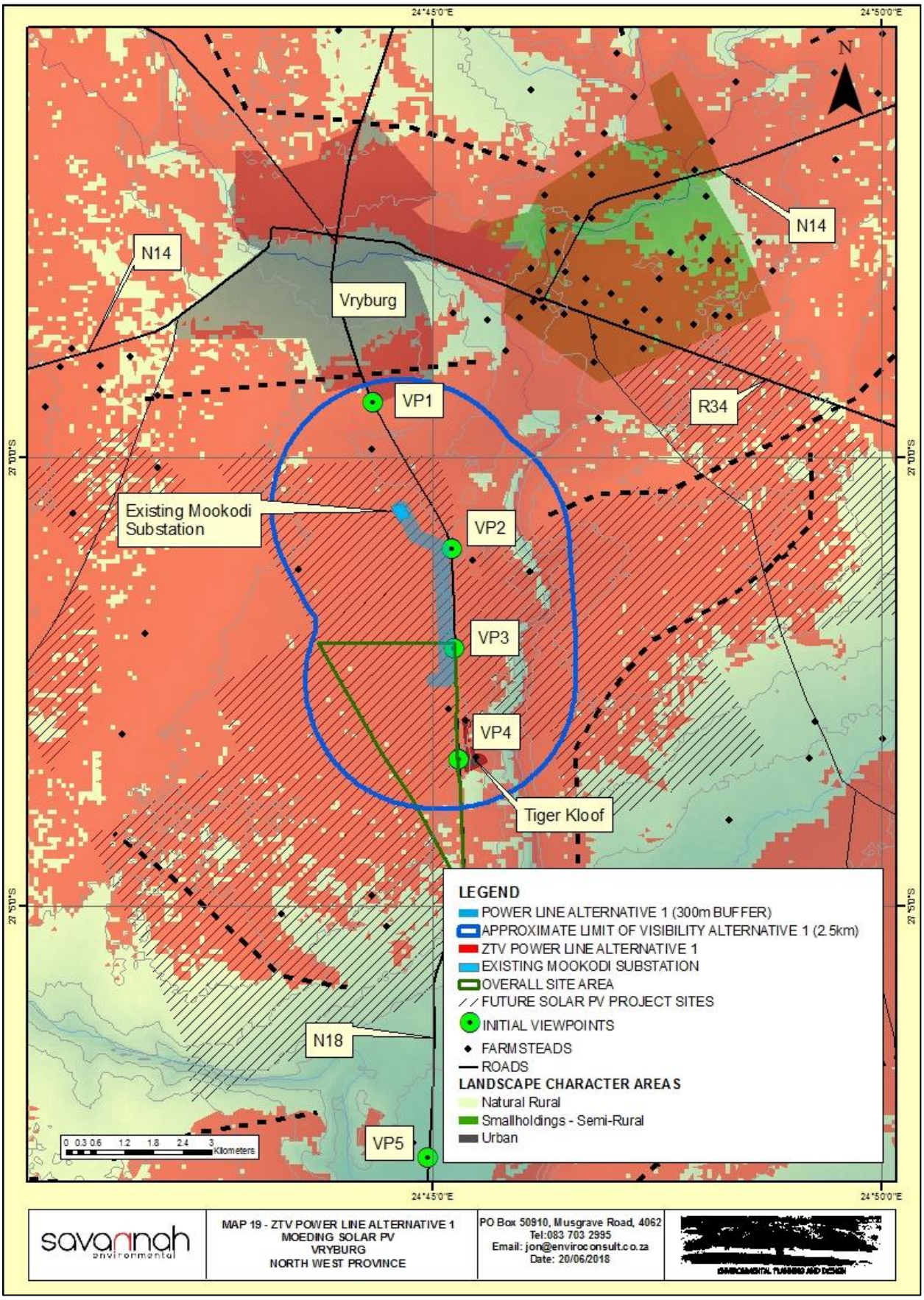
Five viewpoints have been selected including:

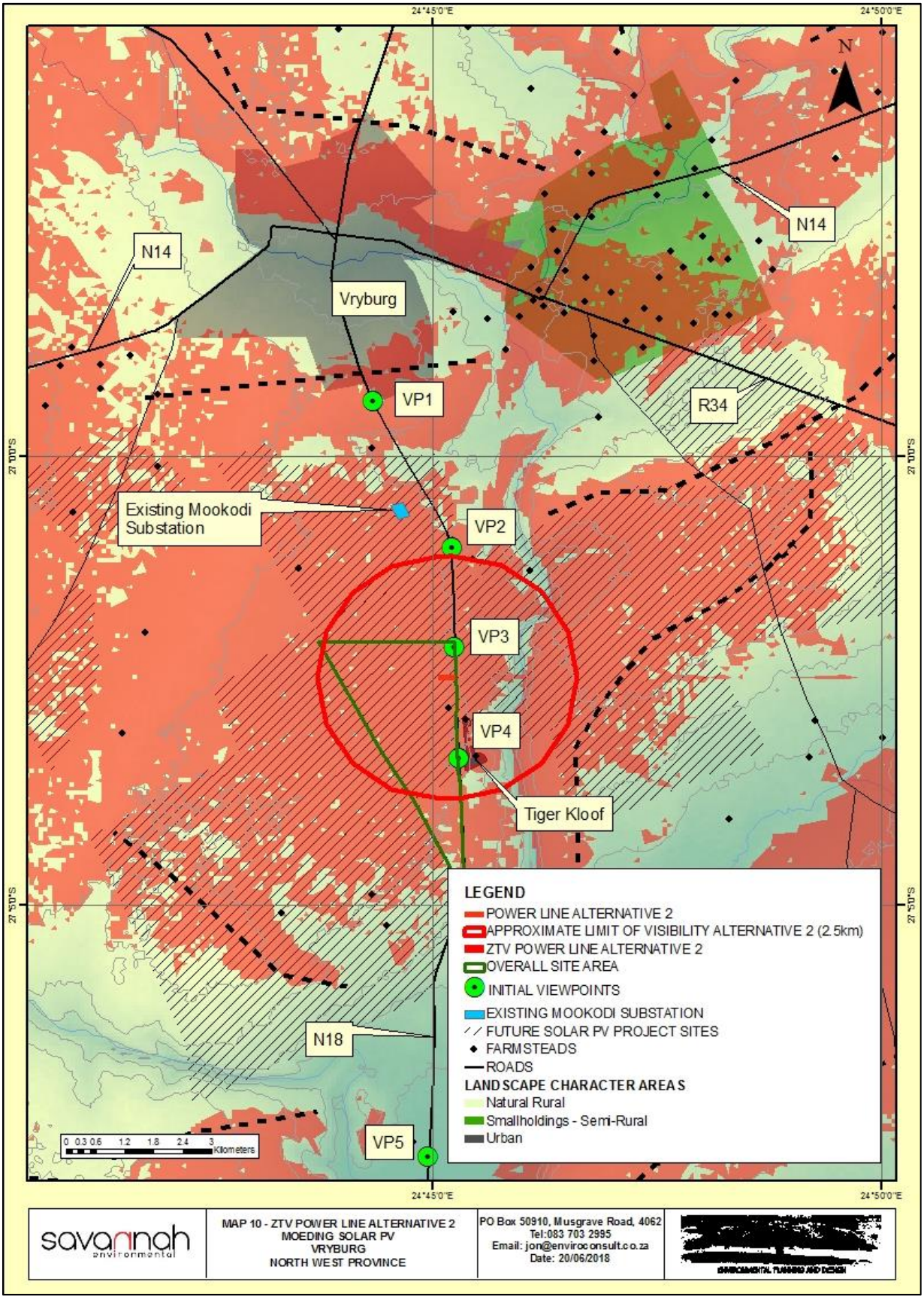
1. VP1 **(Figure 1)** is a view from the N18 at Huhudi. This view indicates the nature of likely views from the urban edge;
2. VP2 **(Figure 2)** is a view from the N18 approximately 2km to the north of the proposed project;
3. VP3 **(Figure 3)** is located on the N18 immediately adjacent to the proposed project. It indicates the likely nature of impacts of people located in close proximity to the project including homesteads and travellers on the N18;
4. VP4 **(Figure 4)** is located on the N18 immediately adjacent to the access road to the Tiger Kloof Combined Schools. It is representative of views from the Schools as well as this section of the N18; and
5. VP5 **(Figure 5)** is located approximately 8km to the south of the proposed project. It is included in order to highlight the screening effect of the existing landform.

The extent of the proposed array as it would appear from the above viewpoints has been marked on the photographs. Each extent has been approximated by measuring on plan the angle of the view that the development occupies given that each view was taken with a 28mm lens which has an approximate angle of vision of just over 74°. This has been cross referenced with known land marks.

The photographs have also been annotated to explain the conclusions made with regard to likely visual impact.


24°40'0"E
24°45'0"E
24°50'0"E
26°55'0"S
27°0'0"S
27°5'0"S
27°10'0"S
N
Vryburg
N14
N14
VP1
VP2
VP3
VP4
VP5
Existing Mookodi Substation
R34
Tiger Kloof
N18
0 0.5 1 2 3 4 5 Kilometers
LEGEND
INITIAL VIEWPOINTS
FARMSTEADS
ROADS
SITE AREA
EXISTING MOOKODI SUBSTATION
PROPOSED SOLAR FIELD
ZTV SUGGESTED DEVELOPMENT AREA
FUTURE SOLAR PV PROJECT SITES
POWER LINE CORRIDOR
LAND SCAPE CHARACTER AREAS
Natural Rural
Smallholdings - Semi-Rural
Urban
RIVERS
savannah environmental
MAP 8 - ZTV PROPOSED SOLAR FIELD
MOEDING SOLAR PV
VRYBURG
NORTH WEST PROVINCE
PO Box 50910, Musgrave Road, 4062
Tel:083 703 2995
Email: jon@enviroconsult.co.za
Date: 20/06/2018


24°45'0"E
24°50'0"E
N
N14
N14
Vryburg
VP1
R34
27°0'0"S
Existing Mookodi Substation
VP2
VP3
VP4
Tiger Kloof
27°5'0"S
LEGEND
POWER LINE ALTERNATIVE 1 (300m BUFFER)
APPROXIMATE LIMIT OF VISIBILITY ALTERNATIVE 1 (2.5km)
ZTV POWER LINE ALTERNATIVE 1
EXISTING MOOKODI SUBSTATION
OVERALL SITE AREA
FUTURE SOLAR PV PROJECT SITES
INITIAL VIEWPOINTS
FARMSTEADS
ROADS
LANDSCAPE CHARACTER AREAS
Natural Rural
Smallholdings - Semi-Rural
Urban
N18
VP5
0 0.3 0.6 1.2 1.8 2.4 3 Kilometers
24°45'0"E
24°50'0"E
savannah environmental
MAP 19 - ZTV POWER LINE ALTERNATIVE 1
MOEDING SOLAR PV
VRYBURG
NORTH WEST PROVINCE
PO Box 50910, Musgrave Road, 4062
Tel:083 703 2995
Email: jon@enviroconsult.co.za
Date: 20/06/2018


24°45'0"E
24°50'0"E
N
N14
N14
Vryburg
VP1
R34
27°00'S
Existing Mookodi Substation
VP2
VP3
VP4
Tiger Kloof
27°50'S
N18
VP5
0 0.3 0.6 1.2 1.8 2.4 3 Kilometers
LEGEND
POWER LINE ALTERNATIVE 2
APPROXIMATE LIMIT OF VISIBILITY ALTERNATIVE 2 (2.5km)
ZTV POWER LINE ALTERNATIVE 2
OVERALL SITE AREA
INITIAL VIEWPOINTS
EXISTING MOOKODI SUBSTATION
FUTURE SOLAR PV PROJECT SITES
FARMSTEADS
ROADS
LANDSCAPE CHARACTER AREAS
Natural Rural
Smallholdings - Semi-Rural
Urban
savannah environmental
MAP 10 - ZTV POWER LINE ALTERNATIVE 2
MOEDING SOLAR PV
VRYBURG
NORTH WEST PROVINCE
PO Box 50910, Musgrave Road, 4062
Tel:083 703 2995
Email: jon@enviroconsult.co.za
Date: 20/06/2018

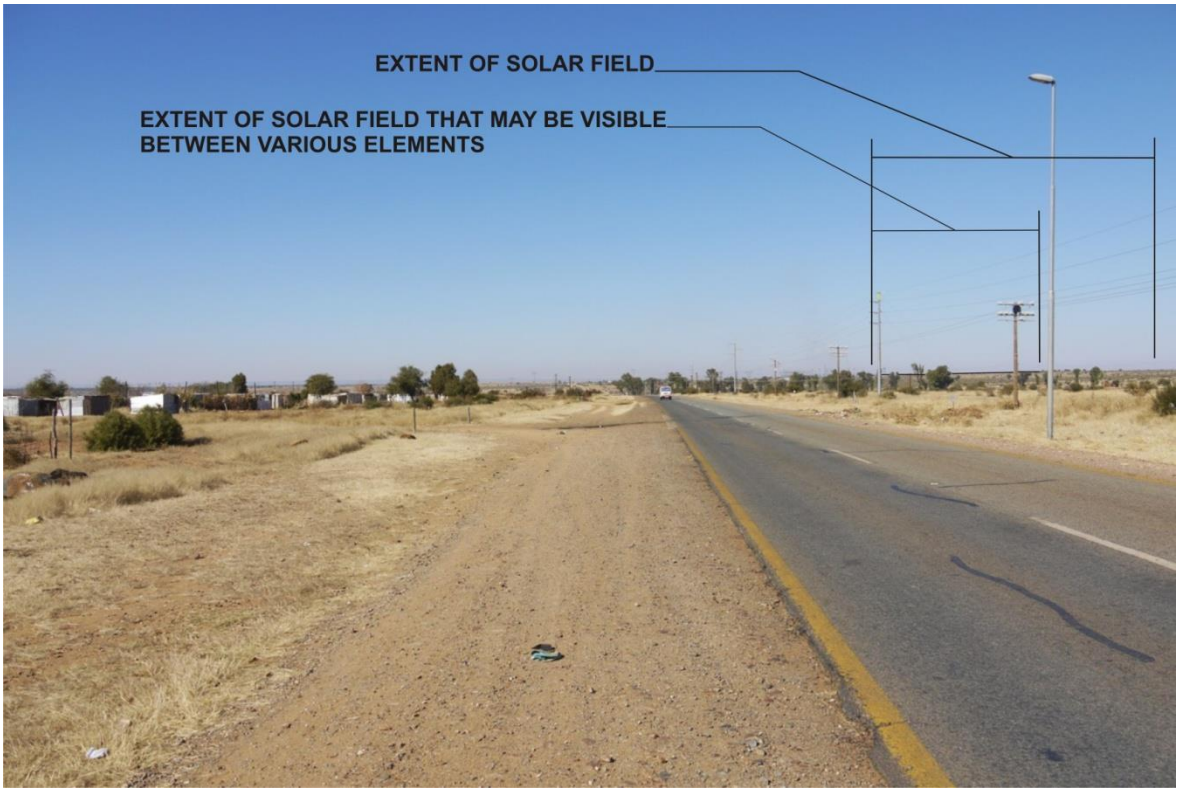


Figure 1, VP1 located on the N18 on the southern edge of Vryburg close to Huhudi approximately 4.7km from the northern edge of the development. The proposed development may be seen as a thin dark line on the horizon. The section of the project that is likely to be visible will be at least partly screened by existing infrastructure and vegetation. At this distance and considering the screening, it is unlikely that the project will be obvious from this viewpoint.

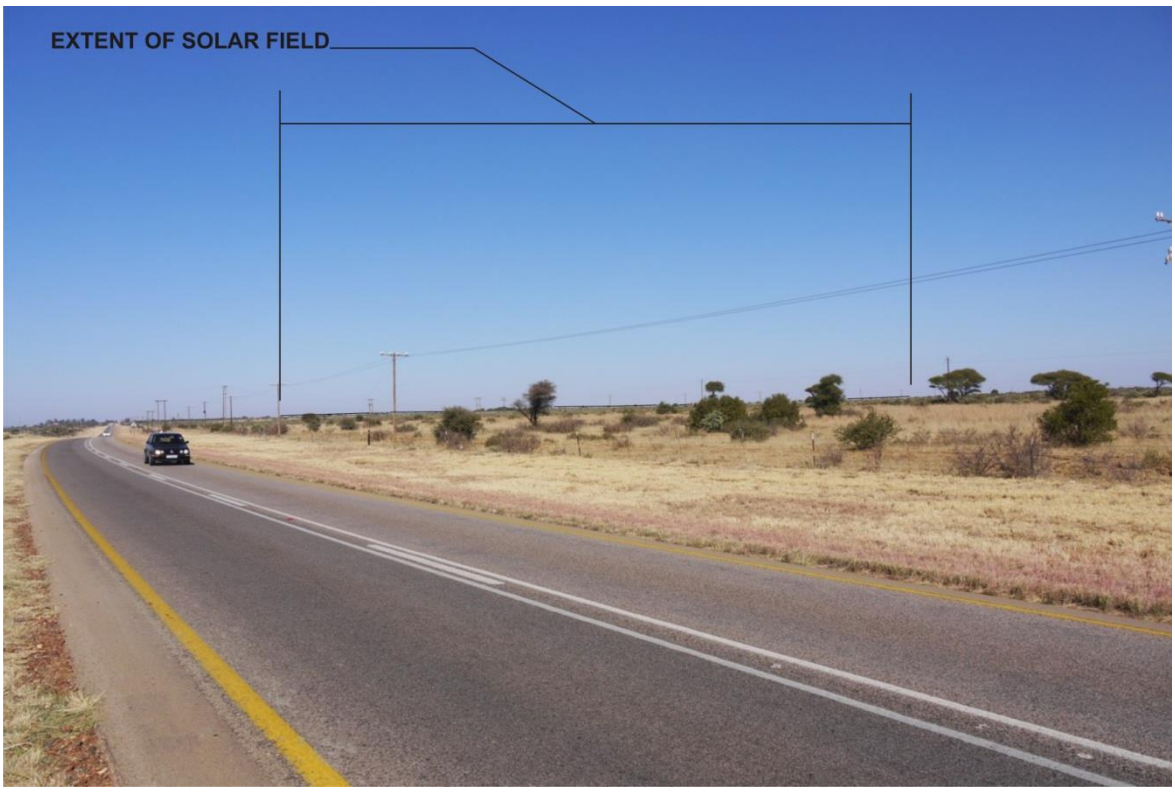


Figure 2, VP2 located on the N18 approximately 1.9km to the north of the proposed project. The proposed project will be viewed as a dark line on the horizon to the right of the road. It is likely that existing vegetation will partially screen the development. Grid Connection Alternative 1 will be seen to the right of the road running parallel with the existing MV power line. Grid Connection Alternative 2 is unlikely to be obvious.

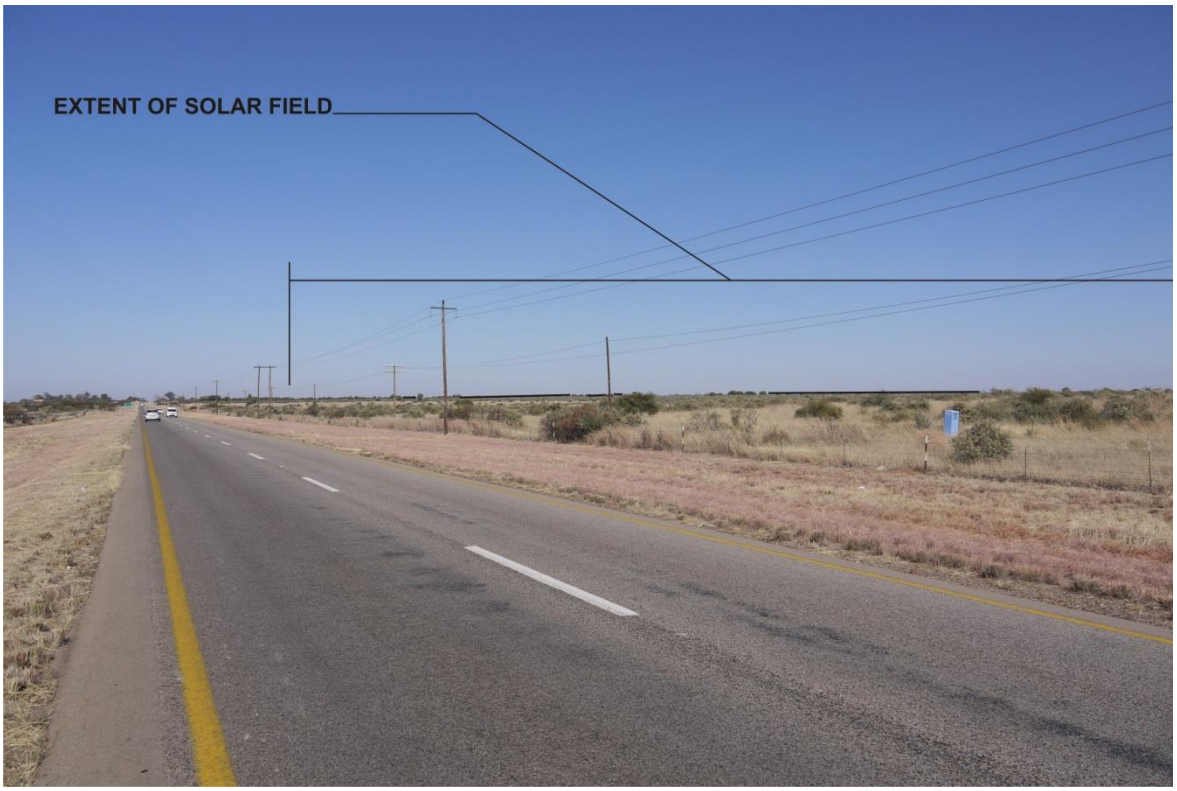


Figure 3, VP3 located on the N18 adjacent to the north eastern corner of the proposed development. The proposed project will be obvious from the road. It will be viewed in side elevation and so the frames on which the PV panels are supported will be seen. Grid Connection Alternative 1 will be seen to the right of the road running parallel with the existing MV power line. Grid Connection Alternative 2 will also be obvious.

Figure 4, VP4 located on the N18 adjacent to the entrance to Tiger Kloof Combined Schools looking north along the N18. The proposed project will be located to the left of the road, approximately 300m from the road edge. Existing vegetation will largely screen the proposed solar array from this section of the road. The development will not be obvious from this view point.

Figure 5, VP5 located on the N18 approximately 5.4km south of the proposed site and approximately 8.3km to the south of the proposed array. Because the development is located over the ridgeline that forms the horizon, the proposed project will be screened from the south and will not be visible from this view point.

6 VISUAL IMPACT ASSESSMENT

6.1 ISSUES TO BE ADDRESSED

The following list of possible impacts were identified and need to be addressed in the assessment;

a) The proposed development could change the character of a relatively natural area.
b) The proposed development could be visible to and impact on an extensive area of small holdings to the north.
c) The proposed development could change the character of the landscape as seen from the urban edge of Vryburg.
d) The proposed project is likely to be visible to and impact on a short length (approximately 5.5km) of the N18.
e) The proposed project is likely to be visible intermittently to and impact on approximately 9.5km of the R34
f) The project is likely to impact on agricultural homesteads.
g) Glare from the proposed project could cause nuisance on adjacent roads and for flightpaths associated with the Vryburg air strip.
h) Lighting impacts.

6.2 ASSESSMENT METHODOLOGY

The previous section of the report identified specific areas where likely visual impacts

may occur. This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues (see Section 1.5) related to the visual impact.

The methodology for the assessment of potential visual impacts includes:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
    - local extending only as far as the development site area – assigned a score of 1;
    - limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
    - will have an impact on the region – assigned a score of 3;
    - will have an impact on a national scale – assigned a score of 4; or
    - will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or

    - permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
    - 0 is small and will have no effect on the environment;
    - 2 is minor and will not result in an impact on processes;
    - 4 is low and will cause a slight impact on processes;
    - 6 is moderate and will result in processes continuing but in a modified way;
    - 8 is high (processes are altered to the extent that they temporarily cease); and
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
    - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
    - Assigned a score of 2 is improbable (some possibility, but low likelihood);
    - Assigned a score of 3 is probable (distinct possibility);
    - Assigned a score of 4 is highly probable (most likely); and
    - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated.*
- The **significance** is determined by combining the criteria in the following formula:
    - S=(E+D+M)P; where S = Significance weighting, E = Extent, D = Duration, M = Magnitude, P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

6.2 VISUAL IMPACT ASSESSMENT

6.2.1 Impact of the Proposed Development on General Landscape Character

Both the proposed solar project and the proposed grid connection are likely to have an impact on general landscape character.

a) Solar Project

Nature of impact:
There is one possible area of impact;

- The proposed solar project will introduce industrial elements into the rural landscape immediately to the south of Vryburg.

This area is already highly influenced by infrastructure development and with the development of currently authorised projects this influence is likely to increase.

The majority of receptors will view the project from the N18 which runs along the eastern boundary of the proposed project site, north from where the fronts of the PV panels will be visible. From the south the development is largely screened by landform. Views of the proposed development are also likely to be possible from the Tiger Kloof Combined Schools that are located on the eastern side of the N18 close to the southern extent of the proposed development.

From most viewpoints to the north, there is a degree of VAC which is provided by existing vegetation and for areas close to the southern edge of Vryburg by other infrastructure development. This will help to soften the view of the development until the viewer is close to the northern edge of the proposed development.

There will be no high level overview of the project possible although from some areas an acute angle overview will be possible.

The above factors will result in the project being seen as an obvious hard geometric form that extends the developed area. It has to be considered however that the character of the affected area is already influenced by infrastructure development including a railway line, the N18, several power lines and the Mookodi Sub Station. There are also a number of other solar PV projects which will transform the landscape.

It is obvious therefore that the rural character of the landscape has been and will be highly modified.

The proposed development will not therefore impact on relatively cohesive rural character areas.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Small to minor, **(1)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low, **(16)**	Low, **(14)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be no irreplaceable loss. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss	**No irreplaceable loss**

	of view as irreplaceable.	
Can impacts be mitigated?	**Yes**	**N/A**

Mitigation / Management:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the R34 and on the northern boundary

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain natural buffer areas adjacent to the R34 and on the northern boundary.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

The proposed project will extend the general influence of solar projects on the character of the landscape surrounding Vryburg.

However, development will occur within an area where landscape character is already strongly influenced by urban and infrastructure development. More cohesive rural areas to the south of the proposed project will be unaffected.

The contribution of the proposed project to this cumulative impact is assessed as low.

See appendix IV.

Residual Risks:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

a) Grid Connection

Nature of impact:

There is one possible area of impact;

- The proposed grid connection will introduce industrial elements into the rural landscape immediately to the south of Vryburg.

This area is already highly influenced by infrastructure development and with the development of currently authorised projects this influence is likely to increase.

The majority of receptors will view the project from the N18 which runs between the Mookodi MT and the project site.

From the north, there is a degree of VAC which is provided by existing vegetation and for areas close to the southern edge of Vryburg by other infrastructure development. This will help to soften / screen the view of Alternative 1 until the viewer is close to the Mookodi MTS. From this section of the road Alternative 2 is unlikely to be visible.

Alternative 1 will be visible for the entire length of road between the Mookodi MTS

and the northern section of the project site. It will be seen in the context of existing power lines and the proposed Mookodi - Magopela 132kV power line which will also run parallel to the road.

Alternative 2 will only be visible from the section of road immediately to the north and to the south of the northern site boundary. Alternative 2 will also be viewed in the context of existing power lines as well as the proposed Mookodi - Magopela 132kV power line.

Both alternatives will impact an area that is already impacted by infrastructure development. It will therefore intensify the influence of development.

	Without mitigation	**With mitigation**
Extent	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**
Duration	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**
Magnitude	**Alternative 1** Minor, **(2)** **Alternative 2** Small to minor, **(1)**	**Alternative 1** Minor, **(2)** **Alternative 2** Small to minor, **(1)**
Probability	**Alternative 1** Improbable **(2)** **Alternative 2** Very improbable **(1)**	**Alternative 1** Improbable **(2)** **Alternative 2** Very improbable **(1)**
Significance	**Alternative 1** Low, **(16)** **Alternative 2** Low, **(7)**	**Alternative 1** Low, **(16)** **Alternative 2** Low, **(7)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be no irreplaceable loss. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	**Alternative 1** No	**Alternative 1** No

	Alternative 2 No	**Alternative 2** No
Mitigation / Management: No meaningful mitigation is likely to be possible as the power line corridors will have to be maintained clear of vegetation. This will mean that both alternatives are likely to be visible from the road.		
Cumulative Impacts: Both alternatives will reinforce the impact of existing and proposed power lines on the existing natural rural landscape. Alternative 2 will influence this impact to a lesser degree than Alternative 1. The cumulative impact of Alternative 1 is assessed as low. The cumulative impact of Alternative 2 is also assessed as low however its impact will have a lower significance than Alternative 1. **See appendix IV.**		
Residual Risks: The residual risk relates to infrastructure remaining in place on decommissioning of the proposed project.		

6.2.2 The proposed development could be visible to and impact on an area of small holdings to the north east.

Nature of impact:
The issue relates to the fact that this is a mixed development area with some sites used for social uses such as a church, others used for light industrial and transport related activities and others have been developed as residential properties. It is the residential use that is likely to be most sensitive to possible industrialisation of the landscape that the properties overlook.

The ZTV indicates that a portion of the area of smallholdings approximately 6.6km to the north east of the proposed development could be affected.

In reality the majority of houses are set amongst trees which will help to screen them from the development. There are also extensive areas of other solar PV development proposed between the proposed project and the small holdings.

Given the distance and the nature of future development, the grid connection will not be visible and it is highly unlikely that the proposed solar project will be obvious from this area.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Small **(0)**
Probability	Very improbable **(1)**	Very improbable **(1)**
Significance	Low **(14)**	Low **(6)**
Status	The character of the rural outlook from the closest properties is highly unlikely to be modified in any significant way. With mitigation it is unlikely that the proposed development will be visible. **Neutral to negative**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the	**No irreplaceable loss.**

	operational phase. There will therefore be **no irreplaceable loss**.	
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the N18 and on the northern boundary

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain natural buffer areas adjacent to the N18 and on the northern boundary.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

Due to distance, existing vegetation and the fact that other solar PV projects have been authorised between the proposed site and these receptors, the proposed project is unlikely to have a significant cumulative effect.

The contribution of the proposed project to this cumulative impact is assessed as low. **See Appendix IV.**

Residual Risks:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

6.2.3 The proposed development could change the character of the landscape as seen from the urban edge of Vryburg.

Nature of impact:

The proposed grid connection will not be visible.

The proposed solar project may be visible but is unlikely to be obvious from the southern edge of Vryburg (Huhudi).

It is also likely that other authorised solar PV projects will be developed between the proposed project and the southern edge of Vryburg.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Small **(0)**
Probability	Improbable **(2)**	Very improbable **(1)**
Significance	Low **(16)**	Low **(6)**
Status	It is unlikely that there will be a significant change in the character of the	**Neutral**

	view from the southern edge of Vryburg. **Neutral to negative impact**	
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

Due to distance, existing vegetation and the fact that other solar PV projects have been authorised between the proposed site and the urban edge, the proposed project is unlikely to have a significant cumulative effect.

The contribution of the proposed project to cumulative impact is assessed as low. **See Appendix IV.**

Residual Risks:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

6.2.4 The proposed project is likely to be visible to and could impact on a short length (approximately 6.0km) of the N18.

Both the proposed solar project and the proposed grid connection are likely to have an impact on views from the N18.

a) Solar Project

Nature of impact:

The N18 runs along the eastern site boundary. Views of the development are likely to be obvious for motorists travelling in both directions along sections of this road.

Views may be possible from approximately 2.3km north of the site close to the existing Mookodi MT to a position adjacent to the site just south of the Tiger Kloof Combined Schools

During the initial stages of the assessment, the importance of maintaining a visual buffer beside the road in order to soften the development from the road was

highlighted. This has resulted in a buffer area of 300m between the road and the edge of the solar field being included. From the northern end of this buffer for approximately 1km extending to the position of the proposed on-site substation (assessed separately) there is little woody vegetation with any height that will help screen the project. Over this section of road, the development is likely to be obvious.

From the position of location the on-site substation to the south, for the full extent of road from which the ZTV indicates that the project could be visible, there is sufficient tall woody vegetation within the 300m buffer to largely screen the solar field.

In effect therefore, the project is likely to be obvious for 3.3km of the road, only, approximately 1.0km of which will be adjacent to the project.

It is likely that mitigation including extending tall woody vegetation into the area to the north of the proposed on-site substation could further decrease the extent of visibility of the proposed project.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor - Low **(3)**	Small - Minor **(1)**
Probability	Highly Probable **(4)**	Probable **(3)**
Significance	Medium **(36)**	Low **(21)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated	Yes	

Mitigation:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the N18 and on the northern boundary.
- Plan to augment and manage woody vegetation within the buffer area to provide screening of the development from the road.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;
- Maintain natural buffer areas adjacent to the N18 and on the southern boundary; and
- Augment woody vegetation within the natural buffer area adjacent to the N18.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial

actions.
Cumulative Impacts: Due to the fact that the proposed project is relatively close to the road and other projects are likely to be visible from the same road, it is possible that it could add to the industrialisation of views from the road. However, with appropriate mitigation / screening, the contribution of the proposed project to cumulative impact is likely to be low. **See appendix IV.**
Residual Risks: The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

b) Grid connection

Nature of impact:

From affected sections of the road to the north of the project, views over the site and proposed grid connection alternatives will be partially screened by existing vegetation and other infrastructure development.

Grid Connection Alternative 1 will be visible from this section of road. The ZTV mapping indicates that it will be visible for up to 5.5km north of the site but in effect this is likely to be largely screened for approximately 2.5km by existing infrastructure and vegetation including the Mookodi MTS.

This Grid Connection will be visible from relatively close quarters as it will run adjacent to the road. It will also add to the impact of the planned Mookodi - Magopela 132kV power line.

By comparison Grid Connection Alternative 2 will be visible for approximately 2.4km of the road. The viewer will gradually approach it from a distance. It therefore will be less obvious than Alternative 1.

	Without mitigation	**With mitigation**
Extent	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**
Duration	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**
Magnitude	**Alternative 1** Minor, **(2)** **Alternative 2** Small to minor, **(1)**	**Alternative 1** Minor, **(2)** **Alternative 2** Small to minor, **(1)**
Probability	**Alternative 1**	**Alternative 1**

	Improbable **(2)** **Alternative 2** Very improbable **(1)**	Improbable **(2)** **Alternative 2** Very improbable **(1)**
Significance	**Alternative 1** Low, **(16)** **Alternative 2** Low, **(7)**	**Alternative 1** Low, **(16)** **Alternative 2** Low, **(7)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be no irreplaceable loss. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	No	No
Mitigation: No mitigation possible		
Cumulative Impacts: Cumulative impacts associated with Alternative 1 are assessed as having a medium significance as the grid connection would run parallel with a second planned 132kV power line as well as two MV power lines. Cumulative impacts associated with Alternative 2 are assessed as low as this alternative would make use of the planned Mookodi – Magopela 132kV power line by looping in and out of this line. **See appendix IV.**		
Residual Impacts: The residual risk relates to the infrastructure being left in place on decommissioning of the solar project. It is therefore critical that effective rehabilitation is undertaken.		

6.2.5 The proposed project is likely to be visible to and impact on the R34.

Nature of impact:
The ZTV indicates that the project could be visible from approximately 9.5km of this road.

However, these possible views will occur close to the Approximate Limit of Visibility. It is also likely that other solar PV projects will be developed close to the affected sections of the R34 which will effectively screen the proposed project.

Given the distance and the nature of future development, the grid connection will not be visible and it is also highly unlikely that the proposed solar project will be obvious from this area.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**

Magnitude	Small to Minor **(1)**	Small **(0)**
Probability	Improbable **(2)**	Very improbable **(1)**
Significance	Low **(14)**	Low **(6)**
Status	It is unlikely that there will be a significant change in the character of the view from the southern edge of Vryburg. **Neutral to negative impact**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- ;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

Due to distance, existing vegetation and the fact that other solar PV projects have been authorised between the proposed site and the urban edge, the proposed project is unlikely to have a significant cumulative effect.

This impact has been assessed as.

See appendix IV.

Residual Risks:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

6.2.6 The project is likely to impact on homesteads.

Nature of impact:

The ZTV indicates that there are approximately five homesteads that could be affected within the Approximate Limit of Visibility. Of these:

- One is within a site on which another solar PV project is proposed;
- One is within the proposed site; and

Two are located between 3.5 and 4.5km to the west of the proposed project. There are however other authorised solar PV projects on intervening properties. The proposed grid connection is unlikely to be visible to homesteads. The proposed solar project may be visible.

It is noted that there are trees surrounding the two homesteads to the west that are likely to largely screen views of the proposed development.

The homestead on the project property is outside the development footprint and close to the N18.

It is assumed that the homestead within the site is owned by /used by people that are likely to be involved in the proposed development.

It is also assumed that the one homestead on land that is likely to be affected by another solar PV project is owned / used by people involved in that project.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor to Low **(3)**	Minor **(2)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low **(27)**	Low **(24)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss.**
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

The proposed solar PV project will impact on a small number of homesteads and these will be impacted on more severely by other planned solar projects.

The contribution of the proposed project to cumulative impact is therefore likely to be low.

See appendix IV.

Residual Risks:
The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

6.2.7 The project is likely to impact on Tiger Kloof Combined Schools.

Nature of impact:
The Tiger Kloof Combined Schools is located on the opposite side of the N18 to the proposed development site and close to the southern extent of the development footprint.

The planned buffer area (300m) between the road and the edge of the solar field will soften views of the development from the road and from Tiger Kloof Combined Schools.

From the position of location the on-site substation to the south, for the full extent of road and the Tiger Kloof Schools from which the ZTV indicates that the project could be visible, there is sufficient tall woody vegetation within the 300m buffer to largely screen the solar field.

The project is therefore likely to be largely screened. It may be possible to see small sections of the solar field between and over vegetation, however, this is very unlikely to be obvious from the Schools.

It is likely that mitigation including maintaining and augmenting tall woody vegetation in the buffer area will further decrease the extent of visibility of the proposed project.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Small **(0)**
Probability	Improbable **(2)**	Very Improbable **(1)**
Significance	Low **(16)**	Low **(6)**
Status	**Negative**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated	Yes	

Mitigation:
Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the N18 and on the northern boundary.
- Plan to maintain and augment woody vegetation within the buffer area to provide screening of the development from the road.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;

- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;
- Maintain natural buffer areas adjacent to the N18 and on the southern boundary; and
- Maintain and augment woody vegetation within the natural buffer area adjacent to the N18.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

It is assessed that impact on the Tiger Kloof Schools is likely to be low. It is also highly unlikely that other solar projects will be visible from the Schools

The contribution of the proposed project to cumulative impact is therefore assessed as low.

See appendix IV.

Residual Risks:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

6.2.8 Glare from the proposed project could cause nuisance on the adjacent N18 and for flightpaths associated with the Vryburg air strip.

Nature of impact:

Research indicates that glint and glare problems are most likely to occur to the west and north-west of a facility in the morning, to the east and north-east in the afternoon and evening.

It needs to be understood that if these impacts do occur, they will be dependent on appropriate conditions that are likely to occur during specific months of the year and time of day. The impacts are therefore likely to be intermittent and not ongoing.

Whilst PV panels are designed to absorb light energy, light is often reflected when the angle of incidence is acute as happens when the sun is bright and low in the sky.

Given the fact that the N18 to the east of the site is at approximately the same level at the site, it is unlikely that sections of this road will be affected.

Given that the flight path into the airstrip to the north is directly over the proposed array, it is also highly unlikely that glint and glare will affect pilots vision on approach or take off from this airstrip.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Small **(0)**
Probability	Very Improbable **(1)**	Very Improbable **(1)**
Significance	Low **(7)**	Low **(6)**
Status	**Negative**	**Negative**

Reversibility	High	High
Irreplaceable loss	There will be no irreplaceable loss.	There will be no irreplaceable loss.
Can impacts be mitigated?	Yes.	

Mitigation (Operation):

- The use of non-reflective finishes and coatings to the surface of PV panels.
- The use of a natural buffer area between the N18 and the facility.
- Should problems occur on the N18, the use of screen fencing.

Cumulative Impact:

The proposed project is unlikely to add to glint and glare issues associated with solar PV development in the area.

The contribution of the proposed project to cumulative impact is therefore assessed as low.

See appendix IV.

Residual Risks:

No residual risk has been identified.

6.2.10 The potential visual impact of operational, safety and security lighting of the facility at night on observers.

Nature of impact:

The area surrounding the site is currently affected by lighting from the adjacent urban area, the existing Mookodi MTS and the Tiger Kloof Combined Schools. It is therefore not a dark area at night.

No specific detail has been provided other than confirmation of the need for lighting at sufficient level to enable security cameras to be used at night. This is likely to result in the development adding to existing light impacts in the area.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Small to minor **(1)**
Probability	Definite **(5)**	Improbable **(2)**
Significance	Medium **(50)**	**Low (12)**
Status	The appearance of a large lit area may be accepted by most people because it is so close to a well lit urban environment. It is likely however that adjacent residents will see a new brightly lit area close to their property as a **negative** factor.	If the lights are generally not visible then the occasional light is unlikely to be seen as negative.
Irreplaceable loss	It would be possible to change the lighting / camera system so the impact cannot be seen as an irreplaceable loss.	No irreplaceable loss
Reversibility	High	High
Can impacts be mitigated?	Yes	

Mitigation / Management:

- Use low key lighting around buildings and operational areas that is triggered only when people are present.
- Plan to utilise infra-red security systems or motion sensor triggered security lighting;
- Ensure that lighting is focused on the development with no light spillage

outside the site; and • Keep lighting low, no tall mast lighting should be used.
Cumulative Impact: There is potential for security lighting and operational lighting associated with solar energy projects to further impact on the area. but this is likely to be of low significance. **See appendix IV.**
Residual Risks: No residual risk has been identified.

7 IMPACT STATEMENT

7.1 VISIBILITY

The area that is likely to be affected by visual impact associated with the proposed project will be limited to the area immediately to the south of the urban area of Vryburg. This area is largely impacted by urban and urban fringe development. Due to the ridgeline to the south of the proposed development, it will not impact on areas to the south that have a more cohesive rural in character and where the landscape character is not influenced by development.

The proposed grid connection is likely to be visible over a relatively small area and will only be obvious from the N18.

Due to its scale, the proposed solar project is likely to be visible over a wider area and impact on the N18, homesteads, the Tiger Kloof Combined Schools, and the southern edge of Vryburg (Huhudi)

De to vegetation, it is likely that broken views into the proposed solar project will be possible from the N18 to the east and the edge of the Huhudi Township to the north.

There are a small number of homesteads in close proximity to the development that could be affected and may be sensitive to change in their views. This includes two homesteads on the proposed site, one homestead within another site on which a solar PV project is planned and two homesteads on agricultural land to the west.

The Tiger Kloof Combined Schools are located close to the south east corner of the proposed development area. The ZTV analysis indicates that this receptor may be affected, however, due to the presence of tall vegetation between the development and the Schools, visibility is likely to be limited.

7.2 LANDSCAPE CHARACTER AREAS AND VISUAL ABSORPTION CAPACITY

The landscape character of the study area can be divided into three distinct Landscape Character Areas (LCAs);

- **Rural areas surrounding Vryburg**. These are likely to be used for cattle grazing and appear relatively natural. The flatness of the landscape combined with scattered shrubs and small trees are likely to help provide screening for low elements within the landscape. With relatively low vegetation and a shallow undulating topography, the height of the PV units is likely to be critical in maximising the little absorption capacity that exists. This LCA can be further sub divided by the area of urban influence that occurs to the north of the proposed project and the area to the south of the subject property that is relatively free of urban influence.
- **The urban area of Vryburg**. This area is generally inward looking drawing little character influence from external areas. It is unlikely that the proposed development will have much influence on these areas other than perhaps at the edges of the urban area that face onto the proposed development area.
- **The semi-rural area** that is comprised of the smallholdings to the east of Vryburg. This is a relatively open developed area from which views into the surrounding rural landscape are likely to be possible. VAC is generally therefore likely to be limited but will depend on localised features such as ornamental

vegetation particularly around residential properties that could provide significant VAC for small areas.

7.3 VISUAL IMPACT

Visual impacts are likely to include;

a) The general change in character of the landscape due to the proposed development was assessed as low to medium significance without mitigation and low significance with mitigation. This is due to the fact that only an area that is already impacted by urban and urban fringe development will be impacted.
b) The likely change in view that is likely to result for smallholdings to the north east was generally assessed as low due to distance, the extent that existing vegetation and the fact that other solar PV projects are authorised between the proposed project and these receptors.
c) Visual impacts on the R34 were also considered to be of low significance for the reasons noted in b).
d) Visual impacts on homesteads outside the marked area of smallholdings was assessed as low. This was due to distance, the fact that the owner of the on-site homestead is involved with the proposed development and the screening effect of other planned projects.
e) Visual impact on the Tiger Kloof Combined Schools is assessed as likely to be of low significance. This is due to the fact that the development is on the opposite side of the N18 and is set back approximately 300m from the road. Vegetation within this buffer area is relatively dense and is likely to largely screen the project to the extent that it is not highly obvious from the Schools.
f) The impact on views as seen from the urban edge of Vryburg which includes Huhudi was assessed as a low significance.
g) The visual impact on the adjacent N18 was assessed as of medium significance without mitigation and of low significance with mitigation. This road runs immediately adjacent to the eastern project site boundary. The development is set back approximately 300m from the road and is likely to be largely screened from the southern section of the road by existing vegetation in this buffer area. There is little screening for the northern section of the affected road. Mitigation including the augmenting of existing screening vegetation and extending it to cover the affected northern section of the road is likely to ensure that the development is largely screened from the road.
h) The visual impact of Grid Connection Alternative 1 which runs beside the N18 between the site and the existing Mookodi MTS also beside two MV power lines and a planned additional 132kV power line is assessed of medium significance.
i) The visual impact of Grid Connection Alternative 2 which connects to a planned 132kV power line immediately adjacent to the site was assessed as having a low significance.
j) The impact of lighting was considered to have a medium significance without mitigation. With mitigation which includes careful planning including the use of motion sensors or infrared security technology the significance is likely to reduce to low.
k) Glint and glare from the PV panels is unlikely to prove to be an issue for adjacent sections of the N18 and the southerly approach to the Vryburg airstrip.

7.4 CUMULATIVE IMPACTS

Cumulative impacts associated with existing and planned developments against which the proposed development will be set have a medium to low significance.

The contribution to cumulative impacts associated with the proposed development including the proposed solar project and the alternative grid connections have been assessed as having a low significance.

7.5 CONCLUSION

Because this development will mainly impact visually on an area where there currently is a strong visual influence from urban and urban fringe development, changes to the landscape quality are unlikely to be problematic.

Identified visual impacts associated with the grid connection alternatives are low.

The adopted grid connection is likely to be dictated by the availability of the proposed Eskom Mookodi - Magopela 132kV power line. From a visual perspective, it is preferable that connection to this line is undertaken (Alternative 2) rather than the construction of a new 132kV connection to the Mookodi MTS running parallel to the proposed Eskom line.

Identified visual impacts associated with the solar project are either low or may be mitigated to a low significance.

The key mitigation measure for visual impacts associated with the proposed solar project is the augmentation and management of vegetation within the 300m wide buffer between the proposed development and the N18.

There is no reason from a landscape and visual impact perspective why the proposed development should not proceed.

REFERENCES

Clifford, K.H., Ghanbari, C.M. & Diver, R.B. 2009. Hazard analysis of glint and glare from concentrating solar power plants. *Proceedings of the SolarPACES Conference*. 15-18 September 2009. Berlin, Germany.

Clifford, H.H., Ghanbari, C.M. & Diver, R.B. 2011. Methodology to assess potential glint and glare hazards from concentrating solar power plants: analytical models and experimental validation. *Journal of Solar Engineering Science*. 133: 1-9.

Landscape Institute and Institute of Environmental Management Assessment. 2013. *Guidelines for landscape and visual impact assessment*. Oxon, UK:Routledge

Oberholzer, B., 2005. *Guidelines for involving visual and aesthetic specialists in EIA processes*: Edition 1. (CSIR Report No. ENV-S-C 2005 053 F). Cape Town, South Africa: Provincial Department of the Western Cape, Department of Environmental Affairs & Development Planning.

United States Department of Interior. 2013. *Best management practices for reducing visual impacts of renewable energy facilities on BLM-administered lands*. Wyoming, United Stated of America: Bureau of Land Management.

Low, A.B. & Rebelo, A.G. (eds), 1996, *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs & Tourism, Pretoria.

Mucina, L. & Rutherford, M.C. (eds.), 2006, *The vegetation of South Africa, Lesotho and Swaziland*, South African National Biodiversity Institute, Pretoria (Strelitzia series; no. 19).

APPENDIX I

SPECIALIST'S BRIEF CV

Name	JONATHAN MARSHALL
Nationality	British
Year of Birth	1956
Specialisation	Landscape Architecture / Landscape & Visual Impact Assessment / Environmental Planning / Environmental Impact Assessment.
Qualifications	
Education	Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979)
	Environmental Law, University of KZN (1997)
Professional	Registered Professional Landscape Architect (SACLAP)
	Chartered Member of the Landscape Institute (UK)
	Certified Environmental Assessment Practitioner of South Africa (ICB)
	Member of the International Association of Impact Assessment, South Africa
Languages	English- Speaking - Excellent
	- Reading - Excellent
	- Writing - Excellent
Contact Details	Post: PO Box 2122
	Westville
	3630
	Republic of South Africa
	Phone: +27 31 2668241, Cell: +27 83 7032995

General

Jon qualified as a Landscape Architect (Dip LA) at Cheltenham (UK) in 1979. He has been a chartered member of the Landscape Institute UK since 1986. He is also a Registered Landscape Architect and is and experienced Environmental Impact Assessment Practitioner.

During the early part of his career (1981 - 1990) He worked with Clouston (now RPS) in Hong Kong and Australia. During this period he was called on to undertake visual impact assessment (VIA) input to numerous environmental assessment processes for

major infrastructure projects. This work was generally based on photography with line drawing superimposed to illustrate the extent of development visible.

He has worked in the United Kingdom (1990 - 1995) for major supermarket chains including Sainsbury's and prepared CAD based visual impact assessments for public enquiries for new store development. He also prepared the VIA input to the environmental statement for the Cardiff Bay Barrage for consideration by the UK Parliament in the passing of the Barrage Act (1993).

His more recent VIA work (1995 to present) includes a combination of CAD and GIS based work for a new international airport to the north of Durban, new heavy industrial operations, overhead electrical transmission lines, mining operations in West Africa and numerous commercial and residential developments.

VIA work undertaken during the last twelve months includes VIA input for wind energy projects, numerous solar plant projects (CSP and PV), a new coal fired power station as well as electrical infrastructure.

Select List of Visual Impact Assessment Projects

- **Establishment of Upmarket Tourism Accommodation on the Selati Bridge, Kruger National Park** – Assessment of visual implications of providing tourism accommodation in 12 railway carriages on an existing railway bridge at the Skukuza Rest Camp in the Kruger Park.
- **Jozini TX Transmission Tower** – Assessment of visual implications of a proposed MTN transmission tower on the Lebombo ridgeline overlooking the Pongolapoort Nature reserve and dam.
- **Bhangazi Lake Development** – Visual Impact Assessment for a proposed tourism development within the iSimangaliso Wetlend Park World Heritage Site.
- **Palesa Power Station** - VIA for a new 600MW power station near Kwamhlanga in Mpumalanga for a private client.
- **Heuningklip PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Kruispad PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Doornfontein PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Olifantshoek Power Line and Substation** – VIA for a new 10MVA 132/11kV substation and 31km powerline, Northern Cape Province, for Eskom.
- **Noupoort Concentrating Solar Plants -** Scoping and Visual Impact Assessments for two proposed parabolic trough projects.
- **Drakensberg Cable Car –** Preliminary Visual Impact Assessment and draft terms of reference as part of the feasibility study.
- **Paulputs Concentrating Solar Plant (tower technology)** – Visual Impact Assessment for a new CSP project near Pofadder in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5** – Scoping and Visual Impact Assessments for the proposed extension of five authorised CSP projects including parabolic trough and tower technology within the Karoshoek Solar Valley near Upington in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5 Shared Infrastructure** –Visual Impact Assessment for the necessary shared infrastructure including power lines, substation, water pipeline and roads for these projects.
- **Ilanga Concentrating Solar Plants 7, 8 & 9** - Scoping and Visual Impact Assessments for three new CSP projects including parabolic trough and tower technology within the Karoshoek Solar Valley near Upington in the Northern Cape.
- **Sol Invictus Solar Plants** - Scoping and Visual Impact Assessments for three new Solar PV projects near Pofadder in the Northern Cape.
- **Gunstfontein Wind Energy Facility** – Scoping and Visual Impact Assessment for a proposed WEF near Sutherland in the Northern Cape.
- **Moorreeesburg Wind Energy Facility** – Visual Impact Assessment for a proposed WEF near Moorreeesburg in the Western Cape.
- **Semonkong Wind Energy Facility** - Visual Impact Assessment for a proposed WEF near Semonkong in Southern Lesotho.
- **Great Karoo Wind Energy Facility** – Addendum report to the Visual Impact Assessment Report for amendment to this authorised WEF that is located near Sutherland in the Northern Cape. Proposed amendments included layout as well as rotor diameter.
- **Perdekraal East Power Line** – Visual Impact Assessment for a proposed power line to evacuate power from a wind energy facility near Sutherland in the Northern Cape.
- **Tshivhaso Power Station** – Scoping and Visual Impact Assessment for a proposed new power station near Lephalale in Limpopo Province.
- **Saldanha Eskom Strengthening** – Scoping and Visual Impact Assessment for the upgrading

of strategic Eskom infrastructure near Saldanha in the Western Cape.

- **Eskom Lethabo PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Lethabo Power Station in the Free State.
- **Eskom Tuthuka PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Thutuka Power Station in Mpumalanga.
- **Eskom Majuba PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Majuba Power Station in Mpumalanga.
- **Golden Valley Power Line** - Visual Impact Assessment for a proposed power line to evacuate power from a wind energy facility near Cookhouse in the Eastern Cape.
- **Mpophomeni Shopping Centre** – Visual impact assessment for a proposed new shopping centre close to the southern shore of Midmar Dam in KwaZulu Natal.
- **Rheeboksfontein Power Line** - Addendum report to the Visual Impact Assessment Report for amendment to this authorised power line alignment located near Darling in the Western Cape.
- **Woodhouse Solar Plants** – Scoping and Visual Impact Assessment for two proposed solar PV projects near Vryburg in the North West Province.
- **AngloGold Ashanti, Dokyiwa (Ghana)** – Visual Impact Assessment for proposed new Tailings Storage Facility at a mine site working with SGS as part of their EIA team.
- **Gateway Shopping Centre Extension (Durban)** – Visual Impact Assessment for a proposed shopping centre extension in Umhlanga, Durban.
- **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
- **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
- **Telkom Towers** – Visual impact assessments for numerous Telkom masts in KwaZulu Natal.
- **Eskom Isundu Substation** – Visual Impact Assessment for a proposed major new Eskom substation near Pietermaritzburg in KwaZulu Natal.
- **Eskom St Faiths Power Line and Substation** – Visual Impact Assessment for a major new substation and associated power lines near Port Shepstone in KwaZulu Natal.
- **Eskom Ficksburg Power Line** – Visual Impact Assessment for a proposed new power line between Ficksburg and Cocolan in the Free State.
- **Eskom Matubatuba to St Lucia Power Line** – Visual Impact Assessment for a proposed new power line between Mtubatuba and St Lucia in KwaZulu Natal.
- **Dube Trade Port, Durban International Airport** – Visual Impact Assessment
- **Sibaya Precinct Plan** – Visual Impact Assessment as part of Environmental Impact Assessment for a major new development area to the north of Durban.
- **Umdloti Housing** – Visual Impact Assessment as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
- **Tata Steel Ferrochrome Smelter** - Visual impact assessment of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
- **Durban Solid Waste Large Landfill Sites –** Visual Impact Assessment of proposed development sites to the North and South of the Durban Metropolitan Area. The project utilised 3d computer visualisation techniques.
- **Hillside Aluminium Smelter, Richards Bay -** Visual Impact Assessment of proposed extension of the existing smelter. The project utilised 3d computer visualisation techniques.
- **Estuaries of KwaZulu Natal Phase 1 –** Visual character assessment and GIS mapping as part of a review of the condition and development capacity of eight estuary landscapes for the Town and Regional Planning Commission. The project was extended to include all estuaries in KwaZulu Natal.
- **Signage Assessments** – Numerous impact assessments for proposed signage

developments for Blast Media.

- **Signage Strategy** – Preparation of an environmental strategy report for a national advertising campaign on National Roads for Visual Image Placements.
- **Zeekoegatt, Durban** - Computer aided visual impact assessment. EDP acted as advisor to the Province of KwaZulu Natal in an appeal brought about by a developer to extend a light industrial development within a 60 metre building line from the National N3 Highway.
- **La Lucia Mall Extension** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed extension to shopping mall for public consultation exercise.
- **Redhill Industrial Development** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed new industrial area for public consultation exercise.
- **Avondale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
- **Hammersdale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
- **Southgate Industrial Park, Durban** - Computer Aided Visual Impact Assessment and Landscape Design for AECI.
- **Sainsbury's Bryn Rhos** - Computer Aided Visual Impact Assessment/ Planning Application for the development of a new store within the Green Wedge North of Swansea.
- **Ynyston Farm Access** - Computer Aided Impact Assessment of visual intrusion of access road to proposed development of Cardiff for the Land Authority for Wales.
- **Cardiff Bay Barrage** – Preparation of the Visual Impact Statement for inclusion in the Impact Statement for debate by parliament (UK) prior to the passing of the Cardiff Bay Barrage Bill.
- **A470, Cefn Coed to Pentrebach** - Preparation of landscape frameworks for the assessment of the impact of the proposed alignment on the landscape for The Welsh Office.
- **Sparkford to Illchester Bye Pass** - The preparation of the landscape framework and the draft landscape plan for the Department of Transport.
- **Green Island Reclamation Study** - Visual Impact Assessment of building massing, Urban Design Guidelines and Masterplanning for a New Town extension to Hong Kong Island.
- **Route 3** - Visual Impact Assessment for alternative road alignments between Hong Kong Island and the Chinese Border.
- **China Border Link** - Visual Impact Assessment and initial Landscape Design for a new border crossing at Lok Ma Chau.
- **Route 81, Aberdeen Tunnel to Stanley** - Visual Impact Assessment for alternative highway alignments on the South side of Hong Kong Island.

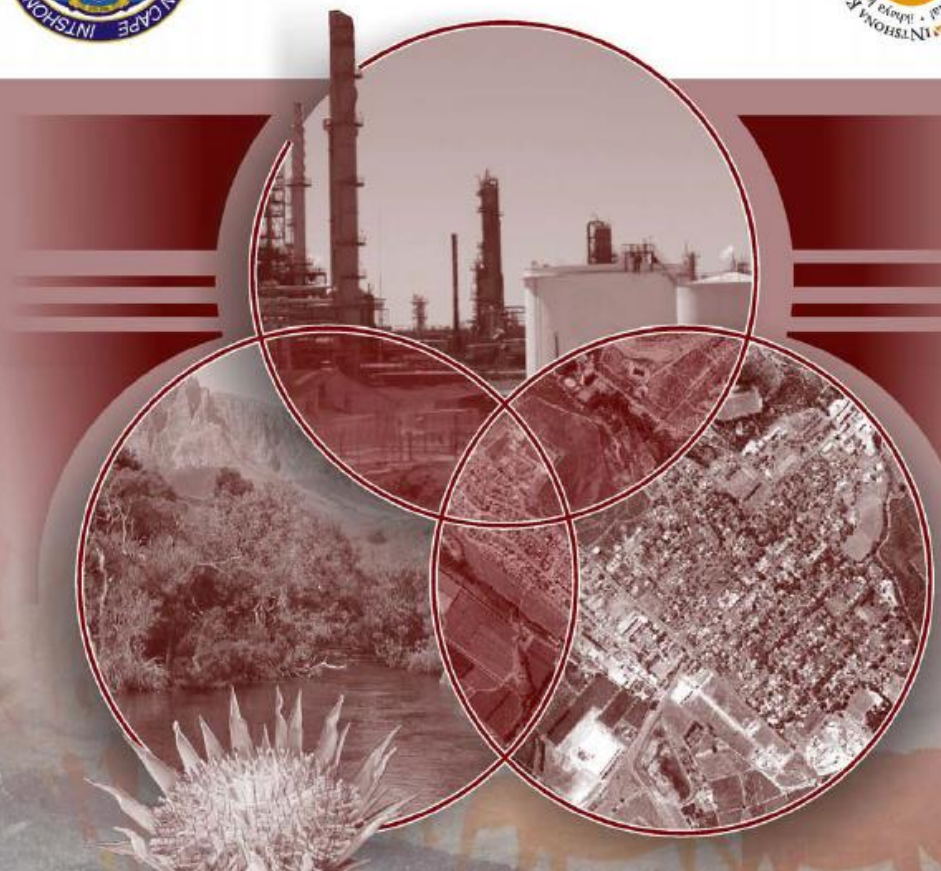
APPENDIX II

GUIDELINES FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

(Preface, Summary and Contents for full document go to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning web site, http://eadp.westerncape.gov.za/your-resource-library/policies-guidelines)

GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

PROVINCIAL GOVERNMENT OF THE WESTERN CAPE:
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
AND DEVELOPMENT PLANNING



bola CSIR

Edition 1
June 2005

GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

Edition 1

Issued by:

Provincial Government of the Western Cape
Department of Environmental Affairs and Development Planning
Utilitas Building, 1 Dorp Street
Private Bag X9086
Cape Town 8000
South Africa

Prepared by:

Bernard Oberholzer Landscape Architect
PO Box 26643
Hout Bay, 7872, South Africa
email: bola@wol.co.za

Coordinated by:

CSIR Environmentek
P O Box 320
Stellenbosch 7599
South Africa

Contact person:

Frauke Münster
Tel: +27 21 888-2538
(fmunster@csir.co.za)

This guideline should be cited as:

Oberholzer, B. 2005. *Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1.* CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

ACKNOWLEDGEMENTS

Steering committee:

Paul Hardcastle	-	DEA&DP
Ayub Mohammed	-	DEA&DP
Susie Brownlie	-	de Villiers Brownlie Associates
Keith Wiseman	-	City of Cape Town
Mike Burns	-	CSIR Environmentek
Paul Lochner	-	CSIR Environmentek
Pete Ashton	-	CSIR Environmentek

Focus group participants:

Paul Hardcastle	-	DEA&DP
Washiela Anthony	-	DEA&DP
Danie Smit	-	DEAT
Eileen Weinronk	-	City of Cape Town
Menno Klapwijk	-	Cave Klapwijk and Associates
Graham Young	-	Landscape Consultant
Bernard Oberholzer	-	Bernard Oberholzer Landscape Architect (BOLA)
Nicolas Baumann	-	Baumann & Winter Heritage Consultants
Sarah Winter	-	Baumann & Winter Heritage Consultants
Tanya de Villiers	-	Chittenden Nicks deVilliers Africa
Frauke Münster	-	CSIR Environmentek

Internal review:

Mike Burns	-	CSIR Environmentek
Eileen Weinronk	-	City of Cape Town
Paul Hardcastle	-	DEA&DP
Washiela Anthony	-	DEA&DP

Stakeholders engaged in the guideline development process:

These guidelines were developed through a consultative process and have benefited from the inputs and comments provided by a wide range of individuals and organizations actively working to improve EIA practice. Thanks are due to all who took the time to engage in the guideline development process.

In particular, thanks are due to Jan Glazewski (University of Cape Town), Keith Wiseman (City of Cape Town), Paul Britton (SANPARKS), Graham Young (University of Pretoria), Lisa Parkes (Ninham Shand) and Paul Claassen (Environomics) for providing useful information and in-depth comments.

Finalisation of report figures and formatting:

Magdel van der Merwe and Elna Logie, DTP Solutions

PREFACE

The purpose of an Environmental Impact Assessment (EIA) is to provide decision-makers (be they government authorities, the project proponent or financial institutions) with adequate and appropriate information about the potential positive and negative impacts of a proposed development and associated management actions in order to make an informed decision whether or not to approve, proceed with or finance the development.

For EIA processes to retain their role and usefulness in supporting decision-making, the involvement of specialists in EIA needs to be improved in order to:

- Add greater value to project planning and design;
- Adequately evaluate reasonable alternatives;
- Accurately predict and assess potential project benefits and negative impacts;
- Provide practical recommendations for avoiding or adequately managing negative impacts and enhancing benefits;
- Supply enough relevant information at the most appropriate stage of the EIA process to address adequately the key issues and concerns, and effectively inform decision-making in support of sustainable development.

It is important to note that not all EIA processes require specialist input; broadly speaking, specialist involvement is needed when the environment could be significantly affected by the proposed activity, where that environment is valued by or important to society, and/or where there is insufficient information to determine whether or not unavoidable impacts would be significant.

The purpose of this series of guidelines is to improve the efficiency, effectiveness and quality of specialist involvement in EIA processes. The guidelines aim to improve the capacity of roleplayers to anticipate, request, plan, review and discuss specialist involvement in EIA processes. Specifically, they aim to improve the capacity of EIA practitioners to draft appropriate terms of reference for specialist input and assist all roleplayers in evaluating whether or not specialist input to the EIA process is appropriate for the type of development and environmental context. Furthermore, they aim to ensure that specialist inputs support the development of effective, practical Environmental Management Plans where projects are authorised to proceed (refer to *Guideline for Environmental Management Plans*).

The guidelines draw on best practice in EIA in general, and within specialist fields of expertise in particular, to address the following issues related to the timing, scope and quality of specialist input. The terms "specialist involvement" and "input" have been used in preference to "specialist assessment" and "studies" to indicate that the scope of specialists' contribution (if required) depends on the nature of the project, the environmental context and the amount of available information and does not always entail detailed studies or assessment of impacts.

The guidelines draw on best practice in EIA in general, and within specialist fields of expertise in particular, to address the following issues related to the timing, scope and quality of specialist input. The terms "specialist involvement" and "input" have been used in preference to "specialist

assessment" and "studies" to indicate that the scope of specialists' contribution depends on the nature of the project, the environmental context and the amount of available information.

	ISSUES
TIMING	▪ When should specialists be involved in the EIA process; i.e. at what stage in the EIA process should specialists be involved (if at all) and what triggers the need for their input?
SCOPE	▪ Which aspects must be addressed through specialist involvement; i.e. what is the purpose and scope of specialist involvement? ▪ What are appropriate approaches that specialists can employ? ▪ What qualifications, skills and experience are required?
QUALITY	▪ What triggers the review of specialist studies by different roleplayers? ▪ What are the review criteria against which specialist inputs can be evaluated to ensure that they meet minimum requirements, are reasonable, objective and professionally sound?

The following guidelines form part of this first series of guidelines for involving specialists in EIA processes:

- Guideline for determining the scope of specialist involvement in EIA processes
- Guideline for the review of specialist input in EIA processes
- Guideline for involving biodiversity specialists in EIA processes
- Guideline for involving hydrogeologists in EIA processes
- Guideline for involving visual and aesthetic specialists in EIA processes
- Guideline for involving heritage specialists in EIA processes
- Guideline for involving economists in EIA processes

The *Guideline for determining the scope of specialist involvement in EIA processes* and the *Guideline for the review of specialist input in EIA processes* provide generic guidance applicable to any specialist input to the EIA process and clarify the roles and responsibilities of the different roleplayers involved in the scoping and review of specialist input. It is recommended that these two guidelines are read first to introduce the generic concepts underpinning the guidelines which are focused on specific specialist disciplines.

Who is the target audience for these guidelines?

The guidelines are directed at authorities, EIA practitioners, specialists, proponents, financial institutions and other interested and affected parties involved in EIA processes. Although the guidelines have been developed with specific reference to the Western Cape province of South Africa, their core elements are more widely applicable.

What type of environmental assessment processes and developments are these guidelines applicable to?

The guidelines have been developed to support project-level EIA processes regardless of whether they are used during the early project planning phase to inform planning and design decisions (i.e. during pre-application planning) or as part of a legally defined EIA process to obtain statutory approval for a proposed project (i.e. during screening, scoping and/or impact assessment). Where specialist input may be required the guidelines promote early, focused and appropriate involvement of specialists in EIA processes in order to encourage proactive consideration of potentially significant impacts, so that negative impacts may be avoided or

effectively managed and benefits enhanced through due consideration of alternatives and changes to the project.

The guidelines aim to be applicable to a range of types and scales of development, as well as different biophysical, social, economic and governance contexts.

What will these guidelines not do?

In order to retain their relevance in the context of changing legislation, the guidelines promote the principles of EIA best practice without being tied to specific legislated national or provincial EIA terms and requirements. They therefore do not clarify the specific administrative, procedural or reporting requirements and timeframes for applications to obtain statutory approval. They should, therefore, be read in conjunction with the applicable legislation, regulations and procedural guidelines to ensure that mandatory requirements are met.

It is widely recognized that no amount of theoretical information on how best to plan and coordinate specialist inputs, or to provide or review specialist input, can replace the value of practical experience of coordinating, being responsible for and/or reviewing specialist inputs. Only such experience can develop sound judgment on such issues as the level of detail needed or expected from specialists to inform decision-makers adequately. For this reason, the guidelines should not be viewed as prescriptive and inflexible documents. Their intention is to provide best practice guidance to improve the quality of specialist input.

Furthermore, the guidelines do not intend to create experts out of non-specialists. Although the guidelines outline broad approaches that are available to the specialist discipline (e.g. field survey, desktop review, consultation, modeling), specific methods (e.g. the type of model or sampling technique to be used) cannot be prescribed. The guidelines should therefore not be used indiscriminately without due consideration of the particular context and circumstances within which an EIA is undertaken, as this influences both the approach and the methods available and used by specialists.

How are these guidelines structured?

The specialist guidelines have been structured to make them user-friendly. They are divided into six parts, as follows:

- **Part A**: Background;
- **Part B**: Triggers and key issues potentially requiring specialist input;
- **Part C**: Planning and coordination of specialist inputs (drawing up terms of reference);
- **Part D**: Providing specialist input;
- **Part E**: Review of specialist input; and
- **Part F**: References.

Part A provides grounding in the specialist subject matter for all users. It is expected that authorities and peer reviewers will make most use of Parts B and E; EIA practitioners and project proponents Parts B, C and E; specialists Part C and D; and other stakeholders Parts B, D and E. Part F gives useful sources of information for those who wish to explore the specialist topic.

SUMMARY

This guideline document, which deals with specialist visual input into the EIA process, is organised into a sequence of interleading sections. These follow a logical order covering the following:

- the background and context for specialist visual input;
- the triggers and issues that determine the need for visual input;
- the type of skills and scope of visual inputs required in the EIA process;
- the methodology, along with information and steps required for visual input;
- finally, the review or evaluation of the visual assessment process.

Part A is concerned with defining the visual and aesthetic component of the environment, and with principles and concepts relating to the visual assessment process. The importance of the process being logical, holistic, transparent and consistent is stressed in order for the input to be useful and credible.

The legal and planning context within which visual assessments take place indicate that there are already a number of laws and bylaws that protect visual and scenic resources. These resources within the Western Cape context have importance for the economy of the region, along with the proclaimed World Heritage Sites in the Province.

The role and timing of specialist visual inputs into the EIA process are outlined, with the emphasis being on timely, and on appropriate level of input, from the early planning stage of a project, through to detailed mitigation measures and management controls at the implementation stage.

Part B deals with typical factors that trigger the need for specialist visual input to a particular project. These factors typically relate to:

(a) the nature of the receiving environment, in particular its visual sensitivity or protection status;
(b) the nature of the project, in particular the scale or intensity of the project, which would result in change to the landscape or townscape.

The correlation between these two aspects are shown in a table, in order to determine the varying levels of visual impact that can be expected, i.e. from little or no impact, to very high visual impact potential.

Part C deals with the choice of an appropriate visual specialist, and the preparation of the terms of reference (TOR) for the visual input. Three types of visual assessment are put forward, each requiring different expertise, namely:

Type A: assessments involving large areas of natural or rural landscape;
Type B: assessments involving local areas of mainly built environment;
Type C: assessments involving smaller scale sites with buildings, or groups of buildings.

The scope of the visual input would in summary relate to the following:

- the issues raised during the scoping process;
- the time and space boundaries, i.e. the extent or zone of visual influence;

- the types of development alternatives that are to be considered;
- the variables and scenarios that could affect the visual assessment;
- the inclusion of direct, indirect and cumulative effects.

Approaches to the visual input relate to the level of potential impact and range from minimal specialist input, to a full visual impact assessment (VIA). A list of the typical components of a visual assessment is given, and the integration with other studies forming part of the EIA process is discussed.

Part D provides guidance for specialist visual input, and on the information required by specialists. Notes on predicting potential visual impacts are given, along with suggested criteria for describing and rating visual impacts. The assessment of the overall significance of impacts, as well as thresholds of significance are discussed.

Further aspects that need to be considered by visual specialists in EIA processes include:

- affected parties who stand to benefit or lose,
- risks and uncertainties related to the project,
- assumptions that have been made, and their justification,
- levels of confidence in providing the visual input or assessment,
- management actions that can be employed to avoid or mitigate adverse effects and enhance benefits, and
- the best practicable environental option from the perspective of the visual issues and impacts.

Finally, pointers for the effective communication of the findings are given.

Part E lists specific evaluation criteria for reviewing visual input by a specialist, where this becomes necessary. Further guidance on this is given in the document on *Guideline for the review of specialist input in EIA processes.*

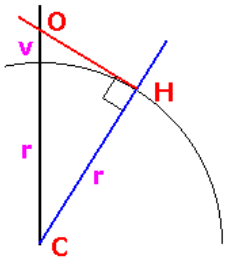
CONTENTS

APPENDIX III

FORMULA FOR DERIVING THE APPROXIMATE VISUAL HORIZON

The Mathematics behind this Calculation

This calculation should be taken as a guide only as it assumes the earth is a perfect ball 6378137 metres radius. It also assumes the horizon you are looking at is at sea level. A triangle is formed with the centre of the earth (C) as one point, the horizon point (H) is a right angle and the observer (O) the third corner. Using Pythagoras's theorem we can calculate the distance from the observer to the horizon (OH) knowing CH is the earth's radius (r) and CO is the earth's radius (r) plus observer's height (v) above sea level.



Sitting in a hotel room 10m above sea level a boat on the horizon will be 11.3km away. The reverse is also true, whilst rowing across the Atlantic, the very top of a mountain range 400m high could be seen on your horizon at a distance of 71.4 km assuming the air was clear enough.

APPENDIX IV

CUMULATIVE IMPACT ASSESSMENT

1 Landscape Change

Both the proposed solar project and the proposed grid connection are likely to have an impact on general landscape character.

a) Solar Project

Nature:
The proposed project will extend the general influence of solar projects on the character of the landscape surrounding Vryburg.

However, development will occur within an area where landscape character is already strongly influenced by urban and infrastructure development. More cohesive rural areas to the south of the proposed project will be unaffected.

Due to roadside vegetation and topography, the proposed project is anticipated to have a relatively low visibility.

A detailed visual analysis of other solar projects in the area has not been undertaken, however, it is likely that a number of projects may be visible at any one time from certain viewpoints. Again, largely due to topography, the areas from which multiple projects are visible are likely to be limited.

With appropriate mitigation the contribution to cumulative impact is likely to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and surroundings (2)	Site and surroundings (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (16)**	**Medium (30)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:
Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the R34 and on the northern boundary

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain natural buffer areas adjacent to the R34 and on the southern boundary.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:
Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

b) Grid Connection

Nature:
The proposed grid connections will affect an area that is already impacted by major electrical infrastructure including power lines and the Mookodi MTS.

However, development will occur within an area where landscape character is already strongly influenced by urban and infrastructure development. More cohesive rural areas to the south of the proposed project will be unaffected.

Whilst Cumulative Impact levels associated with both alternatives is indicated as medium, the contribution to this impact associated with Alternative 2 is likely to be significantly lower than Alternative 1.

With appropriate mitigation the contribution to cumulative impact is likely to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**
Duration	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**
Magnitude	**Alternative 1** Minor, **(2)** **Alternative 2** Small to minor, **(1)**	**Alternative 1** Moderate, **(6)** **Alternative 2** Moderate, **(6)**
Probability	**Alternative 1** Improbable **(2)** **Alternative 2** Very improbable **(1)**	**Alternative 1** Probable, **(3)** **Alternative 2** Probable, **(3)**
Significance	**Alternative 1** Low, **(16)** **Alternative 2** Low, **(7)**	**Alternative 1** Medium, **(36)** **Alternative 2** Medium, **(36)**
Status (positive or negative)	Negative	Negative

Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the R34 and on the northern boundary

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain natural buffer areas adjacent to the R34 and on the southern boundary.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:

Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

2 Impact on Smallholdings

Nature:

A detailed visual analysis of other solar projects in the area has not been undertaken due to limited information being available for these facilities, however, it is likely that, due to distance, existing vegetation and the fact that other solar PV projects have been authorised between the proposed site and these receptors, the proposed project is likely to result in a negligible cumulative effect.

It is likely that only the PV project will have any visual influence over the distance involved. Grid connection alternatives will not be visible.

With appropriate mitigation the contribution to cumulative impact is likely to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and surroundings, **(2)**	Site and surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Small, **(0)**	Minor to low, **(3)**
Probability	Very improbable, **(1)**	Probable, **(3)**
Significance	**Low, (6)**	**Low, (27)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of	No	No

resources?		
Can impacts be mitigated?	Yes	

Mitigation:
Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the R34 and on the northern boundary

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain natural buffer areas adjacent to the R34 and on the southern boundary.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate areas to their natural state;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:
Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

3 The visibility impact on the urban edge of Vryburg

Nature:
A detailed visual analysis of other solar projects in the area has not been undertaken due to limited information being available for these facilities, however, it is likely that, due to distance, existing vegetation and the fact that other solar PV projects have been authorised between the proposed site and these receptors, the proposed project is likely to result in a negligible cumulative effect.

It is likely that only the PV project will have any visual influence over the distance involved. Grid connection alternatives will not be visible.

With appropriate mitigation the contribution to cumulative impact is likely to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate	Site and surroundings, **(2)**

	surroundings, **(2)**	
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Small **(0)**	Low, **(4)**
Probability	Very improbable, **(1)**	Probable, **(3)**
Significance	**Low, (6)**	**Medium, (30)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No
Can impacts be mitigated?	Yes, to a minor degree	

Mitigation:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate areas to their natural state;
- Rehabilitated and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:

Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

4 Cumulative impact on the R34

Nature:

A detailed visual analysis of other solar projects in the area has not been undertaken due to limited information being available for these facilities, however, it is likely that, due to distance, existing vegetation and the fact that other solar PV projects have been authorised between the proposed site and these receptors, the proposed project is likely to result in a negligible cumulative effect.

It is likely that only the PV project will have any visual influence over the distance involved. Grid connection alternatives will not be visible.

With appropriate mitigation the contribution to cumulative impact is likely to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings, **(2)**	Site and surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**

Magnitude	Small, **(0)**	Minor to low, **(3)**
Probability	Very improbable, **(1)**	Probable, **(3)**
Significance	Low, **(6)**	Low, **(27)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No
Can impacts be mitigated?	Yes to a small degree	

Mitigation:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate areas to their natural state;
- Rehabilitated and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:

Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

5 Cumulative impact on the N18

Both the proposed solar project and the proposed grid connection are likely to have an impact on general landscape character.

a) Solar Project

Nature:

A detailed visual analysis of other solar projects in the area has not been undertaken due to limited information being available for these facilities, however, due to the fact that the proposed project is relatively close to the road and other projects are likely to be visible from the same road, it is possible that it could add to the industrialisation of views from the road. However, with appropriate mitigation / screening, the proposed project is likely to be largely screened.

With appropriate mitigation the contribution to cumulative impact is likely to be low.

	Overall impact of the proposed project	**Cumulative impact of the project and other projects**

	considered in isolation	in the area
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small - Minor **(1)**	Low **(4)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low **(21)**	Medium **(30)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the N18 and on the northern boundary.
- Plan to augment and manage woody vegetation within the buffer area to provide screening of the development from the road.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;
- Maintain natural buffer areas adjacent to the N18 and on the southern boundary; and
- Augment woody vegetation within the natural buffer area adjacent to the N18.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:

Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

b) Grid Connection

Nature:

The proposed grid connections will affect an area to the north of the site that is already impacted by major electrical infrastructure including power lines and the Mookodi MTS.

A detailed visual analysis of other solar projects in the area has not been undertaken, however, in addition to there being significant impact already, other planned projects will add to the impact of electrical infrastructure in this area

Whilst Cumulative Impact levels associated with both alternatives is indicated as medium, the contribution to this impact associated with Alternative 2 is likely to be significantly lower than Alternative 1.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**	**Alternative 1** Site and immediate surroundings, **(2)** **Alternative 2** Site and immediate surroundings, **(2)**
Duration	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**	**Alternative 1** Long term, **(4)** **Alternative 2** Long term, **(4)**
Magnitude	**Alternative 1** Minor, **(2)** **Alternative 2** Small to minor, **(1)**	**Alternative 1** Moderate, **(6)** **Alternative 2** Moderate, **(6)**
Probability	**Alternative 1** Improbable **(2)** **Alternative 2** Very improbable **(1)**	**Alternative 1** Probable, **(3)** **Alternative 2** Probable, **(3)**
Significance	**Alternative 1** Low, **(16)** **Alternative 2** Low, **(7)**	**Alternative 1** Medium, **(36)** **Alternative 2** Medium, **(36)**
Status (positive or negative)	**Negative**	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:

Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the R34 and on the northern boundary

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain natural buffer areas adjacent to the R34 and on the southern boundary.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;

- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:
Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

7 Cumulative impact on Homesteads

Nature:
A detailed visual analysis of other solar projects in the area has not been undertaken due to limited information being available for these facilities, however, there are a number of homesteads on the properties that will be affected by other solar projects. The proposed project will also extend the general influence of solar projects on the character of the landscape.
It is likely therefore that the probability of an impact will increase.
Whilst the overall cumulative impact is assessed as having a medium significance, the contribution to cumulative impacts is anticipated as being low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Minor **(2)**
Probability	Probable **(3)**	Highly probable **(4)**
Significance	Low **(24)**	Medium **(32)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes to a small degree	

Mitigation:
Planning:
- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Planning:
- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;

Operations:
- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

Decommissioning:
- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate areas to their natural state;
- Rehabilitated and monitor areas post-decommissioning and implement

remedial actions.
Residual Impacts: Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

8 Cumulative impact of Solar PV projects on Tiger Kloof Combined Schools

Nature of impact:
It is assessed that impact on the Tiger Kloof Schools is likely to be low.

Whilst a detailed visual analysis of other solar projects in the area has not been undertaken, it is also unlikely that other solar projects will be visible from the Schools.

The cumulative impact is therefore assessed as low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small **(0)**	Small **(0)**
Probability	Very Improbable **(1)**	Improbable **(2)**
Significance	Low **(6)**	Low **(12)**
Status	**Neutral**	**Neutral**
Irreplaceable loss	**No irreplaceable loss.**	**No irreplaceable loss.**
Can impacts be mitigated	Yes	

Mitigation / Management:
Planning:

- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain natural buffer areas adjacent to the N18 and on the northern boundary.
- Plan to augment and manage woody vegetation within the buffer area to provide screening of the development from the road.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;
- Maintain natural buffer areas adjacent to the N18 and on the southern boundary; and
- Augment woody vegetation within the natural buffer area adjacent to the N18.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas post-decommissioning and implement remedial actions.

Residual Impacts:
Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning.

10 Cumulative impact of glare.

Nature:

Whilst a detailed glare analysis of other solar projects in the area has not been undertaken, due to the number of projects in the area, the probability of glare being an issue will increase to probable.

The proposed project is unlikely to add to glare issues associated with solar PV development in the area.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Small to minor **(1)**
Probability	Very Improbable **(1)**	Probable **(3)**
Significance	Low **(7)**	Low **(21)**
Status (positive or negative)	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss of resources?	There will be no irreplaceable loss.	There will be no irreplaceable loss.
Can impacts be mitigated?	Yes	

Mitigation:

- The use of non-reflective finishes and coatings to the surface of PV panels.
- The use of a natural buffer area between the R34 and the facility.
- Should problems occur on the N18, the use of screen fencing.

Residual Impacts:
Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

11 Night Time Lighting Impacts

Nature:
Currently lighting in the area is comprised of urban lighting. This is not generally an area that is likely to be sensitive to lighting impacts, however, immediate neighbours may be sensitive.

There is potential for security lighting and operational lighting associated with solar energy projects to further impact on the area but this is likely to be of low significance.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site **(1)**	Local **(1)**
Duration	Long term **(4)**	Long term **(4)**

Magnitude	Small to minor **(1)**	Small to minor **(1)**
Probability	Improbable **(2)**	Probable **(3)**
Significance	**Low (12)**	**Low (18)**
Status (positive or negative)	If the lights are generally not visible then the occasional light is unlikely to be seen as negative.	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No
Can impacts be mitigated?	Yes	
Mitigation: 1) Use low key lighting around buildings and operational areas that is triggered only when people are present. 2) Plan to utilise infra-red security systems or motion sensor triggered security lighting; 3) Ensure that lighting is focused on the development with no light spillage outside the site; and 4) Keep lighting low, no tall mast lighting should be used.		
Residual Impacts: Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,		

APPENDIX V

ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Moeding PV Solar Farm, Construction, Operation and Decommissioning
Potential Impact	Change in Landscape Character Visual impact on roads, homestead, urban edge of Vryburg, and the Tiger Kloof Combined School. Impact of glint and glare.
Activity/risk source	Engineered change in landform being obvious against natural contours. Vegetation clearance and rehabilitation during construction and decommissioning. Glare affecting drivers on N18, during early evening (summer months). Light spill impacting on adjacent homesteads during the hours of darkness. Decommissioning activities.
Mitigation: Target/Objective	Plan platforms and earthworks to blend into surrounding natural contours. Minimise and reinstate vegetation loss. Reinforcement and extension of natural vegetation in the 300m wide Maintain and plant the buffer area adjacent to the N18 and along the northern boundary in order to provide an effective screen. Remove structures and rehabilitate site on decommissioning. Ensure PV panels use non reflective surfaces in order to minimise the potential for glint and glare.

Mitigation: Action/control	**Responsibility** Contractor (C) Environmental Control Officer (ECO) Environmental Liaison Officer (ELO)	**Timeframe** Construction Phase (C) Operational Phase (O) Decommissioning Phase (D)
Ensure that the face of panels have the most effective non reflective surface possible at the time of ordering.	C	C
Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.	C, ECO	C
Reinstate any areas of vegetation that have been disturbed during construction.	C, ECO	C
Maintain and augment woody vegetation within the 300m wide buffer between the development and the N18 and on the northern boundary.	C, ECO	C
Rehabilitate disturbed areas to their natural state on decommissioning.	ECO	D

Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	C, ECO	C, D
Remove all temporary works.	C, ECO	C, D
Remove infrastructure not required for the post-decommissioning use of the site.	C, ECO	D

Performance Indicators	Natural contours rather than rigid engineered land form. Vegetation presence and density. Visibility of the development from the N18. Presence of unnecessary infrastructure. Observing glare on N18 / complaints from drivers.
Monitoring	Evaluate vegetation before, during and after construction. Evaluate vegetation growth and reinstatement during decommissioning and for a year thereafter. Monitor glare on the N18 through visual observations during early evenings particularly during summer months. Take regular time-line photographic evidence. Responsibility: ECO and ELO. Prepare regular reports.