McTAGGARTS PV1 (PTY) LTD

KHUNAB SOLAR GRID CONNECTION FOR KHUNAB SOLAR DEVELOPMENT, NORTHERN CAPE PROVINCE

LANDSCAPE & VISUAL IMPACT ASSESSMENT

September 2019

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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 Khunab Solar Grid Connection by Savannah Environmental (Pty) Ltd.

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

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

One grid connection corridor up to 300m in width and two collector substations, each including switching station components are under consideration.

1.2 PROJECT LOCATION AND PROPERTY DESCRIPTION

The proposed collector substations will be located on Portion 12 of Farm Klip Punt 452 and Portion 3 of Farm McTaggarts Camp 453.

The grid connection corridor will be located on Portion 12 of Farm Klip Punt 452, Portion 3 of the Farm McTaggarts Camp 453 and Olyvenhouts Drift Settlement Agricultural Holdings 1080.

The infrastructure will connect to Eskom's Upington Main Transmission Substation (MTS) which is located on Olyvenhouts Drift Settlement Agricultural Holdings 1080. **(Map 1: Site Location Map).**

1.3 BACKGROUND OF SPECIALIST

Jon Marshall qualified as a Landscape Architect in 1978. He also has extensive experience of Environmental Impact Assessment in 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 CAD 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 also 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 impact that the proposed development will have on the character of the surrounding landscape as well as the impact on views of affected receptors.

The assessment has been 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).

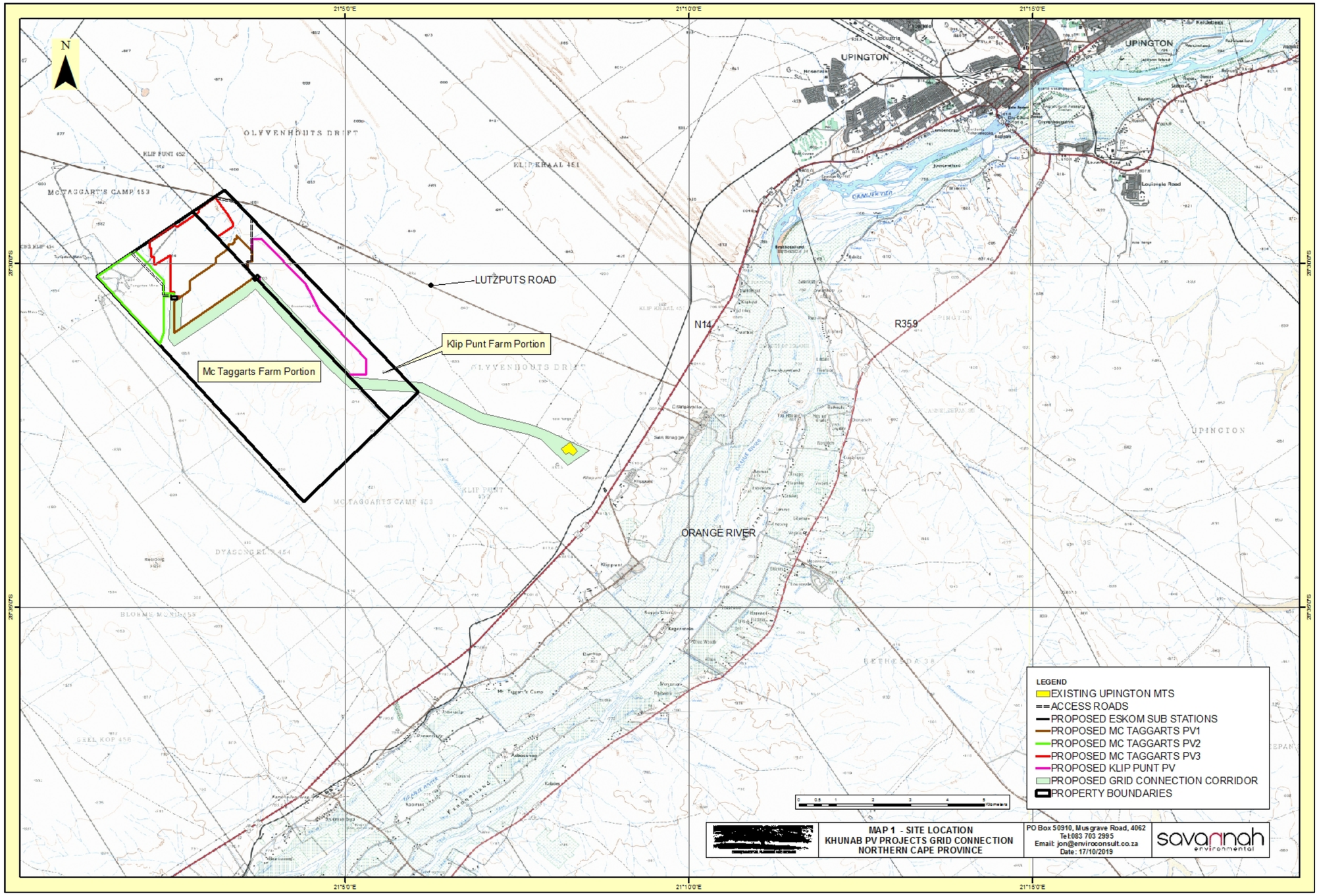
Refer to **Appendix II** for the Western Cape Guideline.

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 over a two day period (24th – 25th June 2019) 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 enabling maximum visibility; and
- 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.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UPINGTON
OLYVENHOUTS DRIFT
KLIP PUNT 452
KLIP KRAAL 451
MC TAGGARTS CAMP 453
LUTZPUTS ROAD
N14
R359
Klip Punt Farm Portion
Mc Taggarts Farm Portion
ORANGE RIVER
DYASONSKLOOF 454
BLOEMSMOND 455
GEEL KOP 456
BETHESDA 38
Louisvale Road
Mc Taggarts Camp
LEGEND
EXISTING UPINGTON MTS
ACCESS ROADS
PROPOSED ESKOM SUB STATIONS
PROPOSED MC TAGGARTS PV1
PROPOSED MC TAGGARTS PV2
PROPOSED MC TAGGARTS PV3
PROPOSED KLIP PUNT PV
PROPOSED GRID CONNECTION CORRIDOR
PROPERTY BOUNDARIES
0 0.5 1 2 3 4 5 Kilometers
[redacted]
MAP 1 - SITE LOCATION
KHUNAB PV PROJECTS GRID CONNECTION
NORTHERN CAPE PROVINCE
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Date: 17/10/2019
savannah environmental

2. PROJECT DESCRIPTION

2.1 MOTIVATION AND CONTEXT

In response to the Department of Energy's requirement for new generation capacity, the applicant is proposing the establishment of grid connection infrastructure (the "project") for four solar photovoltaic (PV) facilities to allow connection to the national grid to augment Eskom's power supply. This development is necessary for the evacuation of generated power into the National Grid.

The grid connection corridor 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 eight Renewable Energy Development Zones (REDZ). The area in which this project is located is the Upington REDZ 7. The grid connection corridor is also located within the northern corridor of the Strategic Transmission Corridors.

2.2 PROJECT DESCRIPTION

Refer to Map 1 for the Site Location

McTaggarts PV1 (Pty) Ltd proposes the construction and operation of a grid connection solution for the proposed McTaggarts PV1, PV2, PV3 and Klip Punt PV1 solar PV facilities near Upington in the Northern Cape Province. The grid connection solution will connect the four solar PV facilities to the Upington Main Transmission Substation (MTS) and will include the development of a single circuit power line and two collector substations, each including switching station components. The collector substations will be known as, the Khunab Collector Substation[1] and the Klip Punt Collector Substation[2]. Other associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays (inclusive of line bays, busbars, bussection and protection equipment), a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

A grid connection corridor that is 300m wide (which increases to ~700m at the Upington Main Transmission Substation) and up to 13km long is being assessed to allow for the optimisation of the grid connection and associated infrastructure to accommodate the identified environmental sensitivities. The grid connection infrastructure will be developed within the 300m wide grid connection corridor. The height of the power line pylons will be up to 32m and will be located within a servitude of up to 36m and the two collector substations will step up the current from 22kV or 33kV to 132kV.

Based on past experience it is expected that the tallest solid structure within the collector substations, will be comprised of transformers and minor buildings. The main infrastructure within the substations is comprised of transformers that will stand approximately 10m high. The tallest structures associated with the substations are likely to include bus-bars to connect power lines to the proposed overhead power line. The

[1] The Khunab Collector SubStation will facilitate a connection from McTaggarts PV2 and McTaggarts PV3 to the national grid and will be located on Portion 3 of McTaggarts Camp No. 453.
[2] The Klip Punt Collector SubStation will facilitate a connection from McTaggarts PV1 and Klip Punt PV1 to the national grid and will be located on Portion 3 of McTaggarts Camp 453 and Portion 12 of Klip Punt 452.

bus-bars are likely to be slender and comprises steel lattice structures that are slightly lower than the height of the proposed overhead power line (up to 32m).

The proposed grid connection corridor runs from the Khunab Collector Substation to the Klip Punt Collector Substation and then south east following the western boundary of Portion 12 of Farm Klip Punt 452 for approximately 3.5km. From this point the alignment turns east to an approximate co-ordinate 28°31'47.53"S, 21°06'07.15"E. It then turns in a general south easterly direction again for approximately 3.7km to the Upington MTS.

This report considers the grid connection corridor and collector substations described above.

Monopole or lattice towers could be used for the power line.

The layout map can be observed in **Map 2**

2. 4 PROJECT CONTEXT

The project is proposed within an area that is a focus for renewable energy development.

It is necessary to evacuate power from the proposed Khunab solar Development to the national grid.

There is one existing Concentrated Solar Power (CSP) project immediately to the south west of the grid connection corridor (Khi Solar One) on Portion 3 of the Farm 453 McTaggarts Camp.

There are two authorised projects (Sirius Solar PV Projects 1 and 2) on an adjacent property to the south (Remaining Extent of the Farm Tungsten Lodge 6) one of which at the time of reporting was currently under construction.

Refer to **Map 2**, Site Layout for the location of the proposed grid connection corridor alignment in relation to these other projects.

All of these developments and associated infrastructure are located within a REDZ and Strategic Transmission Corridor area. These are areas identified and set aside by Government for the development of grid infrastructure and renewable energy projects. Because of the focus for solar energy projects within the REDZ 7 area (i.e. Upington REDZ), there have also been numerous other projects proposed, some of which have received an environmental authorisation by the DEA and others of which authorisation is anticipated in the near future.

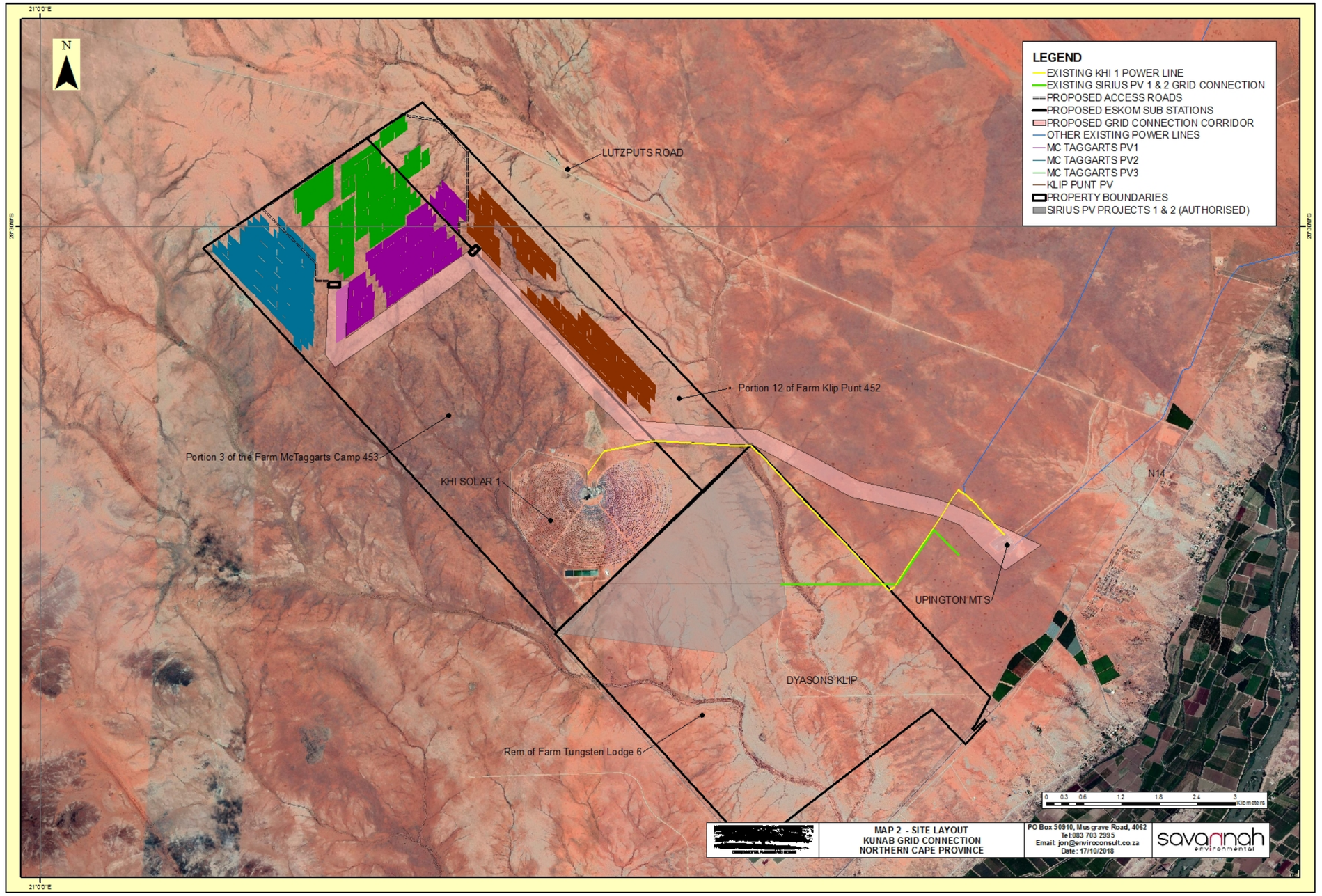
Map 3, Broad Development Context, indicates properties near the proposed site on which other renewable energy projects have been authorised, as well as proposed future Eskom power lines.

Currently within a 30km radius of the proposed project, there are fourteen other properties on which renewable energy projects are proposed. These consist of both CSP projects as well as solar photovoltaic (PV) projects.

The number of renewable energy projects in the vicinity of the grid connection corridor has resulted in the development of strategic high voltage electrical infrastructure including the Upington MTS, as well as power line connections to individual renewable energy projects.

Plate 1, Existing Upington Main Transformer Substation (MTS). Note the Strategic power line connections linking to the Upington MTS

Plate 2 Eskom Monopole, 32m high.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LEGEND
EXISTING KHI 1 POWER LINE
EXISTING SIRIUS PV 1 & 2 GRID CONNECTION
PROPOSED ACCESS ROADS
PROPOSED ESKOM SUB STATIONS
PROPOSED GRID CONNECTION CORRIDOR
OTHER EXISTING POWER LINES
MC TAGGARTS PV1
MC TAGGARTS PV2
MC TAGGARTS PV3
KLIP PUNT PV
PROPERTY BOUNDARIES
SIRIUS PV PROJECTS 1 & 2 (AUTHORISED)
LUTZPUTS ROAD
Portion 12 of Farm Klip Punt 452
Portion 3 of the Farm McTaggarts Camp 453
KHI SOLAR 1
N14
UPINGTON MTS
DYASONS KLIP
Rem of Farm Tungsten Lodge 6
0 0.3 0.6 1.2 1.8 2.4 3 Kilometers
MAP 2 - SITE LAYOUT
KUNAB GRID CONNECTION
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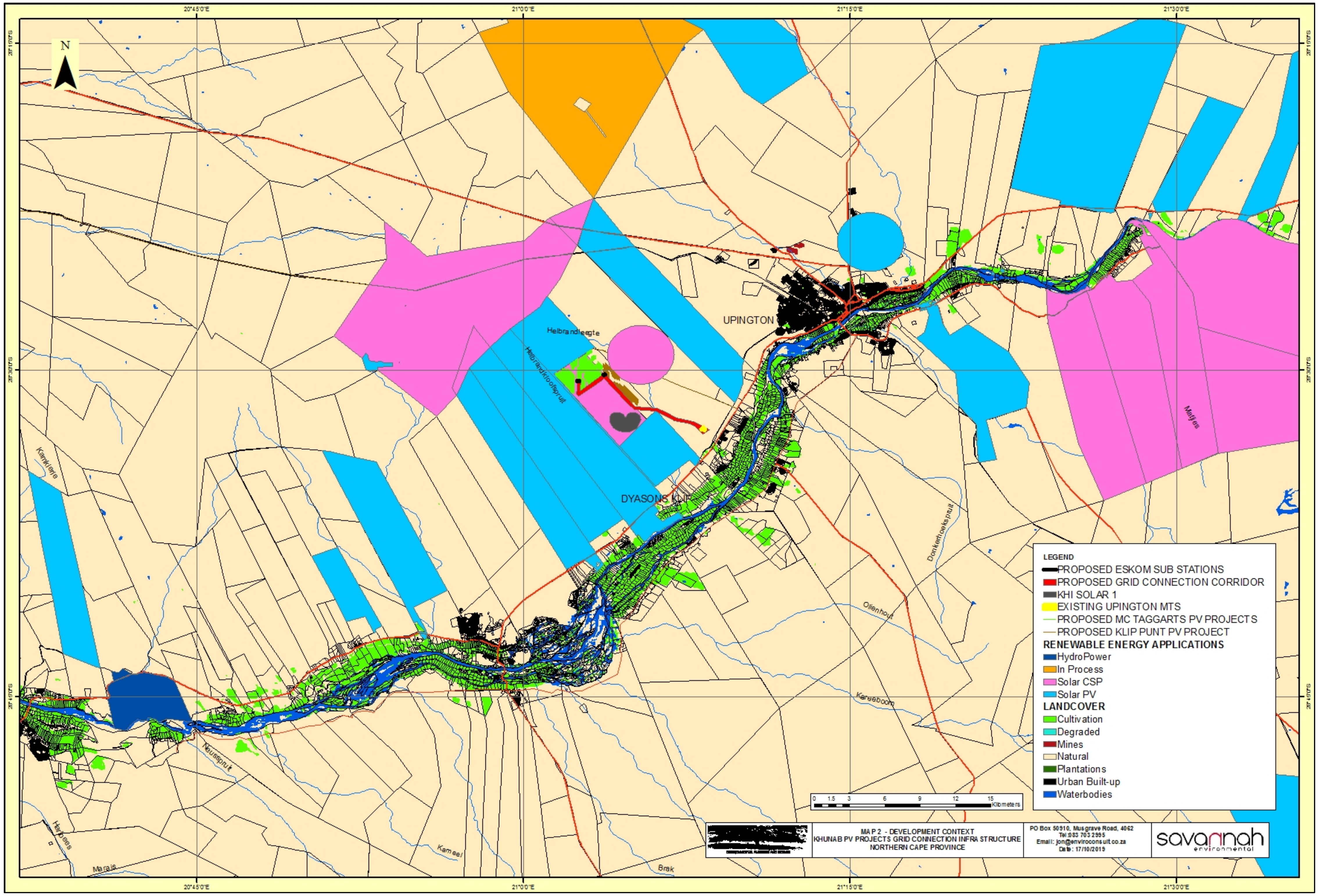
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UPINGTON
Helbrandleegte
DYASONS KLIP
Kanoneiland
Donkerhoekspruit
Olienhout
Kareeboom
Matjies
Kamassie
Brak
Marais
LEGEND
PROPOSED ESKOM SUB STATIONS
PROPOSED GRID CONNECTION CORRIDOR
KHI SOLAR 1
EXISTING UPINGTON MTS
PROPOSED MC TAGGARTS PV PROJECTS
PROPOSED KLIP PUNT PV PROJECT
RENEWABLE ENERGY APPLICATIONS
HydroPower
In Process
Solar CSP
Solar PV
LANDCOVER
Cultivation
Degraded
Mines
Natural
Plantations
Urban Built-up
Waterbodies
0 1.5 3 6 9 12 15 Kilometers
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MAP 2 - DEVELOPMENT CONTEXT
KHUNAB PV PROJECTS GRID CONNECTION INFRA STRUCTURE
NORTHERN CAPE PROVINCE
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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

The topography of the region is relatively homogenous and is described pre-dominantly as lowlands with hills and dune hills to the north. Relatively prominent small hills occur towards the west and south-west of the grid connection corridor.

Whilst the region surrounding the corridor is relatively flat, a degree of relief is provided by minor ridgelines that were formed by an historic dune field that runs in a general north-west to south-east direction at regular intervals. From the air, these minor ridgelines appear as a series of waves in the arid landscape. These ridgelines rise between three and five metres above the valley floor. Whilst they are minor they are likely to have a visual influence in that they will provide a degree of screening.

The terrain surrounding the proposed grid connection corridor is predominantly flat with an even south-eastern slope towards the Orange River valley that forms a distinct hydrological feature in the region.

The grid connection corridor is located within this area of relatively flat topography between approximately 1.2km and 10.2km to the north-west of the Orange River Valley.

There is also a series of non-perennial water courses that flow into the Orange River at intervals. As these fall from the undulating plain into the shallow river valley they have created larger and slightly deeper valleys. This is particularly obvious driving along the N14 which is located on the edge of the river valley. This section of road runs through valleys that are approximately 15m deep from the floor to the crest of the ridgelines. These valley lines are likely to have a significant influence over the visibility of the project from the road.

There are two minor non-perennial water courses, the Helbrandkloofspruit and the Helbrandleegte, that run close to the grid connection corridor before they flow into the Orange River Valley. The Helbrandleegte flows across the corridor at its approximate halfway point (Refer to **Map 4**).

Plate 3, View from the N14 approximately 8.5km to the south-east of the grid connection corridor looking along the road.
The gently undulating nature of the landform on the edge of the Orange River Valley is clear from the road profile. When in one of the valleys, visibility over the surrounding landscape is restricted.

Plate 4, View from close to the N14 looking down into the Orange River Valley. The shallow valley sides slope gently down to the river.

3.1.2 Landcover

The Orange River has, to a large degree, dictated the settlement pattern in this arid region by providing a source of perennial water for the cultivation of grapes and cotton. This and the associated production of wine and dried fruit (raisins and sultanas) are the primary agricultural activity of this district.

The majority of cultivation and settlement in the region occurs around the Orange River.

Upington is a major regional centre that lies approximately 10km to the north-east of the grid connection corridor. Due to distance and the relatively flat terrain, it is highly unlikely that the proposed project will have any visual impact on this area.

In the vicinity of the corridor there are extensive vineyards within the Orange River Valley.

Settlement in the form of small townships and groups of farm buildings are located on the edges of the Orange River Valley and within the cultivated areas. This cultivation and settlement generally extends to the N14 which runs along the upper edge of the River Valley. Because the majority of settlement is within the River Valley and at a lower level than the grid connection corridor, it is likely that the proposed development will be largely screened, particularly from settlements located on the northern side of the Orange River.

Other than areas located around the Orange River, settlement in the region is sparse.

From the site visit only one tourism land use was obvious. This was the Bezalel Wine Farm, the entrance to which is located on the N14 approximately 13km to the south of grid connection corridor. The farm itself including accommodation, a restaurant and a wine tasting area is located within the valley. Views of the Khunab Solar Grid connection will not be possible from this operation.

Plate 5, View of the Bezalel Wine Farm within the Orange River Valley
Because of its location within the River Valley, this tourism operation is unlikely to have a view of the Khunab Solar Grid Connection.

Plate 6, View of Khi Solar One from the Lutzputs Road to the north-east Other planned solar power projects and the proposed Khunab Solar Grid Connection are likely to change the landscape.

Plate 7, View of Sirius Solar PV One **project under construction (centre picture) from the Lutzputs Road.**

3.1.3 Vegetation Patterns

The following vegetation types are evident within the grid connection corridor;

a) Natural vegetation that is generally associated with the rural landscape; and
b) Vegetation within the Orange River Valley that is generally associated with agricultural operations.

These vegetation types are indicated on **Map 6**.

a) Natural Vegetation

Mucina and Rutherford[3] indicate that the natural vegetation of the area includes:

- Bushmanland Arid Grassland;
- Kalahari Karroid Shrubland; and
- Gordonia Dunveld.

Mucina and Rutherford's description of Bushmanland Arid Grassland includes;

Extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses (Stipagrostis species) giving this vegetation type the character of semidesert 'steppe'. In places low shrubs of Salsola change the vegetation structure. In years of abundant rainfall rich displays of annual herbs can be expected.

Mucina and Rutherford's description of Kalahari Karroid Shrubland includes;

Low karroid shrubland on flat, gravel plains. Karoo-related elements (shrubs) meet here with northern floristic elements, indicating a transition to the Kalahari region and sandy soils.

Mucina and Rutherford's description of Gordonia Dunveld includes;

Parallel dunes about 3–8 m above the plains. Open shrubland with ridges of grassland dominated by Stipagrostis amabilis on the dune crests and Acacia haematoxylon on the dune slopes, also with A. mellifera on lower slopes and Rhigozum trichotomum in the interdune straaten.

Whilst botanically these vegetation types may be very different, in visual terms the most important characteristics include:

- They are key components of the natural, semi-desert, landscape of the region;
- The description of Gordonia Duneveld picks up on the regular, wave like, dunes that are a dominant feature of the landscape surrounding Upington; and
- All the descriptions highlight the fact that vegetation in the area is low and provides little screening potential for development.

b) Vegetation within the Orange River Valley

Vegetation within this area is comprised of a matrix of:

- Crop vegetation that is largely comprised of grapes for wine making and fruit;
- Patches of low natural vegetation particularly on the upper valley slopes;
- Ornamental vegetation including large trees around homesteads and small settlements; and
- Patches of mainly alien vegetation particularly on the edges of cultivation.

[3] The Vegetation of South Africa, Losotho and Swaziland 2015

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 discrete geographical areas of a particular landscape type"[4].

Visual Absorption Capacity (VAC) is defined as the landscape's ability to absorb physical changes without transformation in its visual character and quality. 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 critical in providing VAC, for example; a new large scale industrial development located within a small scale rural 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 **(Map 7).**

- Plateau LCA includes the gently undulating, arid plateau above the Orange River Valley. This area is generally natural in character with very little settlement. It is obvious from **Map 2** that the character of this area is in transition in that existing grid infrastructure and solar projects are likely to create an industrial aesthetic within a matrix of natural vegetation. VAC within this area is only provided by the regular, low, dune formation as well as slopes of the slightly larger minor valleys that are associated with the non-perennial water courses that flow into the Orange River Valley.
- The River Corridor LCA is comprised of the shallow valley area surrounding the Orange River. This area is generally inward looking drawing little character influence from the surrounding plateau. Landform, vegetation and development all play a role in screening views of surrounding areas and contribute to significant VAC.

3.3 VISUAL RECEPTORS

Visual Receptors are defined as "individuals and / or defined groups of people who have the potential to be affected by the proposal"[5].

3.3.1 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 the use could be sensitive to landscape change. They include:

- Area Receptors include the minor urban settlement areas, that are located within the Orange River Corridor LCA. From the site visit it appears that the majority of

[4] UK Guidelines.
[5] UK Guidelines

settlement areas relate to agricultural use of the Orange River Valley. It is likely that the residents of these minor settlements are predominantly focused on agricultural production of the area. As these settlements are located within the River Valley LCA, it is likely that views of the proposed development particularly from the northern side of the valley will be difficult. It is also likely that vegetation within the River Valley will help screen views of the proposed development that may be possible from the valley;

- Linear Receptors or routes through the area include the N14, the R359, the Lutzputs Road and the Upington to Kakamas Spur Railway Line. Both the N14 and the R359 roads have tourism significance, although the N14 is possibly the most important in this regard. The Lutzputs Road is an un-surfaced road that at its closest runs approximately 2.4km to the north of the grid connection corridor, this road is likely to be mainly used by local people. The Upington to Kakamas Spur Railway Line is used for transporting goods and so is not considered further;
- Point Receptors include individual homesteads that are located both within the River Valley LCA and the Plateau LCA. From the site visit, it is unlikely that settlements on the northern side of the Orange River will have views over the grid connection corridor and associated infrastructure. It is possible that settlements on the higher sections on the southern side of the valley could have views of the corridor. These however will be distance views and they are likely to be softened / screened by vegetation on the fringes of the Orange River Valley.

Visual receptors, including places and routes that may be sensitive to landscape change are indicated on **Map 7.**

LANDSCAPE CHARACTER AREAS

Plate 8, Plateau LCA

Plate 9, River Corridor LCA

SENSITIVE VISUAL RECEPTORS

Plate 10, View from the R359 across the River Valley LCA.

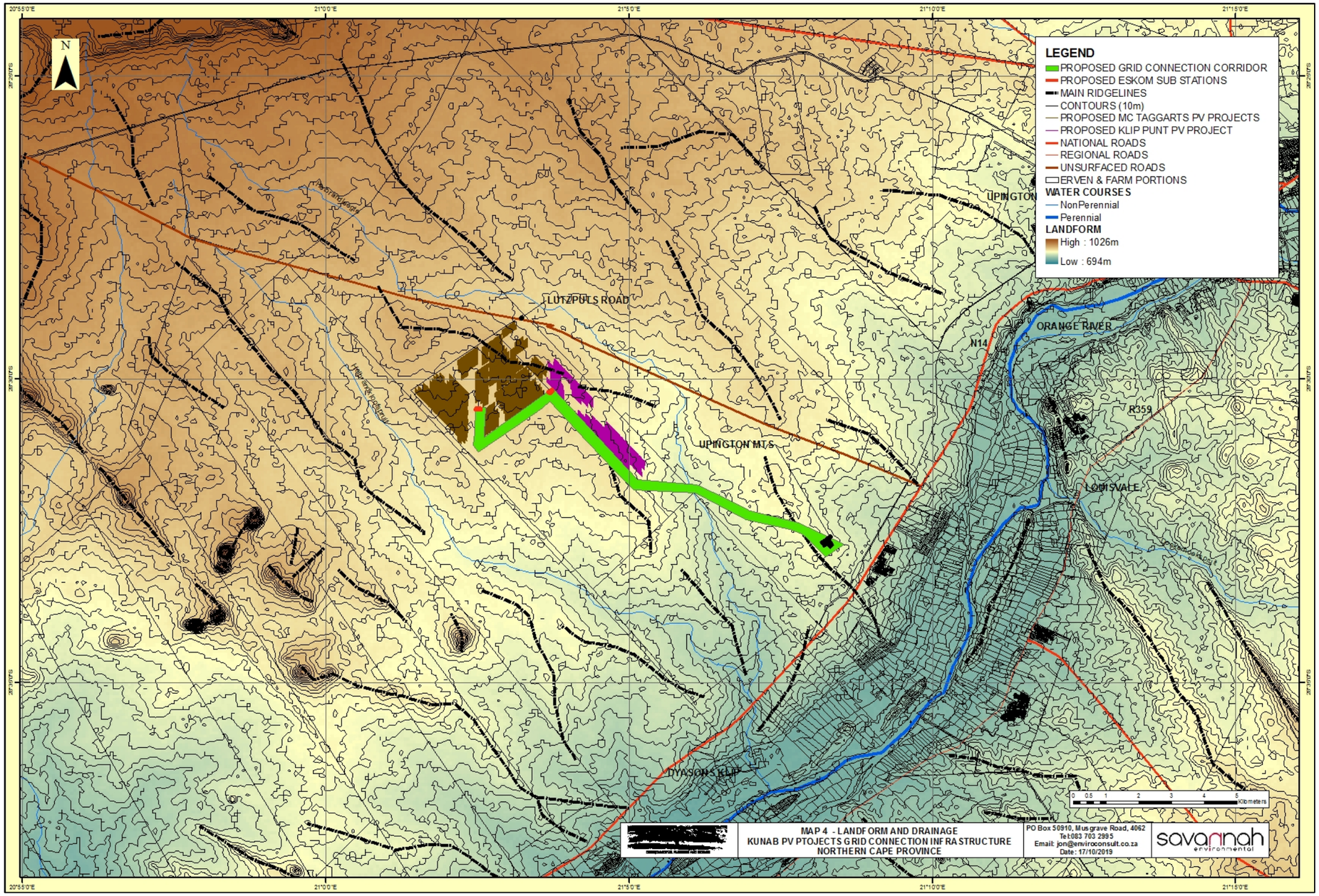
Plate 11, Settlement and homesteads within the River Valley LCA

Plate 12, The N14. This is a major regional route that runs close to the southern edge of the grid connection corridor and is important for tourism.

Plate 13, Homesteads within the Plateau LCA.

Plate 14, The Lutzputs Road. This is an un-surfaced local road that runs to the north and east of the grid connection corridor. It is likely to be largely used by local people.

Plate 15, The Upington to Kakamas Branch Line. This line is used for the transport of fruit and goods from Kakamas.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LEGEND
PROPOSED GRID CONNECTION CORRIDOR
PROPOSED ESKOM SUB STATIONS
MAIN RIDGELINES
CONTOURS (10m)
PROPOSED MC TAGGARTS PV PROJECTS
PROPOSED KLIP PUNT PV PROJECT
NATIONAL ROADS
REGIONAL ROADS
UNSURFACED ROADS
ERVEN & FARM PORTIONS
WATER COURSES
NonPerennial
Perennial
LANDFORM
High : 1026m
Low : 694m
LUTZPULS ROAD
UPINGTON
ORANGE RIVER
N14
R359
UPINGTON MTS
LOMSVALE
DYASON'S KLIP
0 0.5 1 2 3 4 5
Kilometers
MAP 4 - LANDFORM AND DRAINAGE
KUNAB PV PTOJECTS GRID CONNECTION INFRASTRUCTURE
NORTHERN CAPE PROVINCE
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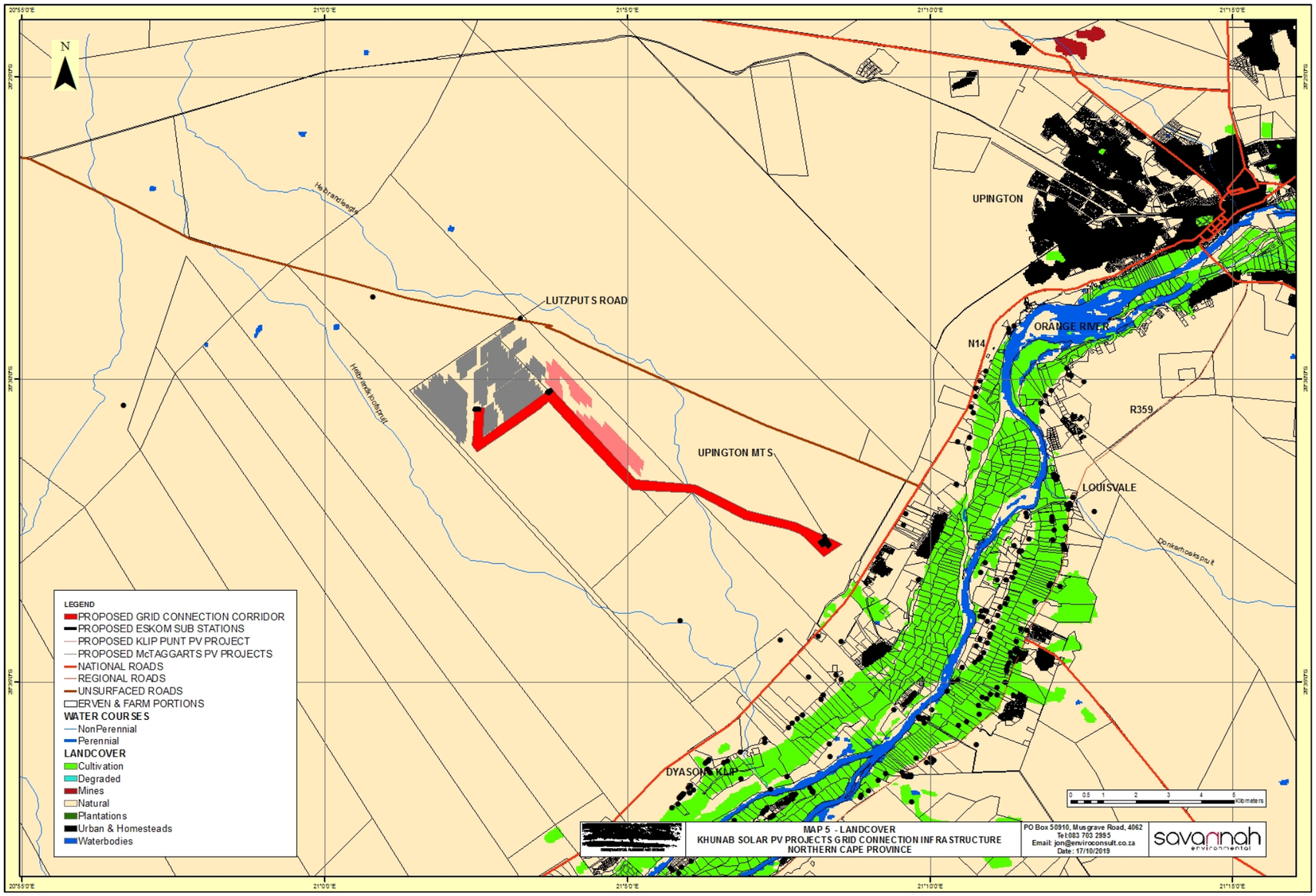
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PROPOSED ESKOM SUB STATIONS
PROPOSED KLIP PUNT PV PROJECT
PROPOSED McTAGGARTS PV PROJECTS
NATIONAL ROADS
REGIONAL ROADS
UNSURFACED ROADS
ERVEN & FARM PORTIONS
WATER COURSES
NonPerennial
Perennial
LANDCOVER
Cultivation
Degraded
Mines
Natural
Plantations
Urban & Homesteads
Waterbodies
0 0.5 1 2 3 4 5 Kilometers
MAP 5 - LANDCOVER
KHUNAB SOLAR PV PROJECTS GRID CONNECTION INFRASTRUCTURE
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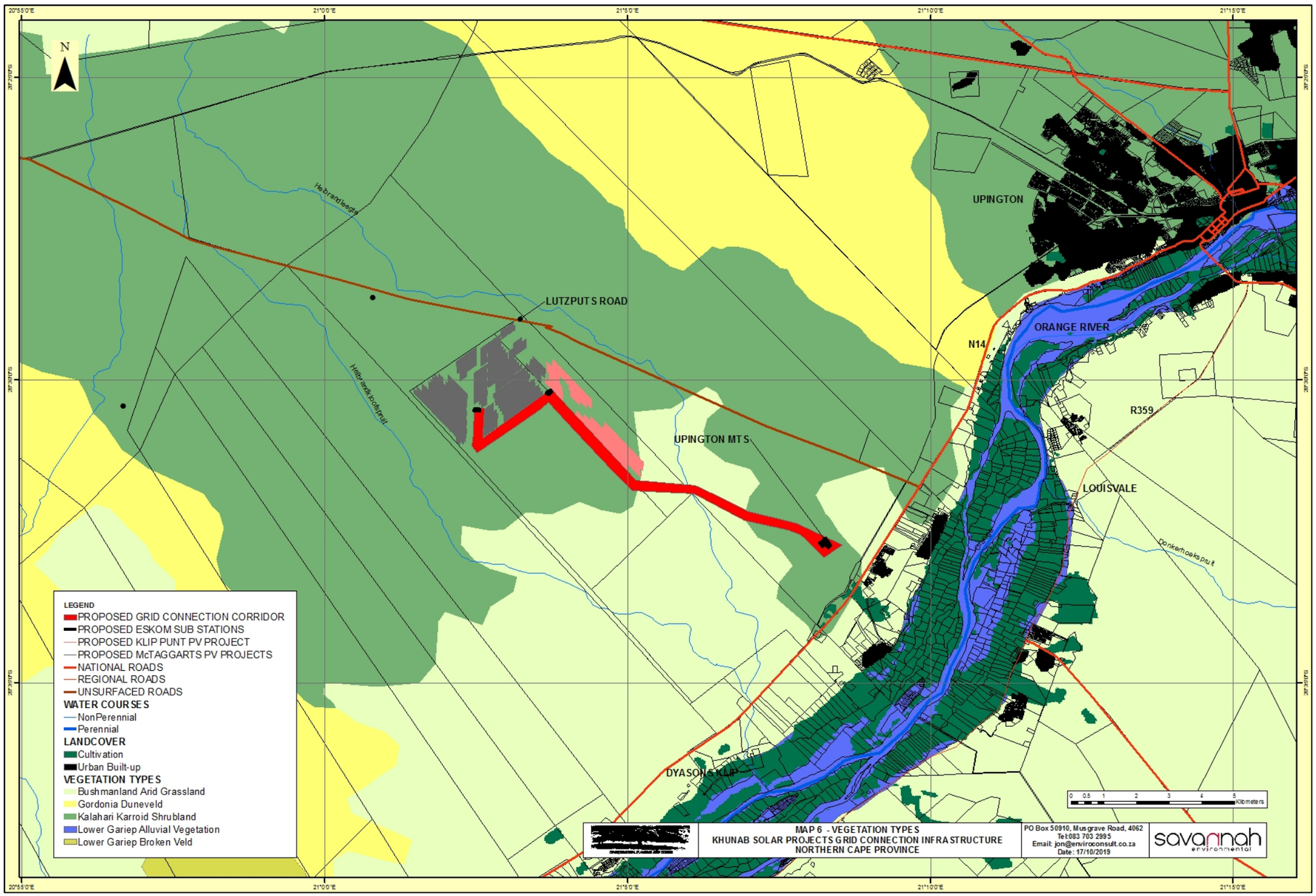
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LOUISVALE
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DYASONS KLIP
LEGEND
PROPOSED GRID CONNECTION CORRIDOR
PROPOSED ESKOM SUB STATIONS
PROPOSED KLIP PUNT PV PROJECT
PROPOSED McTAGGARTS PV PROJECTS
NATIONAL ROADS
REGIONAL ROADS
UNSURFACED ROADS
WATER COURSES
NonPerennial
Perennial
LANDCOVER
Cultivation
Urban Built-up
VEGETATION TYPES
Bushmanland Arid Grassland
Gordonia Duneveld
Kalahari Karroid Shrubland
Lower Gariep Alluvial Vegetation
Lower Gariep Broken Veld
0 0.5 1 2 3 4 5 Kilometers
MAP 6 - VEGETATION TYPES
KHUNAB SOLAR PROJECTS GRID CONNECTION INFRASTRUCTURE
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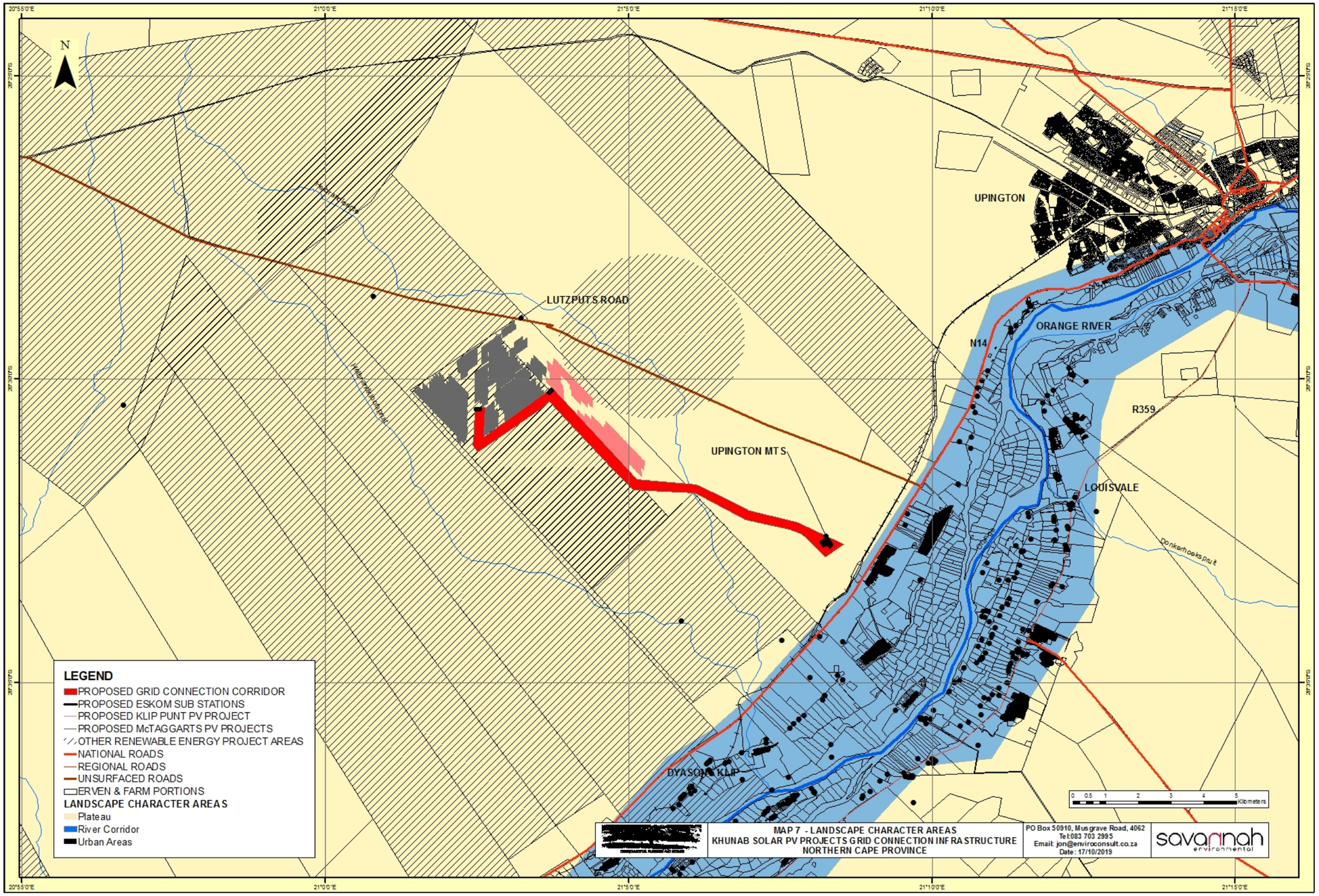
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UPINGTON
LUTZPUTS ROAD
ORANGE RIVER
N14
R359
UPINGTON MTS
LOUISVALE
Donkerhoeks pruit
DYASONS KLIP
LEGEND
PROPOSED GRID CONNECTION CORRIDOR
PROPOSED ESKOM SUB STATIONS
PROPOSED KLIP PUNT PV PROJECT
PROPOSED McTAGGARTS PV PROJECTS
OTHER RENEWABLE ENERGY PROJECT AREAS
NATIONAL ROADS
REGIONAL ROADS
UNSURFACED ROADS
ERVEN & FARM PORTIONS
LANDSCAPE CHARACTER AREAS
Plateau
River Corridor
Urban Areas
0 0.5 1 2 3 4 5 Kilometers
MAP 7 - LANDSCAPE CHARACTER AREAS
KHUNAB SOLAR PV PROJECTS GRID CONNECTION INFRASTRUCTURE
NORTHERN CAPE PROVINCE
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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 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 likely to relate to visual intrusion.

Landscape and visual assessment can be a subjective judgement. To a large degree however, it should relate to the relative importance of the landscape and the receptors involved.

In this case the landscape is not critical but the N14 has tourism importance. All other receptors have a relatively low importance.

The landscape is heavily affected by industry and particularly electrical infrastructure but not to the extent that it completely dominates views particularly from the N14 which are still relatively natural.

The assessment is therefore swayed towards minimising impacts on receptors and particularly the N14 rather than landscape protection.

4.2 LIMIT OF VISIBILITY

The proposed power line of the development will consist of a single circuit overhead power line with a transmitting capacity of up to 132kV. The height of a 132kV power line is up to 32m with a span between towers of up to 250m.

Because the taller and slender elements within the proposed collector substations, such as bus bars being comprised of lattice structures, will be slightly lower than the proposed power line, the visibility of these elements will fall within the area from which the proposed power line will be visible. These elements are likely to be of similar construction to the power line supports and thus they are likely to have a similar level of impact.

The lower (10m) and more solid elements within the proposed collector substations such as electrical infrastructure, minor buildings and outdoor transformers are likely to be visible over a smaller area than the proposed power line. Due to the solid nature of these elements, whilst they will not be visible to the same extent as the taller elements, they are likely to be more noticeable over the distance that they can be seen from. They are therefore likely to have a localised impact when compared with other elements associated with the substations.

In order to provide an indication of the likely limit of visibility of the various elements included in the project, a universally accepted navigational calculation (**Appendix V**) has been used to calculate the likely distance that the proposed structures might be visible over. This indicates that in a flat landscape that the main bulk of the proposed development, which is consisted of the power line and the collector substations, will both be visible over the following approximate distances.

Approximate Limit of Visibility (ALV)

ELEMENT	APPROXIMATE LIMIT OF VISIBILITY
132kV Power line, up to 32m high	20.2 kilometres
Substation infrastructure, up to 10m high	11.3 kilometres

In reality the ALV distances noted will be reduced by:

- Weather conditions that limit visibility. This could include hazy conditions during fine weather as well as mist and rain;
- Scale and colour of individual elements making it difficult to differentiate structures from the background; and
- The fact that as the viewer gets further away, the apparent height of visible elements reduces. At the limit of visibility it will only be possible that the very tip of an object may be visible. This reducing scale means that an object will become increasingly more difficult to see as the distance from it increases.

Plates 16 and 17 are photographs of two existing overhead 132kV power lines. These are similar in scale to the proposed overhead power lines. The images indicate the types of impact that might be expected from these structures.

Plates 16 indicates a view along the line of a 132kV overhead power line. The views are 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 this review it is obvious that the theoretical distance of a 132kV power line may be visible from is approximately 2-3km.

It is possible that either lattice or monopole towers could be used for the development. Due to the fact that from close views lattice towers tend to read as a more solid structure and the cross section of pole used for a monopole is significantly smaller than the cross section of a lattice tower, monopoles tend to be less imposing from close up. From a distance, however, lattice towers are more visually permeable and the more solid monopole structure is generally more obvious. Despite the observations above, the potential visibility of monopoles and lattice towers is likely to be similar.

The following visual limits for the power lines have been drawn from these observations:

a) Due to the matt grey colour of the galvanised steel from which it is constructed, visibility of overhead power line structures reduces significantly with distance.

b) The visual mass of the overhead power line is unlikely to be obvious from distances greater than 3km.

Plates 18 and 19 are photographs of the existing Upington MTS taken from a distance of 2.5km and 5.0km respectively. The proposed collector substations are likely to be smaller than the pictured Upington MTS which is visually obvious at 2.5km but is difficult to see at 5km.

The following visual limits have been drawn for the collector substations from these observations:

a) The substations may be obvious in the landscape at a distance of up to 3km.

b) At distances between 3km and 5km the substations may be visible but are unlikely to be highly obvious.

c) At distances greater than 5km, the substations will not be obvious.

Plate 16 - A view along the line of a 132kv overhead power line with monopole towers

Plate 17 - A view along the line of an existing similar overhead power line with steel lattice towers

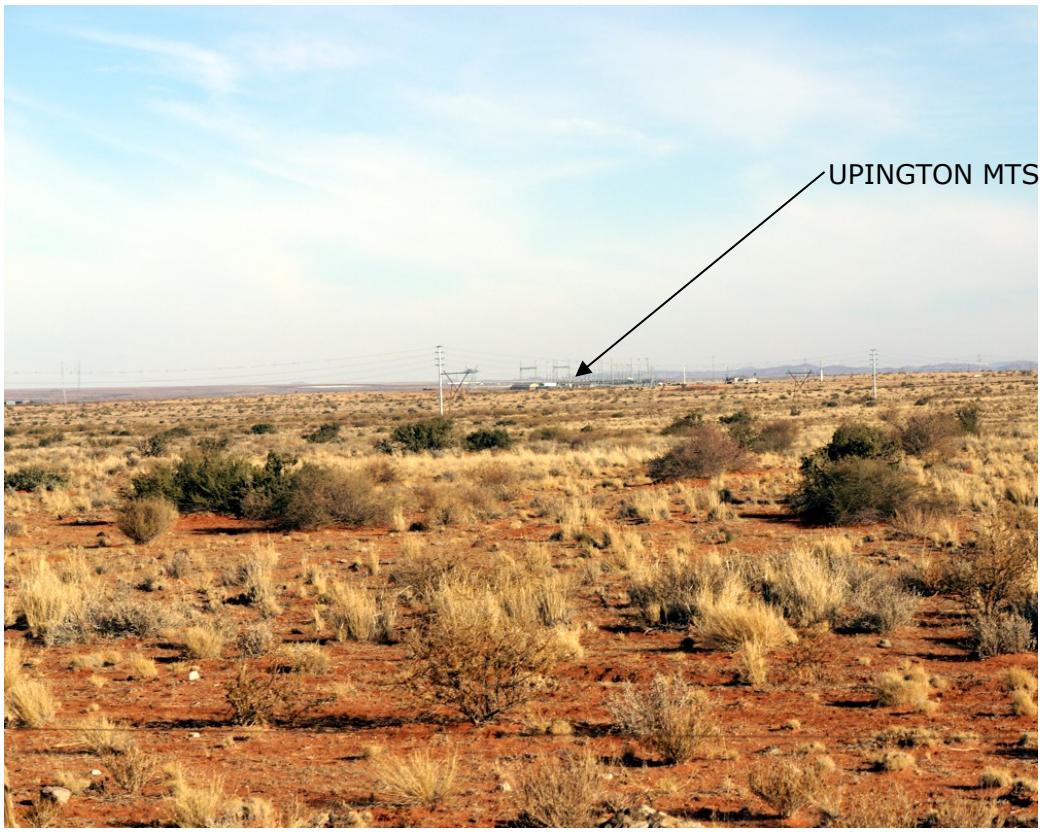


Plate 18 - Existing Upington MTS viewed from approximately 2.5km.

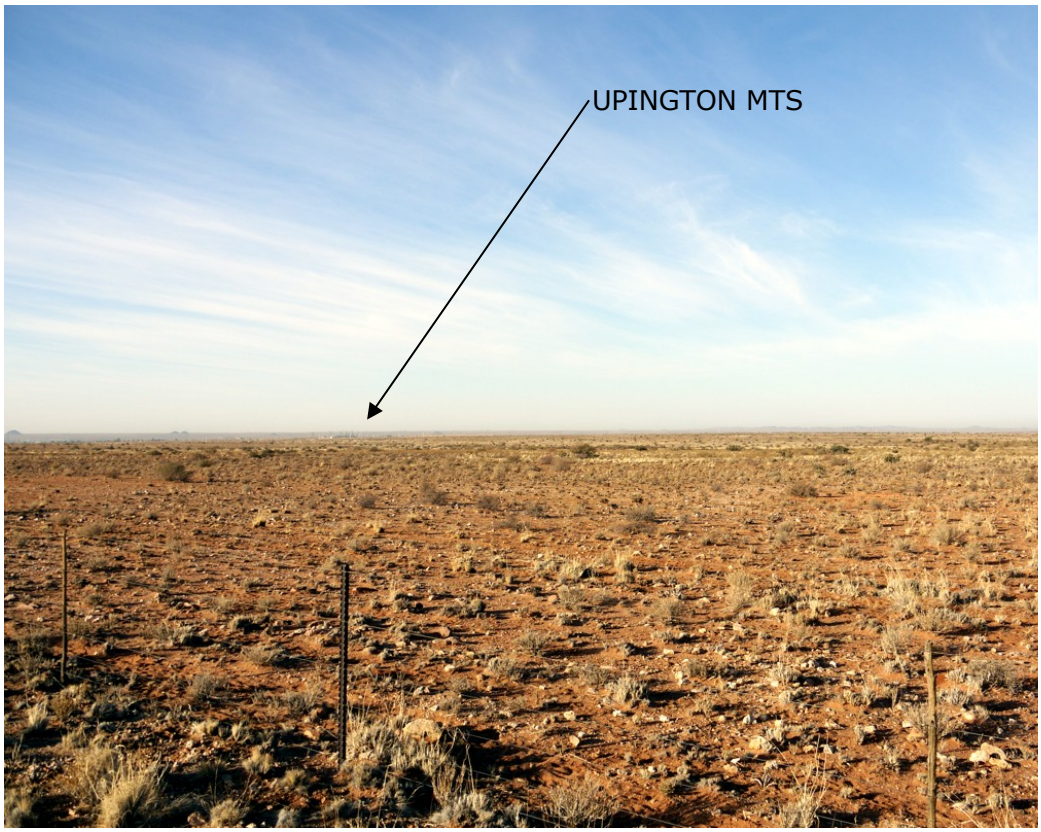


Plate 19 - Existing Upington MTS viewed from approximately 5.0km.

5 VISIBILITY OF THE PROPOSED DEVELOPMENT AND THE LIKELY NATURE OF VISUAL IMPACTS

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 NASA 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 ALVs indicated in Section 4, have been adopted as limits to the study area.

The visual effects associated with the various elements as noted in Section 4 have been used as a guide to the likely area within which significant impacts may occur. These include:

- The proposed power line is unlikely to be obvious at a distance greater than 4km and is unlikely to be visually obvious at a distance greater than 7km.
- The proposed collector substations are unlikely to be obvious at a distance greater than 4km and are unlikely to be visually obvious at a distance greater than 5km.

The assessment therefore focuses on an area within 7.0km of the power line and 5.0km of the collector substations (each including switching station components).

5.3 APPROACH TO THE ASSESSMENT

The detailed location of the proposed grid connection corridor and collector substations has been provided by the developer **(Map 1)**.

In order to generate the ZTV, it has been assumed that support towers (i.e. pylons) will be spaced 250m apart and will be up to 32m high.

Points have been set at each approximate tower and collector substation location with appropriate height offsets for the generation of the ZTV using the Viewshed option in Arc Spatial Analyst.

5.4 VISIBILITY OF THE DEVELOPMENT

From the ZTV analysis, the following conclusions can be drawn;

a) The power line may be visible up to the ALV.
b) Considering the likely sensitive visual receptors, the proposed collector substations are only likely to be visible from the Lutzputs Road.

c) The proposed power line to be constructed within the grid connection corridor is also likely to be largely visible from the Lutzputs Road, however the eastern most sections may also be visible to the N14, a small number of homesteads and minor settlement areas.

5.5 CUMULATIVE IMPACTS

The proposed grid connection corridor follows the existing Khi Solar One grid connection power line for part of the alignment.

The areas of visual impact associated with the proposed infrastructure are likely to fall within the impact area associated with other projects and particularly the Khi Solar One existing project. Whilst this may intensify local levels of impact it will not extend the impact area of renewable energy and associated grid connection projects.

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

The Visual Absorption Capacity (VAC) of the landscape is relatively low. Landform is the main element that limits the extent of views of the proposed development. This screening effect is taken into account in the ZTV analysis.

5.7 KEY VIEWPOINTS

The following key viewpoints have been selected to illustrate the nature of likely visual impacts associated with the proposed Khunab Solar Grid Connection.

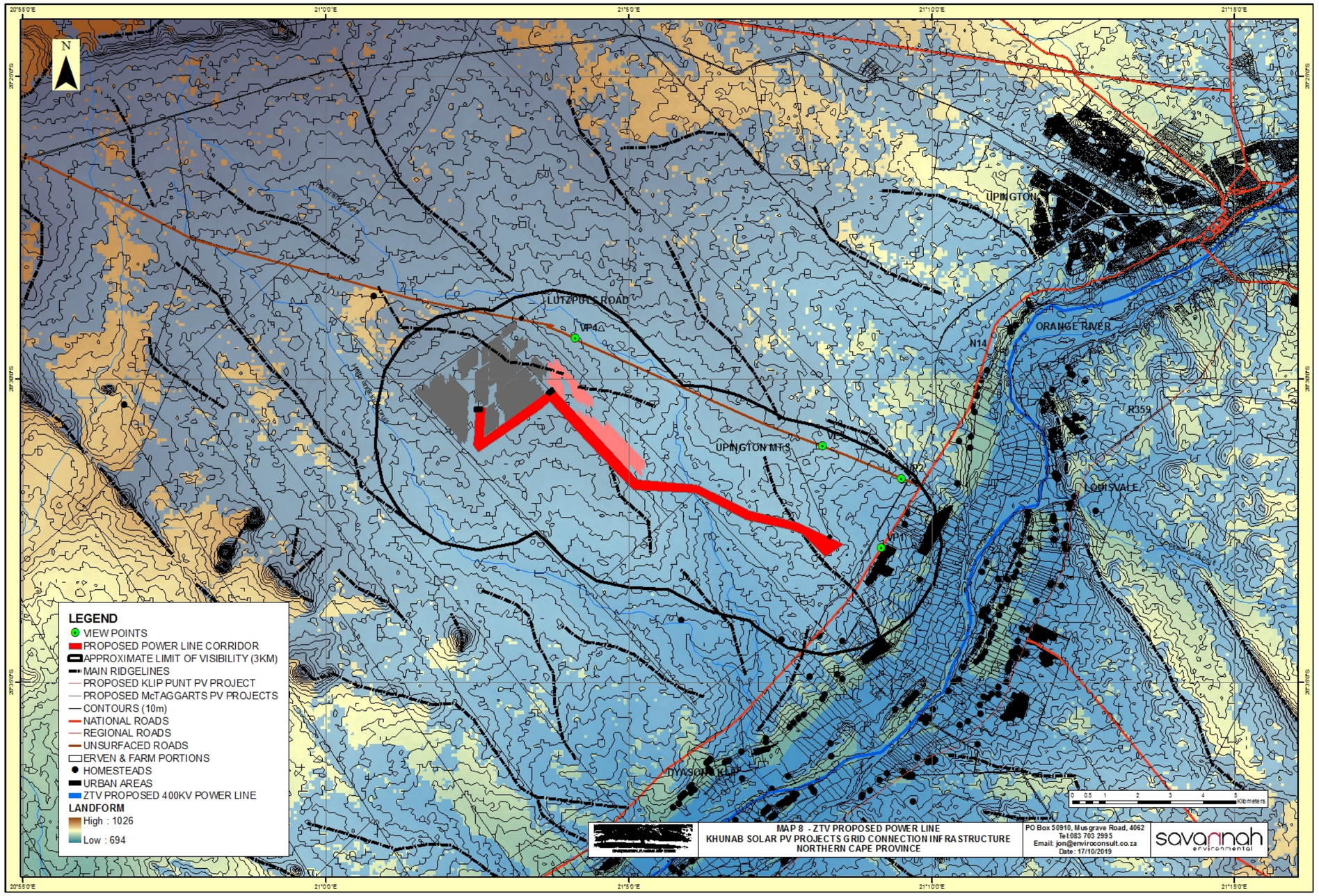
The locations of the viewpoints are indicated on the ZTV mapping.

Plate 20, VP1 – View looking to the north-west from the N14 looking towards the Upington MTS. The proposed power line will be viewed linking into the opposite side of the MTS. The connection will be viewed through the MTS as well as other strategic electrical infrastructure.

Plate 21, VP 2 – View looking to the south-west along an existing HV overhead power line from the Lutzputs Road. The existing Upington MTS is located to the left of plate 21. The existing Khi Solar One grid connection is just obvious on the horizon. The proposed power line alignment (to be developed within the grid connection corridor) will be viewed against this existing power line. The proposed alignment may be slightly more obvious as it will be closer to the road.

Plate 22, VP 3 – View looking to the south-west along two existing MV overhead power lines (left of picture) from the Lutzputs Road. The existing Khi Solar One grid connection is just obvious on the horizon. The proposed power line alignment, within the grid connection corridor, will be viewed against this existing power line. The proposed alignment may be slightly more obvious as it will be closer to the road.

Plate 23, VP 4 – View looking to the south from the Lutzputs Road approximately 1.9km from the proposed eastern most Collector Substation. This is the closest point on the road to the collector substation. Only the eastern most substation will be visible over the ridgeline to the right of the Khi Solar One tower. The ridgeline will screen approximately 6m of the collector substation height. The proposed power line will be viewed running to the left of the collector substation, however it is unlikely to be highly obvious.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28°30'0"S
LUTZPUTS ROAD
VP4
UPINGTON
ORANGE RIVER
N14
R359
UPINGTON MTS
VP2
VP1
LOUISVALE
Dyason's Klip
LEGEND
VIEW POINTS
PROPOSED POWER LINE CORRIDOR
APPROXIMATE LIMIT OF VISIBILITY (3KM)
MAIN RIDGELINES
PROPOSED KLIP PUNT PV PROJECT
PROPOSED McTAGGARTS PV PROJECTS
CONTOURS (10m)
NATIONAL ROADS
REGIONAL ROADS
UNSURFACED ROADS
ERVEN & FARM PORTIONS
HOMESTEADS
URBAN AREAS
ZTV PROPOSED 400KV POWER LINE
LANDFORM
High : 1026
Low : 694
0 0.5 1 2 3 4 5
Kilometers
MAP 8 - ZTV PROPOSED POWER LINE
KHUNAB SOLAR PV PROJECTS GRID CONNECTION INFRASTRUCTURE
NORTHERN CAPE PROVINCE
PO Box 50910, Musgrave Road, 4062
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Date: 17/10/2019
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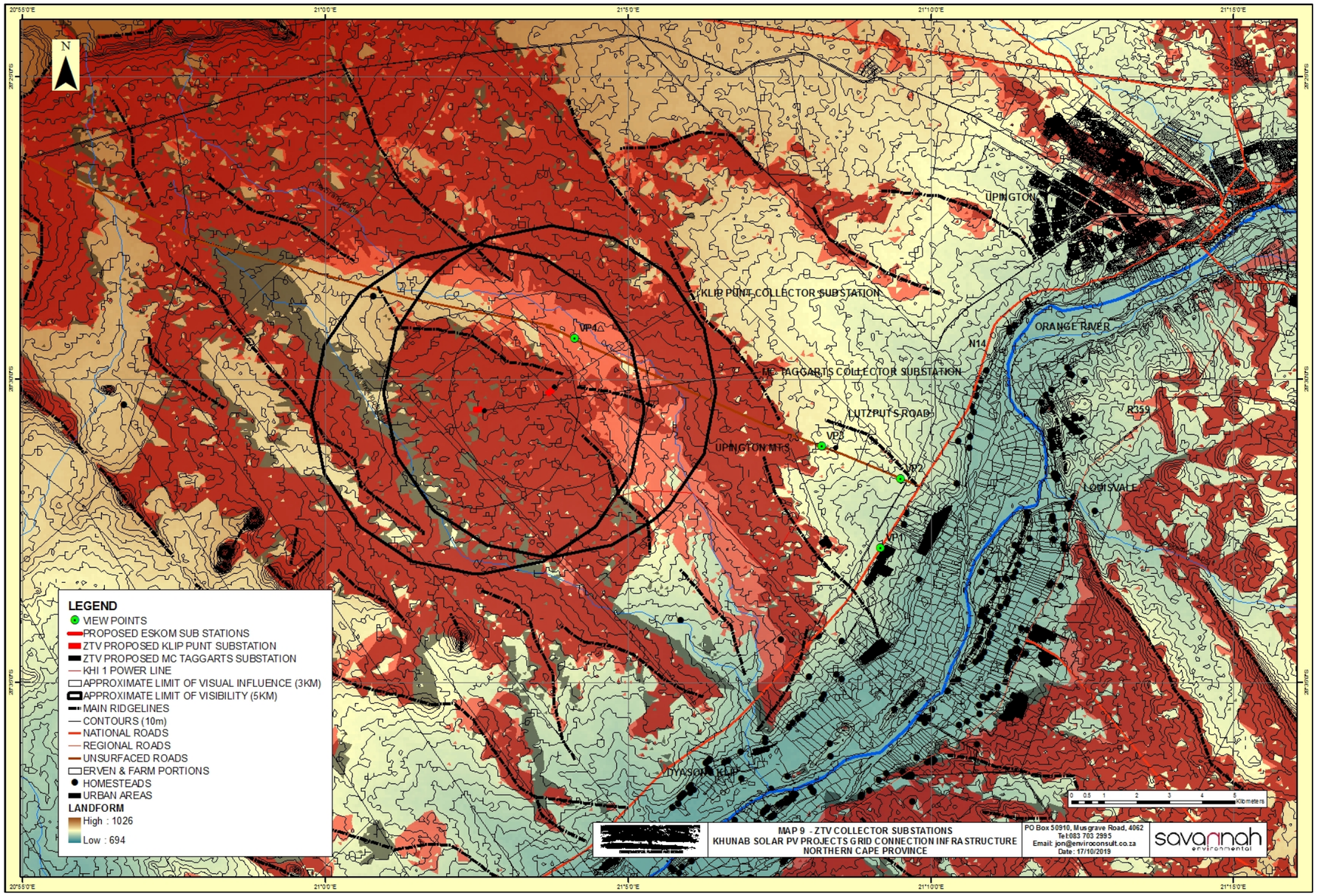
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N
KLIP PUNT COLLECTOR SUBSTATION
MC TAGGARTS COLLECTOR SUBSTATION
UPINGTON
ORANGE RIVER
N14
R359
LUTZPUTS ROAD
UPINGTON MTS
LOUISVALE
VP1
VP2
VP3
VP4
R2
DYASONSKLIP
LEGEND
VIEW POINTS
PROPOSED ESKOM SUB STATIONS
ZTV PROPOSED KLIP PUNT SUBSTATION
ZTV PROPOSED MC TAGGARTS SUBSTATION
KHI 1 POWER LINE
APPROXIMATE LIMIT OF VISUAL INFLUENCE (3KM)
APPROXIMATE LIMIT OF VISIBILITY (5KM)
MAIN RIDGELINES
CONTOURS (10m)
NATIONAL ROADS
REGIONAL ROADS
UNSURFACED ROADS
ERVEN & FARM PORTIONS
HOMESTEADS
URBAN AREAS
LANDFORM
High : 1026
Low : 694
0 0.5 1 2 3 4 5 Kilometers
MAP 9 - ZTV COLLECTOR SUBSTATIONS
KHUNAB SOLAR PV PROJECTS GRID CONNECTION INFRASTRUCTURE
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6. VISUAL IMPACT ASSESSMENT

The previous section of the report identified specific areas where visual impacts may occur as well as their likely nature. This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues.

6.1 ISSUES TO BE ADDRESSED

The following list of possible impacts have been identified;

a) The proposed Khunab Solar Grid Connection could change the character and sense of place of the landscape setting;
b) The proposed Khunab Solar Grid Connection could change the character of the landscape as seen from the N14;
c) The proposed Khunab Solar Grid Connection could change the character of the landscape as seen from the R359;
d) The proposed Khunab Solar Grid Connection could change the character of the landscape as seen from the un-surfaced Lutzputs Road to the north and east;
e) The proposed Khunab Solar Grid Connection could change the character of the landscape as seen from local homesteads;
f) The proposed Khunab Solar Grid Connection could change the character of the landscape as seen from local settlement areas;
g) Lighting impacts.

It should be noted that the impacts identified will all gradually increase from the current situation to the impact level indicated during the construction phase, be consistent at the impact levels indicated during the operation phase and decrease again from the levels indicated to close to the current situation during the decommissioning phase.

6.2 ASSESSMENT METHODOLOGY

The previous section of the report identified specific areas where visual impacts may occur. This section will quantify these impacts in their respective geographical locations and in terms of the identified issues (see Section 1.5).

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).

6.3 ASSESSMENT

6.3.1 The proposed development could change the character and sense of place of the landscape setting (Landscape Change)

Nature of impact:

The proposed grid connection corridor is located within an arid plateau landscape area and at their closest are within approximately 1.5km from the closest section of the verdant Orange River Corridor.

The proposed collector substations are also located within arid plateau landscape area and approximately 10.6km from the Orange River Corridor.

The Approximate Limit of Visibility (ALV) of the collector substations indicates that they are only likely to affect the arid plateau and that they may be visible from the Lutzputs Road but they are unlikely to be visible from any other receptor.

The ALV of the proposed grid connection corridor alignment also indicates that the power line is likely to largely be visible from the arid plateau landscape. It also indicates however, that it could be seen from a section of the Orange River Corridor to the south east of the corridor alignment. This is due to the height of the supporting structure. Given that:

- The power line will be seen through other electrical infrastructure including an HV power line and the Upington MTS;
- Views from within the Orange River Corridor are at least partly screened and are generally softened by vegetation on the edges and within the corridor; and
- The majority of the affected section of the Orange River Corridor is outside the Approximate Limit of Visual Influence.

It is highly unlikely that a power line within the proposed corridor will be obvious from the Orange River Corridor.

It is possible that the power line could be visible to a small number of homesteads, the Lutzputs Road, the N14 and small settlements on the edge and within the Orange River Corridor. However:

- The affected homesteads are located close to the Approximate Limit of Visibility;
- From the N14, the power line will be viewed through other closer electrical infrastructure including an HV power line and the Upington MTS.
- From the Lutzputs Road the power line will be viewed close to the Approximate Limit of Visibility and in the context of other electrical infrastructure including Khi Solar One and its existing grid connection power line that follows a similar route; and
- Small settlement areas that could be affected are located on the edge and within the Orange River Corridor which is unlikely to be affected to any significant degree.

The development of a power line and the collector substations within the proposed corridor is only likely to affect sections of the landscape and sensitive receptors that are already affected by existing grid infrastructure and solar projects.

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

	Plateau LCA Long term **(4)**	**Plateau LCA** Long term **(4)**
Magnitude	**Orange River LCA** Small **(0)** **Plateau LCA** Small **(1)**	**Orange River LCA** Small **(0)** **Plateau LCA** Small **(1)**
Probability	**Orange River LCA** Very improbable **(1)** **Plateau LCA** Improbable **(2)**	**Orange River LCA** Very improbable **(1)** **Plateau LCA** Improbable **(2)**
Significance	**Orange River LCA** Low **(6)** **Plateau LCA** Low **(14)**	**Orange River LCA** Low **(6)** **Plateau LCA** Low **(14)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation phase. Therefore there will be **no irreplaceable loss**. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders may consider the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	**Yes,**however possible mitigation will not change the level of significance	**N/A**

Mitigation / Management:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude;
» Ensure that vegetation is not unnecessarily removed during the construction period;
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities;
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources; and
» Align the power line as far from identified receptors as possible within the grid connection corridor

Cumulative Impacts:

The proposed project will extend the general influence of development in the area and specifically for grid connection infrastructure.

The overall cumulative impact is assessed as having a medium significance, however, 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.

6.3.2 The proposed development could change the character of the landscape as seen from the N14.

Nature of impact:
The proposed grid connection corridor is located approximately 1.5km from the N14.

The proposed collector substations are located approximately 10.6km from the N14.

The Approximate Limit of Visibility (ALV) of the collector substations indicates that the proposed collector substations are highly unlikely to be visible from the N14.

The ALV of the proposed grid connection corridor alignment indicates that a power line developed in the corridor could be visible for approximately 5.9km of the road at a minimum distance of less than 2km. However, the power line will be seen through other electrical infrastructure including an HV power line and the Upington MTS.

The proposed corridor alignment approaches the road at a right angle which means that the power line will not run along the length of the road and the power line is likely to become less obvious the further the viewer is from the line.

	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 to minor **(1)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(14)**	Low **(14)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation 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	**No irreplaceable loss**

	may consider the loss of view as irreplaceable.	
Can impacts be mitigated?	**Yes,** however possible mitigation will not change the level of significance.	

Mitigation / Management:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the grid connection corridor

Cumulative Impacts:

The proposed project will extend the general influence of development and specifically grid connection infrastructure in the area.
The overall cumulative impact is assessed as having a medium significance, however, 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.

6.3.3 The proposed development could change the character of the landscape as seen from the R359.

Nature of impact:

The ALV of the collector substations indicates that they are highly unlikely to be visible from the R359.

The ALV of the proposed grid connection corridor alignment indicates that a power line developed in the corridor is highly unlikely to be visible from this road. Should it be visible the power line will be viewed through other electrical infrastructure including an HV power line as well as the Upington MTS. Also given the extent of vegetation within the Orange River Valley between the road and the project, it is highly unlikely that the project will be visible from the road.

	Without mitigation	**With mitigation**
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)**	Very improbable **(1)**
Significance	Low **(6)**	Low **(6)**
Status	Given that neither the collector substations nor the power line are likely to be visually obvious and because	**Neutral Impact**

	if small sections of the development are visible they will be seen in the context and behind other existing grid infrastructure, the change in view is unlikely to be seen as a negative impact. **Neutral impact**.	
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	**Yes,** however possible mitigation will not change the level of significance.	

Mitigation / Management:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified grid connection corridor.

Cumulative Impacts:

The proposed grid connection infrastructure is likely to have negligible visual impact on the R359.

From the site visit, it seems possible that the overall cumulative impact on the R359 may have a medium significance. 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.

6.3.4 The proposed development could change the character of the landscape as seen from the Lutzputs Road.

Nature of impact:

The ZTV analysis indicates that the proposed collector substations could be visible over approximately 6.5km of the road but only one (Klip Punt Collector Substation) is likely to be visually obvious (within the Area of Visual Influence) over approximately 4.5km.

There is a minor ridge between the road and the Klip Punt Collector Substation. The Klip Punt PV1 facility solar arrays will also be located between the substation and the road. Both of these elements will provide a degree of screening, however, the bulk of the substation will be visible over these.

The ZTV analysis indicates that the proposed power line could be visible over approximately 12.6km of the road, however, it will be seen close to the Approximate Limit of Visibility and therefore is unlikely to be highly obvious.

The proposed power line will be viewed in the context of other grid connection infrastructure and existing solar project in the areas, as well as strategic power lines and the Upington MTS.

	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)**	Minor **(2)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low **(24)**	Low **(24)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral to negative**	**Neutral to negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operation phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	**Yes**, however possible mitigation will not change the level of significance.	

Mitigation / Management:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified grid connection corridor

Cumulative Impacts:

The proposed project will have a low level impact on the Lutzputs Road.

From the site visit, the overall cumulative impact of grid connection infrastructure on the Lutzputs Road is assessed as having a medium significance. 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.

6.3.5 The proposed development could change the character of the landscape as seen from local homesteads.

Nature of impact:
The ZTV analysis indicates that the proposed collector substations will not be visible from existing homesteads.

The proposed overhead power line however could be visible to homesteads. The potentially affected homesteads are largely located within the Orange River Corridor. Due to the extent of vegetation within this LCA, it is likely that views of the power line will be largely softened / screened. If the power line is visible it will be seen behind an existing HV power line as well as the Upington MTS.

There are also two homesteads on the Plateau to the north west of the N14 from which the proposed power line could be visible, however, these homesteads are located close to the adjacent Sirius Solar PV One project (under construction). One is located within the property on which the Sirius Solar PV One project is under development. It is likely that grid connections associated with that project will be more obvious than the proposed project.

The proposed grid connection corridor runs within 2.9km of the closest homestead. At this distance the overhead power line is unlikely to be visually obvious.

	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 to Minor **(1)**
Probability	Improbable **(1)**	Improbable **(1)**
Significance	Low **(7)**	Low **(7)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral to negative**	**Neutral to negative**
Reversibility	High	High

Irreplaceable loss	**No irreplaceable loss**	**No irreplaceable loss**
Can impacts be mitigated?	**Yes**, however possible mitigation will not change the level of significance.	

Mitigation / Management:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the grid connection corridor

Cumulative Impacts:

It is highly unlikely that there will be an impact on local homesteads. There is therefore unlikely to be any contribution to cumulative visual impacts on homesteads.

The cumulative impact of the proposed grid connection infrastructure was assessed as low.

See Appendix IV.

Residual Impacts:

The residual risk relates to the grid connection infrastructure being left in place on decommissioning of the associated solar projects. It is therefore critical that effective rehabilitation is undertaken.

6.3.6 The proposed development could change the character of the landscape as seen from local settlement areas.

Nature of impact:

All local settlements are located close to or within the Orange River Corridor.

The ZTV analysis indicates that the proposed collector substations will not be visible from settlements.

The closest settlement is located approximately 1.4km from the eastern end of the proposed grid connection corridor. It is likely that a power line developed in the corridor will be visible from this settlement. However, the new power line will be viewed through other existing electrical infrastructure including an existing HV power line as well as the Upington MTS.

	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 to Minor **(1)**

Probability	Improbable **(1)**	Improbable **(1)**
Significance	Low **(7)**	Low **(7)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral to negative**	**Neutral to negative**
Reversibility	High	High
Irreplaceable loss	**No irreplaceable loss**	**No irreplaceable loss**
Can impacts be mitigated?	**Yes**, however possible mitigation will not change the level of significance.	

Mitigation / Management:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified corridor.

Cumulative Impacts:

It is highly unlikely that there will be an impact on local settlements due to the proposed grid connection infrastructure development.

The overall cumulative visual impact on settlement was assessed as having a medium significance. The contribution to this impact due to the proposed project was assessed as low.

See Appendix IV.

Residual Risks:

No residual risks.

6.3.7 The potential visual impact of operational, safety and security lighting of the grid connection infrastructure at night on observers.

Nature of impact:

Only the collector substations will be lit. Lighting is likely to include:

- Security lights that will light the substations to a level sufficient to ensure that security cameras can operate at night;
- Low level operational lights around buildings; and
- Flood lighting may also be required for emergency work during the hours of darkness.

This could result in the substations being obvious at night from surrounding areas.

The Khi Solar One project approximately 4.5km to the south appears relatively dark at night.

There are obvious lights from Upington, from the Upington MTS as well as from passing traffic and small settlements and homesteads particularly in the Orange River Valley.

The area therefore is not completely dark during the night.

There is potential for the project to add to these existing lighting levels.

	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 lit area may be accepted by most people. It is likely however that some people will see the expansion of lighting as a **negative** impact.	If the lights are generally not visible then the occasional light is unlikely to be seen as negative. **Neutral**
Irreplaceable loss	It would be possible to change or adapt 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;
- Ensure that flood lighting for night time repair work is on a separate circuit and is turned off when not required; and
- Keep lighting low, no tall mast lighting should be used.

Cumulative Impact:

There is potential for security lighting and operational lighting associated with grid connection infrastructure to further impact on the area but with mitigation the contribution of this project to possible cumulative impacts is likely to be of low significance.

See appendix IV.

Residual Risks:

No residual risk has been identified.

7 IMPACT STATEMENT

7.1 PROJECT DESCRIPTION

The development of the proposed Khunab Solar Grid Connection is required for the transmission of electricity generated from the Klip Punt PV1 and McTaggarts PV1, PV2 and P3 facilities to the Upington MTS, which is located approximately 8.3km to the south east of the proposed solar PV facilities.

The grid connection infrastructure will have a transmitting capacity of up to 132kV, whilst the two collector substations will have a combined footprint of approximately 3 ha.

The height of the 132kV power line is anticipated to be up to 32m, and either monopole or lattice towers might be used during the construction phase.

The height of solid infrastructure within the collector substations, being comprised of transformers and small buildings, is approximately 10m.

7.2 VISIBILITY

The Visual Absorption Capacity of the landscape is relatively low considering the height of the structures proposed to be developed within the grid connection corridor, the relatively flat nature of the topography and low natural vegetation.

The visibility of the proposed project is largely limited by the relatively slender nature of the taller structures and the overhead power line and by the ability of the human eye to differentiate these elements over distance.

From observations of similar power lines, the following visual limits were set;

Power Line	Main area of visual influence	Approximate Limit of Visibility
132kV	3km	20.2km
Collector substations	3km	11.3km

The ZTV analysis indicates that the power line is likely to be visible throughout the majority of the Approximate Limit of Visibility.

7.3 LANDSCAPE CHARACTER

The proposed project could impact on two distinct Landscape Character Areas (LCAs) including:

- Plateau LCA includes the gently undulating, arid plateau above the Orange River Valley. This area is generally natural in character with very little settlement. It is obvious from **Map 2** that the character of this area is in transition in that solar projects and existing grid infrastructure are likely to create an industrial aesthetic within a matrix of natural vegetation. VAC within this area is only provided by the regular, low, dune formation as well as slopes of the slightly larger minor valleys that are associated with the non-perennial water courses that flow into the Orange River Valley.
- The River Corridor LCA is comprised of the shallow valley area surrounding the Orange River. This area is generally inward looking drawing little character

influence from the surrounding plateau. Landform, vegetation and development all play a role in screening views of surrounding areas and contribute to significant VAC.

The proposed power line and collector substations will mainly influence the Plateau LCA and will have negligible influence over the River Corridor LCA.

No protected areas are likely to be affected.

7.4 SENSITIVE RECEPTORS

Identified visual receptors include:

- Area Receptors including the minor urban settlement areas that are located within the River Corridor LCA;
- Linear Receptors or routes through the area including the N14, the R359, and the Lutzputs Road. The un-surfaced Lutzputs Road is predominantly used by local people;
- Point Receptors that include individual homesteads that are located both within the River Valley LCA and the Plateau LCA.

7.5 VISUAL IMPACT AND MITIGATION POTENTIAL

7.5.1 General Landscape Character

The Approximate Limit of Visibility (ALV) of the collector substations indicates that they are only likely to affect the arid plateau and that the collector substations may be visible from the Lutzputs Road but are unlikely to be visible from any other receptor.

The development of a power line within the proposed corridor is only likely to affect sections of the landscape and sensitive receptors that are already affected by solar projects and the associated grid connection infrastructure.

The proposed project will therefore not impact negatively on landscape areas outside those that are already affected by existing industrial infrastructure (including renewable energy projects and the associated grid connection infrastructure). Because of this the landscape impact is assessed as being likely to have a low significance and a neutral status.

7.5.2 The impact of the proposed project on views from the N14

The proposed collector substations are highly unlikely to be visible from the N14 and therefore it will have no visual impact.

The ALV of the proposed grid connection corridor indicates that a power line developed in the corridor could be visible for approximately 5.9km of the road at a minimum distance of less than 2km. However, the power line will be seen through other electrical infrastructure including an HV power line and the Upington MTS.

The proposed corridor alignment approaches the road at a right angle which means that the power line will not run along the length of the road and the power line is likely to become less obvious the further the viewer is from the line.

The development of the power line within the proposed corridor was assessed as likely to have a visual impact of low significance on the N14. Given the fact that the

development will occur within an area affected by other industrial infrastructure (including solar projects and their associated infrastructure) and because the proposed power line will be viewed through other existing electrical infrastructure, this impact was assessed as being likely to have a neutral status.

7.5.3 The impact of the proposed project on views from the R359

The proposed collector substations will not be visible from this road.

A power line developed within the proposed corridor is unlikely to be visually obvious from this road.

The visual impact of the development was therefore assessed as being very improbable, having a low significance and a neutral status.

7.5.4 The impact of the proposed project on views from the Lutzputs Road

The ZTV analysis indicates that the proposed collector substations could be visible over approximately 6.5km of the road but only one (Klip Punt Collector Substation) is likely to be visually obvious over approximately 4.5km.

There is a minor ridge between the road and the substation. The Klip Punt PV1 facility solar arrays will also be located between the substation and the road. Both of these elements will provide a degree of screening, however, the bulk of the substation will be visible over these.

The ZTV analysis indicates that the proposed power line could be visible over approximately 12.6km of the road, however, it will be seen from close to the Approximate Limit of Visibility and therefore is unlikely to be highly obvious.

The proposed power line will be viewed in the context of other industrial infrastructure (including solar projects and associated electrical infrastructure) as well as strategic power lines and the Upington MTS.

The visual impact of the development was therefore assessed as being probable, having a low significance and a neutral to negative status.

7.5.5 The proposed development could change the character of the landscape as seen from local homesteads.

The proposed collector substations will not be visible from existing homesteads.

There are two homesteads on the Plateau to the north west of the N14 from which the proposed power line may be visible, however, these homesteads are located close to the adjacent Sirius Solar PV One project. One is located within the property on which the Sirius Solar PV One project is under development. It is likely that grid connections associated with that project will be more obvious. The project was under construction at the time of compilation of this report

The proposed grid connection corridor runs within 2.9km of the closest homestead. At this distance the overhead power line is unlikely to be visually obvious.

Given the distance involved and the other intervening project, the proposed project was assessed as being likely to have an improbable visual impact of low significance and neutral to negative status.

7.5.6 The impact of the proposed project on views from local settlements

All local settlements are located close to or within the Orange River Corridor.

The ZTV analysis indicates that the proposed collector substations will not be visible from settlements.

The closest settlement is located approximately 1.4km from the eastern end of the proposed grid connection corridor. It is likely that a power line developed in the corridor will be visible from this settlement. However, the new power line will be viewed through other electrical infrastructure including an existing HV power line as well as the Upington MTS.

Given the distance involved and the other intervening infrastructure, the proposed project was assessed as being likely to have an improbable visual impact of low significance and neutral to negative status.

7.5.7 The impact of lighting associated with the project

Only the collector substations will be lit. Lighting is likely to include:

- Security lights that will light the substation to a level sufficient to ensure that security cameras can operate at night.
- Low level operational lights around buildings; and
- Flood lighting that may be required for emergency work during the hours of darkness.

This could result in the substations being obvious at night from surrounding areas.

The Khi Solar One project approximately 4.5km to the south appears relatively dark at night. There are obvious lights from Upington, from the Upington MTS as well as from passing traffic and small settlements and homesteads particularly in the Orange River Valley.

The area therefore is not completely dark during the night.

There is potential therefore for the project to add to these existing lighting levels but with appropriate mitigation the level of lighting is likely to be similar to the existing situation.

With mitigation therefore lighting impacts are improbable with a low significance and neutral status.

7.6 CUMULATIVE IMPACTS

Whilst detailed assessments of all other projects has not been undertaken, due to the development of numerous renewable energy projects and their associated grid connection infrastructure in the area, cumulative visual impacts were generally assessed as being likely to medium significance.

The contribution of the proposed project to these cumulative impacts was assessed as having a low significance.

7.7 CONCLUSION

The proposed collector substations will have a visual impact on a small section of the Lutzputs Road only. This road is un-surfaced and carries infrequent local traffic. The

affected area is also impacted by other industrial infrastructure including grid infrastructure and solar projects.

Visual impacts associated with power line development in the proposed corridor are low.

Therefore, from a landscape and visual impact perspective, there is no reason why the proposed development of the grid connection infrastructure within the grid connection corridor should not be authorised. This is subject to the implementation of the recommended mitigation measures.

REFERENCES

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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

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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 Certified Environmental Assessment Practitioner of South Africa (2009).

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 iSimangalisoWetlend 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.
- **NoupoortConcentrating 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

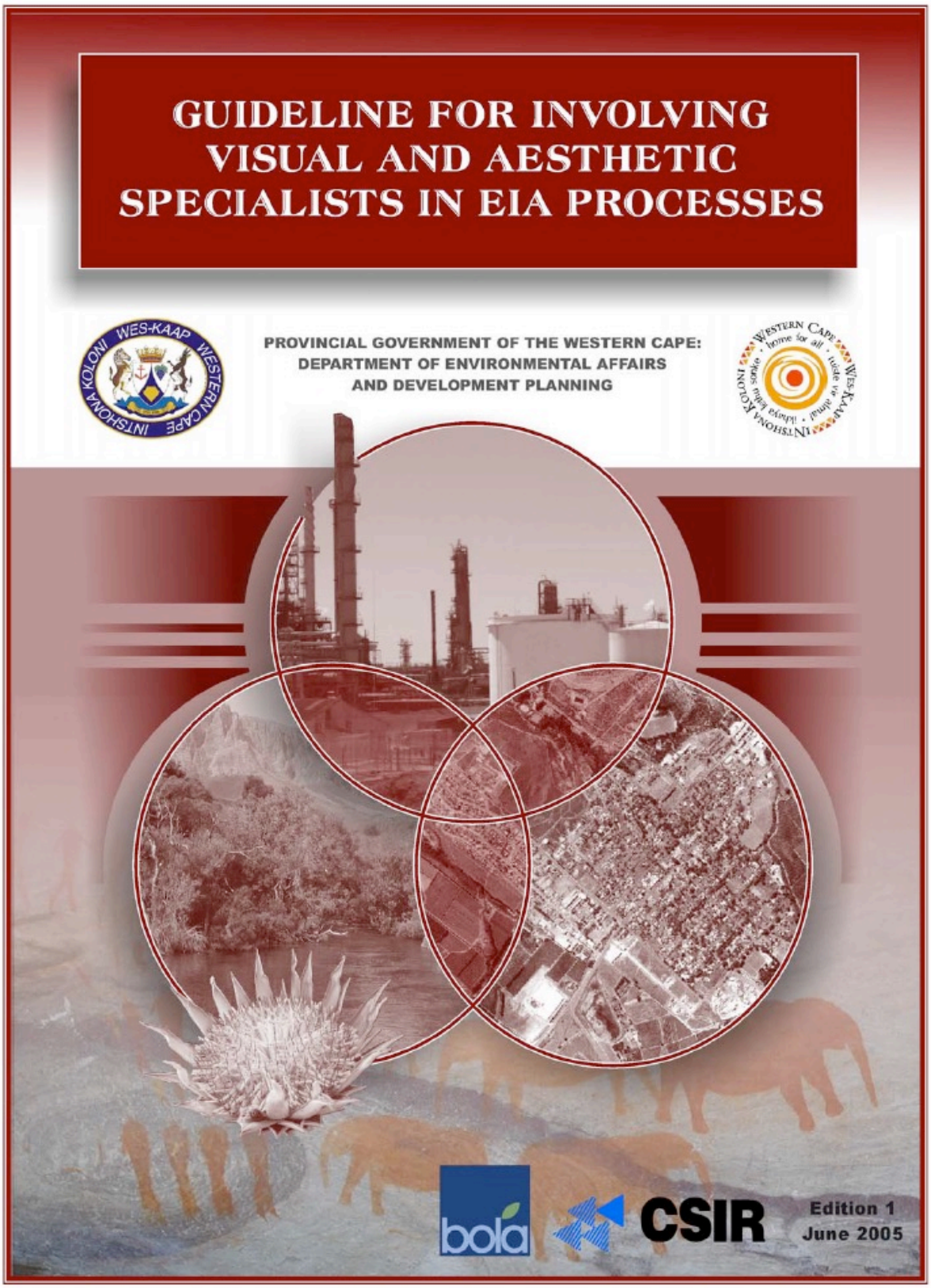
developments for Blast Media.

- **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, CefnCoed 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
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GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

Edition 1

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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*.

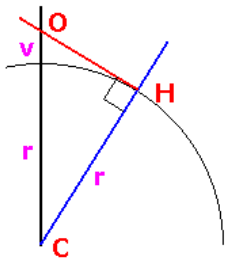
CONTENTS

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

CUMULATIVE IMPACTS

Cumulative visual impacts have considered the current impacts of infrastructure and mining as well as the future proposed development of other renewable energy projects and planned grid connection infrastructure.

Proposed mitigation measures relate to mitigation necessary to minimise the cumulative contribution of the project under consideration only.

a) General cumulative change in the character and sense of place of the landscape setting (Landscape Change).

Nature:
The proposed collector substations and overhead power line will impact an area that is currently impacted by one major solar project and around which a number of other solar projects are authorised / proposed.

The proposed project will therefore not extend the visual influence of industry, it will however intensify if within a relatively small area.

Whilst a detailed visual analysis of other solar projects and their grid connections in the area has not been undertaken, the combined effect of all proposed projects could be significant. Because the proposed project will affect an area within which there is already significant visual influence of solar projects and their grid connections, it is only likely to have a relatively small contribution to landscape change.

These facilities will have negligible impact on the Orange River Corridor. They will only impact on the arid Plateau LCA.

As the impact of the proposed project on the Orange River Corridor is minimal and because it is more difficult to predict the impact of other projects on this area without undertaking a detailed analysis, only the impact of projects on the Plateau LCA is considered.

	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)**	Region **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small **(0)**	High **(8)**
Probability	Improbable **(2)**	Probable **(3)**
Significance	**Low (12)**	**Medium (45)**
Status (positive or negative)	**Neutral**	Negative
Reversibility	**High**	High
Irreplaceable loss of resources?	**No**	No
Can impacts be mitigated?	**Yes,** however possible mitigation will not change the level of significance	Unknown

Mitigation:
» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.

» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities. » Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources. » Align the power line as far from roads as possible within the identified corridor.

b) The cumulative impact of the proposed power line and collector substations on views from the N14.

Nature:
Whilst a detailed visual analysis of other solar projects and their grid connections in the area has not been undertaken, the combined effect of all proposed projects could be significant. Because the proposed project will affect an area within which there is already significant visual influence of solar projects and their grid connections, it is only likely to have a relatively small contribution to landscape change.

The ZTV analysis indicates that the proposed collector substations will not be visible from the N14 and that the proposed power line will be visible from approximately 5.9 km of the road and at a minimum distance of less than 2km. However it will be viewed through other electrical infrastructure including another HV overhead line and the Upington MTS.

The proposed corridor approaches the road at a right angle which means that the power line will not run along the length of the road and the power line is likely to become less obvious the further the viewer is from the line.

Because the proposed project will be seen through other existing infrastructure it will reinforce existing visual impacts.

	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)**	Region **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Moderate to low **(5)**
Probability	Improbable **(2)**	Probable **(5)**
Significance	Low **(14)**	Medium **(60)**
Status (positive or negative)	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral**	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	**Yes**, however possible mitigation will not change the level of significance.	Unknown

Mitigation:
» Planning: Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.

» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from roads as possible within the identified corridor.

c) Change in the character of the landscape as seen from the R359.

Nature:

The assessment indicates that the proposed collector substations and overhead power line is highly unlikely to have any visual impact on this road.

Due to their limited height, the distance between other PV projects to the north of the Orange River and the fact that significant screening is likely to be provided by vegetation within the Orange River Valley, it is unlikely that any currently developed PV projects and the associated infrastructure will have a significant impact on this road. It should be noted however from reference to **Map 3** that it is possible that future development on the southern side of the Orange River Corridor could have a greater impact on this road.

	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)**	Regional **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Small **(0)**	Minor to Low, **(3)**
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 irreplaceable loss
Can impacts be mitigated?	**Yes**, however possible mitigation will not change the level of significance.	Unknown

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified corridor.

d) Change in the character of the landscape as seen from the Lutzputs Road.

Nature:

The assessment indicates that due to distance and the nature of the road the proposed collector substations and the proposed power line will be visible but the visual impact will have a low significance.

From the site visit the impact of existing infrastructure on the Lutzputs Road was assessed as medium

The overall cumulative impact could therefore have a medium significance. The proposed project is likely to result in a relatively low contribution to this overall impact.

	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)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Low **(4)**
Probability	Probable **(3)**	Highly probable **(4)**
Significance	Low **(24)**	Medium **(44)**
Status (positive or negative)	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral to negative**	Negative
Reversibility	High	High
Irreplaceable loss of resources?	The proposed development can be dismantled and removed at the end of the operation phase. There will therefore be **no irreplaceable loss**.	No irreplaceable loss
Can impacts be mitigated?	**Yes**, however possible mitigation will not change the level of significance.	Unknown

Mitigation:

- Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
- Ensure that vegetation is not unnecessarily removed during the construction period.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
- Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.

» Align the power line as far from identified receptors as possible within the identified corridor.

e) **Cumulative impact on local homesteads**

Nature:
Visual impacts of the proposed infrastructure on homesteads were assessed as being low and improbable. The proposed project is therefore unlikely to contribute significantly to cumulative visual impacts on homesteads.

Because the majority of homesteads are located within the Orange River Valley and are likely to be at least partially screened from PV projects to the north by landform and vegetation, the cumulative visual impact of other solar PV projects and associated infrastructure is also anticipated 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)**	Region **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to Minor **(1)**	Minor **(2)**
Probability	Improbable **(1)**	Probable **(3)**
Significance	Low **(7)**	Low **(27)**
Status (positive or negative)	Neutral to negative	Neutral to negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Unknown

Mitigation:
» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align the power line as far from identified receptors as possible within the identified corridor.

f) Cumulative impact on Settlement

Nature:

There are numerous small settlement areas along the N14 and within the Orange River Valley.

The likely visual impact of the proposed infrastructure on settlement areas was assessed as having a low significance.

Whilst a detailed assessment of other planned projects has not been undertaken, it is possible that they may impact to a small degree on settlement areas.

	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)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to Minor **(1)**	Moderate **(6)**
Probability	Improbable **(1)**	Probable **(3)**
Significance	Low **(7)**	Medium **(39)**
Status	Given the low level of impact and the fact that the landscape is currently impacted, it is unlikely that the majority of stakeholders will view the impact as negative. **Neutral to negative**	**Negative**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	**Yes**, however possible mitigation will not change the level of significance.	Unknown

Mitigation:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.
» Ensure that vegetation is not unnecessarily removed during the construction period.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at appropriately licensed waste facilities.
» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.
» Align power line as far from identified receptors as possible within the identified corridor.

g) **Cumulative Night Time Lighting Impacts**

Nature:

Currently lighting in the area arises from the settlement areas and homesteads within the Orange River Valley and traffic on the N14. There is also a background lighting level from the urban area of Upington.

There is a risk that the proposed collector substations will extend the influence of lighting however with appropriate mitigation lighting levels are anticipated to be low and in keeping with the current lighting pattern.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site **(1)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Small to minor **(1)**
Probability	Improbable **(2)**	Improbable **(3)**
Significance	Low **(12)**	Low **(24)**
Status (positive or negative)	If the lights are generally not visible then the occasional light is unlikely to be seen as negative. **Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	

Mitigation:

- 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;
- Ensure that flood lighting for night time repair work is on a separate circuit and is turned off when not required; and
- Keep lighting low, no tall mast lighting should be used.

APPENDIX VI

ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Khunab solar grid connection and associated infrastructure for the McTaggarts Solar PV1, McTaggarts Solar PV2, McTaggarts Solar PV3 and Klip Punt PV1 projects - Construction, Operation and Decommissioning		
Potential Impact	Change in Landscape Character Visual Impact affecting the N14 Visual Impact affecting the R359 Visual Impact affecting the Lutzputs Road Visual Impact affecting Rural Homesteads Visual impact affecting travellers on Settlements Lighting Impacts		
Activity/risk source	Vegetation clearance and rehabilitation during construction and decommissioning resulting in degradation and further loss of character. Unnecessary impact due to lack of consideration of visual impacts on sensitive receivers Unnecessary impacts due to extended construction period Unnecessary impacts due to poor waste management Residual risk of un-necessary impact should infrastructure not be removed on decommissioning.		
Mitigation: Target/Objective	Minimise and reinstate vegetation loss. Place structures as far from sensitive receivers as much as the grid connection corridor will allow. Minimise the construction period. Ensure that appropriate waste management is undertaken. Remove structures and rehabilitate site on decommissioning.		
Mitigation: Action/control		**Responsibility** Contractor (C) Environmental (EO) Environmental Liaison Officer (ELO)	**Timeframe** Construction Phase (C) Operation Phase (O) Decommissioning Phase (D)

Plan construction to minimise impact period on identified receptors.	(C)	(C)
Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development footprint.	C, EO, ELO	C
Reinstate any areas of vegetation that have been disturbed during construction.	C, EO, ELO	C
Rehabilitate areas to their natural state on decommissioning.	C, EO, ELO	C, D
Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	C, EO, ELO	C, D
Remove all temporary works.	C, EO, ELO	C, D
Remove infrastructure not required for the post-decommissioning use of the site.	C, EO, ELO	C, D

Performance Indicators	Construction of specific sections of the infrastructure exceeding the construction programme. Vegetation presence and density is sufficient. Presence of unnecessary infrastructure is avoided. Location of structures is not closer to sensitive receivers than is necessary
Monitoring	Regular review of the construction programme. Review layout drawings to ensure that towers are placed as appropriately as possible with regard to the views of sensitive receivers. Evaluate vegetation before, during and after construction. Check to ensure that all structures are removed and rehabilitation is undertaken during decommissioning. Responsibility: EO and ELO. Prepare regular reports.