

ABO WIND AGGENEYS 1 PV (PTY)  
**GRID CONNECTION INFRASTRUCTURE  
FOR THE AGGENEYS 2 SOLAR PV FACILITY,  
NORTHERN CAPE PROVINCE**

**LANDSCAPE & VISUAL IMPACT  
ASSESSMENT**

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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 grid connection infrastructure for the Aggeneys 2 solar PV facility 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 Visual Impact Assessment Report has been prepared for inclusion in the project Basic Assessment Report.

There are two power line corridors up to 1.5km in width and two collector substation alternatives under consideration.

## **1.2 PROJECT LOCATION AND PROPERTY DESCRIPTION**

The proposed power line will be located on the RE of the Farm Bloemhoek 61, Portion 1 of the Farm Bloemhoek, Portion 2 of the Farm Bloemhoek, Portion 3 of the Farm Bloemhoek, RE of the Farm Aggeneys 56, Portion 1 of Aggeneys 56, and Portion 2 of Aggeneys 56 and RE of Portion 1 of Farm Aggeneys 56.

The power line will connect to Eskom's Aggeneis Main Transmission Substation (MTS) which is located on Portion 2 of the Farm Aggeneys 56.

The proposed corridor and the alternative corridor run to the east, to the south and to the south west of the town of Aggeneys. **(Map 1: Site Location Map).**

No site alternatives are under consideration for the proposed development as both alternatives are located on the same properties.

## **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**

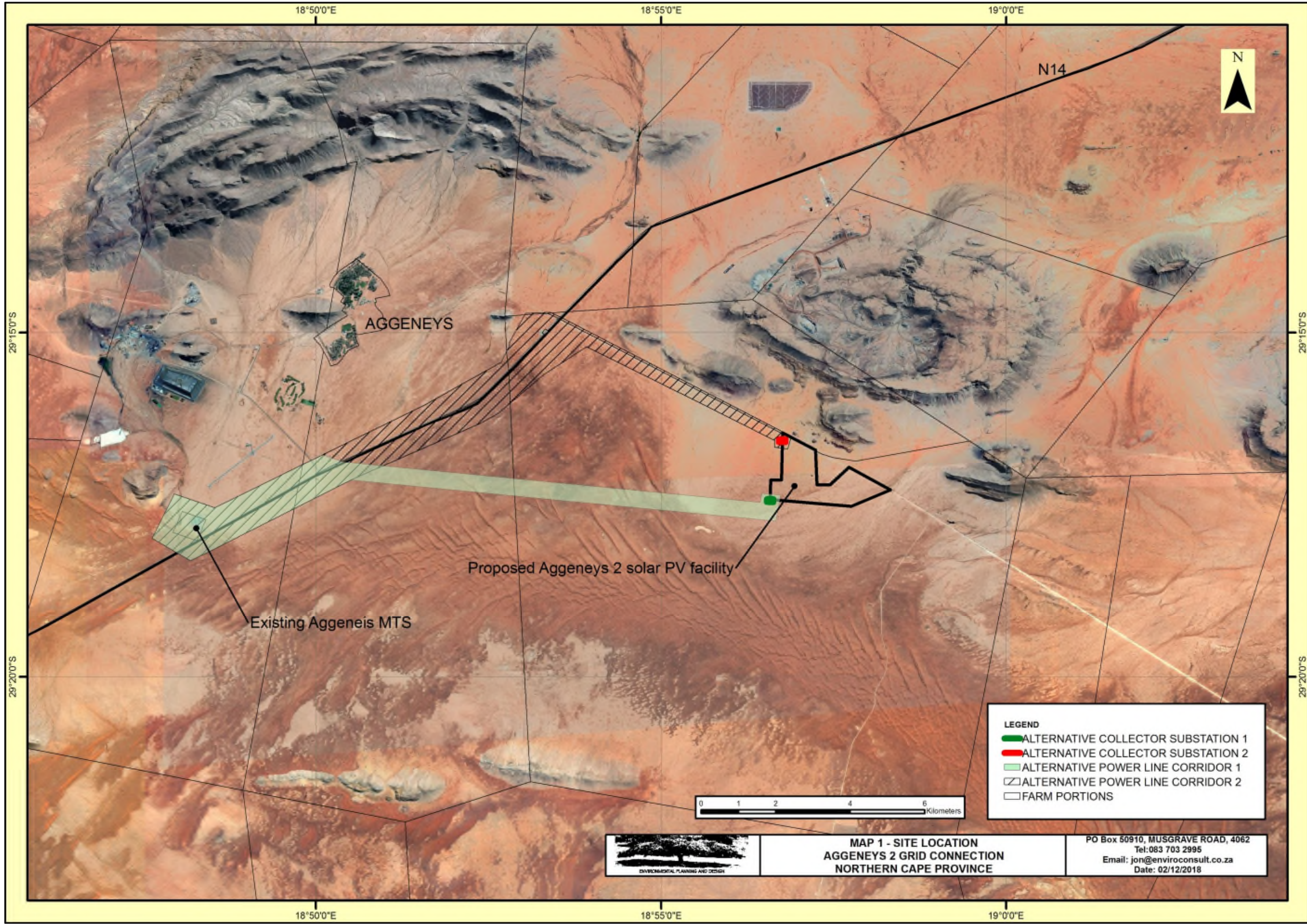
The following limitations and assumptions should be noted:

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 on a single day (5<sup>th</sup> January 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 ensuring maximum visibility.

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



## **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 a solar photovoltaic (PV) facility (Aggeneys 2) for input into the national grid to augment Eskom's power supply.

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

The area within which the project is proposed has been identified as a key area for renewable energy generation by the South African Department of Environmental Affairs in their strategic assessment which identifies eight Renewable Energy Development Zones (REDZ). The area in which this project is located is the Springbok REDZ 8.

The proposed power line is required in order to distribute power generated by the Aggeneys 2 solar PV facility to the National Grid.

### **2.2 PROJECT DESCRIPTION**

Refer to Map 1, Site Location

The proposed grid connection infrastructure for Aggeneys 2 consists of the following:

- A single circuit power line with a capacity of up to 220 kV and a maximum height of up to 40m. The servitude width would be up to a maximum of 47m wide and two alternative corridors have been proposed for assessment as follows:
  - Power Line Corridor Alternative 1 – follows an existing 400kV power line, and eventually meets with and follows the N14, extending for approximately 15 km in length; and
  - Power Line Corridor Alternative 2 – follows the Loop 10 gravel road, and eventually meets with and follows the N14, extending for approximately 17 km in length.
- A new collector substation including new feeder bays, busbars, protection equipment etc., with an area of approximately 1.25 ha, would be located at the eastern end of each power line corridor alternative;
- A gravel access road (to be tarred if required) to the substation, ~6 m wide and up to ~2 km long;
- New feeder bay/s at the exiting Aggeneis Main Transmission Substation (MTS).

The new collector substation is necessary for the project to step up current in order for it to be fed into the National Grid. It is anticipated that this substation will be an outdoor type within a fenced compound. From experience it is expected that the tallest solid structure being comprised of transformers and minor buildings will be in



the region of 5m high. The tallest structures associated with the substation are likely to include bus-bars to connect power lines to the proposed overhead power line. The bus-bars are likely to be slender construction comprised of steel lattice structures that are slightly lower than the height of the proposed overhead power line (up to 40m).

The purpose of the grid connection infrastructure is to evacuate the power generated by the Aggeneys 2 solar PV facility proposed on the RE of the Farm Bloemhoek 61. The collector substation on the PV project site, to be operated by Eskom, will be connected to the Eskom Aggeneis Main Transmission Substation (MTS) via a single circuit overhead powerline with a contracting capacity of up to 220kV. The Aggeneis MTS is located approximately 13.5km to the east of the proposed Aggeneys 2 project.

This report considers two power line corridor alternatives associated with Aggeneys 2, the collector substation and associated infrastructure.

The height of the power line gantries of a 220kV power line is up to 40m.

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

## **2.4 PROJECT CONTEXT**

The project is proposed within an area that is a focus for both mining, agriculture and renewable energy development.

The town of Aggeneys was founded to service the Black Mountain Mine which is an underground base-metal zinc/lead/copper/silver mine just to the west of the town. The produce of the mine is transported by truck to the nearest railway line, located 150 km to the south-east along a virtually straight gravel (dirt) road.

A major zinc deposit is being mined in the Gamsberg inselberg which is located immediately to the north of the proposed site. This mine is one of the largest mining operations in South Africa<sup>1</sup>.

The proposed development of the grid connection infrastructure is 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 8 area, there have been numerous 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 2**, Development Context, indicates the properties within the vicinity of the proposed site on which other renewable energy projects have been authorised as well as proposed future Eskom power lines. For a detailed list of other solar projects, see **Appendix III**.

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<sup>1</sup> Engineering News, October 2017.



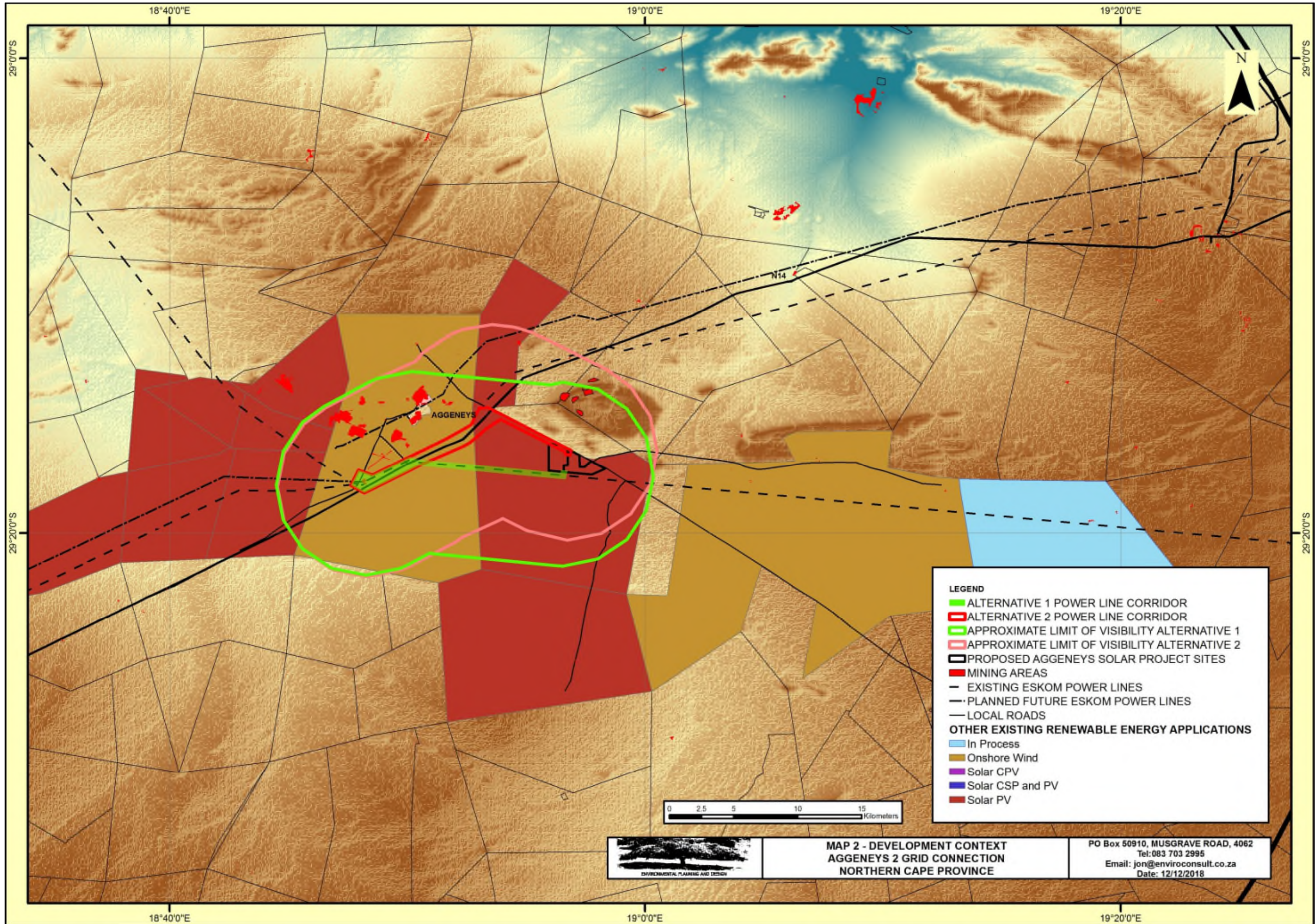
**Plate 1, Existing Aggeneis Main Transformer Substation (MTS).**



**Plate 2, Eskom 220kV Monopole, 40m high.**



**Plate 3, Eskom 220kV Monopole.**



## **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”<sup>2</sup>.

The proposed site is located within the floor of a broad valley system that generally falls from the east to the west towards the Orange River. Beside the Orange River there is a near continuous range of rocky hills.

The landscape surrounding the site is arid, comprising relatively flat drainage plains with inselbergs or rocky outliers such as the Aggeneys Mountains, Black Mountain and Gamsberg rising above wide plains.

Areas to the south of the proposed site appear relatively natural, whilst to the north, east and west there are extensive areas of mining. The small town of Aggeneys lies approximately 10.5km west north west of the proposed Aggeneys 2 solar PV facility.

Landscape Character is a composite of a number of influencing factors including:

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

#### **3.1.1 Landform and Drainage**

The site is located south of the Kalahari Basin. The landscape is sparsely vegetated and covered by pale red aeolian sands of the Quaternary Gordonia Formation (Kalahari Group)<sup>3</sup>.

The Orange River flows from north west to south east approximately 37 km north of the proposed development site. The Orange River is a major regional river system that has its source in the mountains on the western edge of Lesotho, is joined by the Vaal and flows into the sea on the West Coast where it forms the border between South Africa and Namibia.

The site is located within a broad valley that drains towards the Orange River. The site is set at an elevation of 840 – 870 m above mean sea level (amsl).

The valley floor surrounding the site is incised by a number of shallow water courses that drain towards the Orange River. These water courses are non-perennial and only run for short periods of time during and after Summer and Autumn rains.

Most of the study area comprises fairly flat-lying terrain between Inselbergs or isolated steep rocky outcrops.

The inselbergs in the vicinity of the site are concentrated to the north, north-west and north-east of the study area where they form the upper valley slopes and ridgelines.

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<sup>22</sup> UK Guidelines

<sup>3</sup> Almond

Immediately to the north and north-west, a large rocky outcrop (Gamsberg) rises to approximately 1100 m amsl.

There are also two isolated areas of rocky outcrop within the valley floor to the south of the proposed site.

This landform is likely to have a number of implications for visibility of the proposed development:

- Given the relatively low nature of the proposed development, the small changes in elevation within the generally flat landscape could help provide screening of the proposed facility or could open up views over the proposed arrays; and
- The scattered Inselbergs and particularly the Gamsberg will provide screening for the proposed development.

**Refer to Map 3** for analysis of the landform and drainage.

### **3.1.2 Nature of Development and Land Uses**

Landcover information has been extracted from the latest (2005) SANBI landcover survey. Landcover can be divided into the following types:

- **Natural Area.** The main landcover type surrounding the proposed development is natural area. This area is likely to be used largely for stock rearing and low intensity grazing. As this has not resulted in mass clearance of vegetation, the majority of the area retains a relatively natural appearance. Situated within this landcover are occasional homesteads that are scattered sparsely throughout the area. The low density of development is no doubt a product of the low agricultural potential / carrying capacity of the area.
- **Urban development,** in the small town of Aggeneys, includes housing, sports grounds and commercial uses. Particularly within the well-established areas of these settlements, streets are relatively broad and are lined with street trees. Gardens generally have mature woody ornamental plants. The density of development and the extent of vegetation is likely to serve to screen most external views from the urban area.
- **Degraded areas** are also evident. From reference to online aerial photography, these appear to be associated with mining.
- **Mine development** includes a mine located close and to the west of Aggeneys and the Black Mountain Gamsberg Mine which is an open-pit zinc mine located close and to the north of the proposed site.

**Refer to Map 4 for Landcover.**

### **3.1.3 Vegetation Patterns**

The majority of the landscape is covered by low sparse grass and herbaceous vegetation. During much of the year this vegetation lies dormant and is brown due to lack of water. However, during Summer and Autumn rains, the landscape rapidly becomes green and colourful as plants use this period to regenerate and reproduce.

Mucina and Rutherford<sup>4</sup> indicate that the natural vegetation types within the study area include:

- Bushmanland Sandy Grassland
- Bushmanland Arid Grassland
- Bushmanland Inselberg Shrubland; and
- Aggeneys Gravel Vygieveld

Vegetation and landscape features associated with **Bushmanland Sandy Grassland** are described as dense, sandy grassland plains with dominating white grasses (*Stipagrostis*, *Schmidtia*) and abundant drought-resistant shrubs. After rainy winters rich displays of ephemeral spring flora (*Grielum humifusum*, *Gazania lichtensteinii*) can occur.

Vegetation and landscape features associated with **Bushmanland Arid Grassland** are described as 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.

Vegetation and landscape features associated with **Bushmanland Inselberg Shrubland** are described as Shrubland with both succulent (Aizoaceae, Asphodelaceae, Crassulaceae, Didiereaceae, Euphorbiaceae, Zygophyllaceae) as well as non-succulent (mainly Asteraceae) elements and with sparse grassy undergrowth (*Aristida*, *Eragrostis*, *Stipagrostis*) on steep slopes of the Inselbergs.

Vegetation and landscape features associated with **Aggeneys Gravel Vygieveld** are described as flat or slightly sloping plains (appearing as distinctly white surface quartz layers against the background of red sand or reddish soil) and supporting sparse, low-growing vegetation dominated by small to dwarf leaf-succulents of the families Aizoaceae, Crassulaceae, Euphorbiaceae, Portulacaceae and Zygophyllaceae, with some perennial component. The resurrection grass *Eragrostis nindensis* the dominant perennial graminoid.

Whilst there are obvious botanical differences, in terms of visual considerations all vegetation types are relatively low in nature and are comprised largely of grass species. They are therefore unlikely to provide significant visual absorption capacity (VAC) and will contribute to an open landscape character within which long distance views are possible.

The uniformity of the vegetation cover and its transformation after rain is a major constituent of the current landscape character. Major disturbance of this could have implications for landscape character.

In addition to the natural vegetation types highlighted above, taller woody vegetation occurs in limited areas including:

- The town of Aggeneys where dense tree and shrub planting has occurred around houses and on the town's golf course.

**Refer to Map 5 for Vegetation Types.**

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<sup>4</sup> Vegetation of South Africa, Lesotho and Swaziland, 2006

### **3.1.4 Landscape Character Areas and, Visual Absorption Capacity (VAC)**

Landscape Character Areas (LCAs) are defined by the UK Guidelines as “single unique areas which are the discrete geographical areas of a particular landscape type”<sup>5</sup>.

Visual Absorption Capacity (VAC) is defined as “the landscape's ability to absorb physical changes without transformation in its visual character and quality”<sup>6</sup>.

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 rural small scale field pattern is likely to be all the more obvious due to its scale.

The over-riding character of the area is comprised of wide open plains and shallow valleys that are clothed with natural low grasslands and backed by dramatic ridgelines that are made up of inselbergs and the continuous rocky ridgeline beside the Orange River.

Overlaid onto this broad pattern, mining and other development has influenced the degree to which this natural pattern has been influenced.

In terms of the definition of LCAs the inselbergs and the rocky ridgeline that borders the southern side of the Orange River provide a large degree of visual containment that structures the way in which the landscape is experienced in the area.

The Gamsberg, a large group of inselbergs to the north-west and west of Aggeneys and minor inselbergs to the south west of the settlement all help to limit views of the developed sections of the landscape from those directions.

To the west, views of the developed areas around Aggeneys are largely limited by distance and limitations of human vision.

The tallest elements that are likely to be visible over the longest distance include mine dumps, including a dump on the northern side of the Gamsberg where spoil is effectively dumped from the top of the landform. This currently forms an obvious addition to the landform as the dump is terraced and is viewed largely in profile from the N14. Currently mining of the Gamsberg is focused on the northern edge and within the centre of the landform. There is no sign of it extending to the southern side of the escarpment facing towards the proposed site. This section of the landform still appears relatively natural.

From the east, the most obvious mine dump is located to the north of the N14 and approximately 12.5km to the west of the proposed site. This dump is approximately 20m high meaning that in a flat landscape, it could be visible for up to approximately 16km.

The influence of urban development and mining is therefore limited to the north, west and south by landform and to the east by distance. Outside of these limitations, the

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<sup>5</sup> UK Guidelines

<sup>6</sup> Western Cape Guidelines

landscape is generally experienced as relatively natural although, occasional homesteads, roads and power line corridors are obvious.

Landscape Character Areas therefore include:

- The **Developed Landscape Character Area** around Aggeneys that is defined by surrounding inselbergs and by distance; and
- The **Rural Landscape Character Area** that surrounds the developed area.

**Rural Landscape Character Area:** This LCA is largely protected from the influence of major development around Aggeneys by landform.

Throughout this LCA, VAC of the landscape is only likely to be provided by landform which includes minor ridgelines and isolated inselbergs. The inselbergs are often located close to and across the line of the N14. This creates the feeling for the traveller along the road of passing through a series of discrete landscape areas with each one being enclosed by the tall rocky landforms.

Within the discrete landscape areas indicated above, any structure that extends above the grass / herbaceous vegetation is likely to be obvious. The higher and bulkier a structure is, the more obvious it is likely to be in the landscape. Bright colours are also likely to exacerbate visibility within a landscape that for much of the year is mono-tonal.

**Developed Landscape Character Area:** This LCA is largely enclosed by landform consisting of the Gamsberg and the inselbergs to the north, west and south of Aggeneys.

Whilst it is possible that minor undulations in topography could provide a degree of screening, due to the relatively flat topography between inselbergs, only the lowest development is likely to be afforded any degree of screening.

However, views of new development within the LCA are likely to be limited by the same landform features that largely define its extent. The exception to this is likely to include any development that occurs towards the eastern extremity of the LCA. Development in this area is likely to extend the influence of development into the Rural LCA.

The LCAs are indicated on **Map 6, Landscape Character Areas**.

As indicated in 2.1, in the near future, the implementation of a large group of renewable energy projects is likely to influence this landscape pattern; these projects are likely to create a cohesive character area that is largely driven by development.





**Plate 4, Relatively natural landscape in the vicinity of the proposed Aggeneys 2 solar project at the eastern end of Power Line Corridor 2.** Note the unsurfaced road that links the proposed projects to the N14. The proposed PV project is located to the left of the road, and Power Line Corridor Alternative 2 follows the left hand side of the road to the N14. Collector Substation Alternative 2 will also be located on the left hand side of the road.

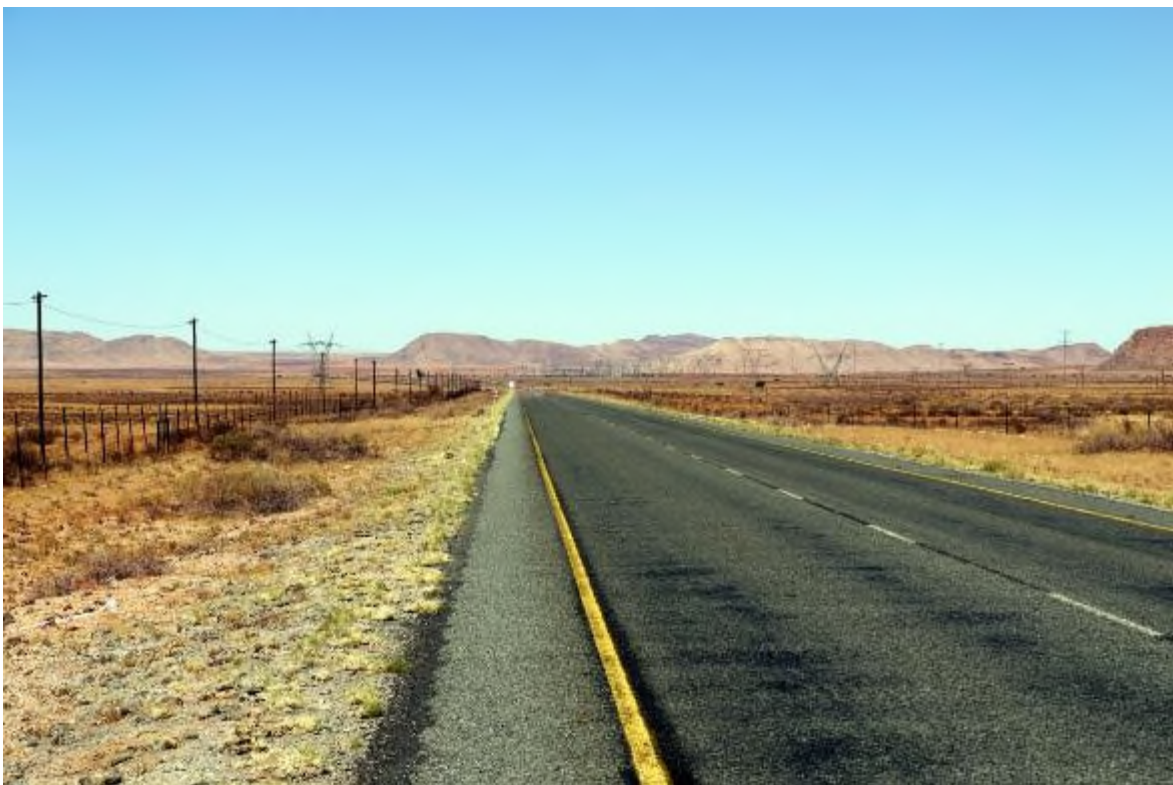


**Plate 5, Small industrial operations are obvious in the landscape from the N14 to the east of Aggeneys.** This creates the feeling for the traveller along the road of passing through a series of discrete landscape areas with each one being

enclosed by the tall rocky landforms.



**Plate 6, Mine dump on the north west facing slope of the Gamsberg.**



**Plate 7, Aggeneis to Aries 400kV power line crossing the N14 to the south of Aggeneis.** The view is looking towards the Aggeneis MTS from close to the point where Power Line Corridor Alternative 2 joins the N14. Power Line Corridor Alternative 2 extends along the N14 both sides of this road.



**Plate 8, Aggeneis to Aries 400kV power line approaching the N14 from the direction of the proposed solar PV project.** Power Line Corridor Alternative 1 is centred on this existing power line.

## **3.2 LANDSCAPE QUALITY AND IMPORTANCE**

### **3.2.1 General.**

There are currently no statutory protected areas in the study area, however, the Anglo Base Metals Black Mountain mine has a conservation agreement covering the approximately 23 000 ha of mine holdings around Aggeneys. This is a significant area for biodiversity and a very important private conservation initiative. This area is indicated on **Map 5** labelled as "MINING LICENSE AREAS".

The entire study area is located within the Riemvasmaak Community Conservancy (RCC). This conservancy is 74 000 ha in extent and is overseen by local Nama and Xhosa tribes. The RCC is reported to have been one of post-Apartheid South Africa's first land restitution project. It belongs to the local Nama and Xhosa descendants of the people who were resettled from the Area in 1974.

The area is therefore highly important to local communities and for this reason it is critical to ensure that future potential use of the land for agriculture and tourism is not compromised by development.

The area is also a corridor for tourism related traffic using the N14 for access from the south west into the Kalahari region.

### **3.2.2 Rural Landscape Character Area (LCA).**

This LCA is primarily important as a productive agricultural area.

The low intensity grazing regimes that appear to be adopted has also resulted in a relatively natural outlook that is typical of the area. The low density of development

combines with relatively pristine vegetation to provide an outlook that is perhaps close to wilderness. The only elements that currently detract from this natural appearance are the occasional farmsteads, wind pumps, roads, overhead power lines and substations. As the viewer moves away from existing infrastructure, the natural character of the area becomes stronger. This natural outlook no doubt helps to contribute to the general attraction of the area for local and regional tourism.

The inselbergs provide structure and focal points within the landscape. When travelling through the landscape, they compartmentalise the valley floor, foreshortening views and screening adjacent areas.

It is the contrast between what appears to be a planar natural valley floor and dramatic steep land forms as well as this compartmentalisation provided by the inselbergs that maintains the interest of the viewer in the dramatic and ever changing scene.

### **3.2.3 Developed Landscape Character Area.**

This LCA is primarily important as a productive mining area as well as a settlement area which largely accommodates people that are working at the mine.

Whilst mining development is highly obvious within the LCA from public areas and particularly from the N14, the various elements area seen within the context of natural vegetation and against the backdrop that is provided by the inselberg. This is important as it provides visual continuity with the surrounding rural area.

### **3.2.4 Future Landscape Change.**

The properties on which renewable energy projects are currently proposed have been overlaid onto **map 6** which indicates the likely visual influence of the proposed grid connection infrastructure together with the properties on which other grid infrastructure development projects are proposed. This indicates that the grid connection infrastructure is likely to significantly influence the landscape character change around Aggeneys. This change is likely to affect both the Developed and Rural LCAs.

It is noted in 3.1.4 that the northern side of the Gamsberg escarpment has been heavily modified by the mining activities taking place in this area, as they have an influence on the landscape character of the town and the N14 corridor.

However, the southern side of the escarpment that faces on to the proposed site remains relatively natural. From reference to the Environmental Management Programme for the mine<sup>7</sup> it is obvious that the southern edge of the escarpment will remain largely undisturbed. However, the Waste Rock Dump will wrap around the western extremity of the landform and will modify the western end of the southern escarpment face. Refer to **Appendix IV**.

## **3.3 VISUAL RECEPTORS**

### **3.3.1 Definition**

Visual Receptors are defined as "individuals and / or defined groups of people who have the potential to be affected by the proposal"<sup>8</sup>.

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<sup>7</sup> ERM

<sup>8</sup> UK Guidelines

It is also 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.

### **3.3.2 Possible visual receptors and sensitivities**

This section is intended to highlight possible visual receptors within the landscape which due to use could be sensitive to landscape change. They include;

#### **Area Receptors**

Within the vicinity of the proposed project, the only potential area receptor is the urban area of Aggeneys. Areas associated with this use are likely to be the most sensitive to possible changes in outlook associated with the proposed development. However, due to the already highly industrialised landscape around the settlement, it is unlikely that residents would object unless the proposed project is likely to significantly increase existing impacts.

#### **Linear Receptors**

Linear receptors include:

- The N14 that at its closest runs approximately 6.8 km to the north west of the proposed PV 2 project area. Because this route carries a high proportion of recreational and tourism related traffic it is considered sensitive to potential change in outlook.
- An un-surfaced local road runs adjacent to the northern boundary of the proposed site. This road joins the N14 approximately 6km to the north west of the Aggeneys 2 project site and the Collector Substation Alternative 2. Whilst it is un-surfaced, it serves as the only east – west route in the region, linking a number of regional routes all of which run in a general north – south direction. This road runs for more than 200 km and along this distance there appear to be few settlements or farmsteads that are served by it. It is likely that it is used mainly by local people and mining operators. However it is also likely to be used by more adventure minded tourists.

#### **Point Receptors**

Four homesteads have been identified within the Approximate Limit of Visibility of the proposed project. These are likely to be used by local stock farmers who probably will be more concerned with the productivity of the land rather than the outlook. Should any of these homesteads be used for tourism related activities, this will increase sensitivity to landscape change.

The closest homestead is approximately 1.8km from the proposed Aggeneys 2 project site and 4.2km from both Collector Substation alternatives.

Visual receptors were ground truthed during the site visit. The main receptors that have been identified are indicated on **map 6 (Landscape Character Areas)**.

## LANDSCAPE CHARACTER AREAS



### **Plate 9, Rural LCA**

This LCA appears relatively natural with indigenous grass covering the relatively flat topography backed by steep inselbergs and few man-made elements visible. The area is largely used for low intensity livestock grazing.



### **Plate 10, Developed LCA**

This LCA is largely enclosed by the inselbergs to the north, west and east of Aggeneys. Mining, electrical infrastructure and settlement are all obvious within the context of natural vegetation.

## SENSITIVE RECEIVERS



**Plate 11, The urban edge of Aggeneys.** The density of vegetation and development means that views are largely inward looking.



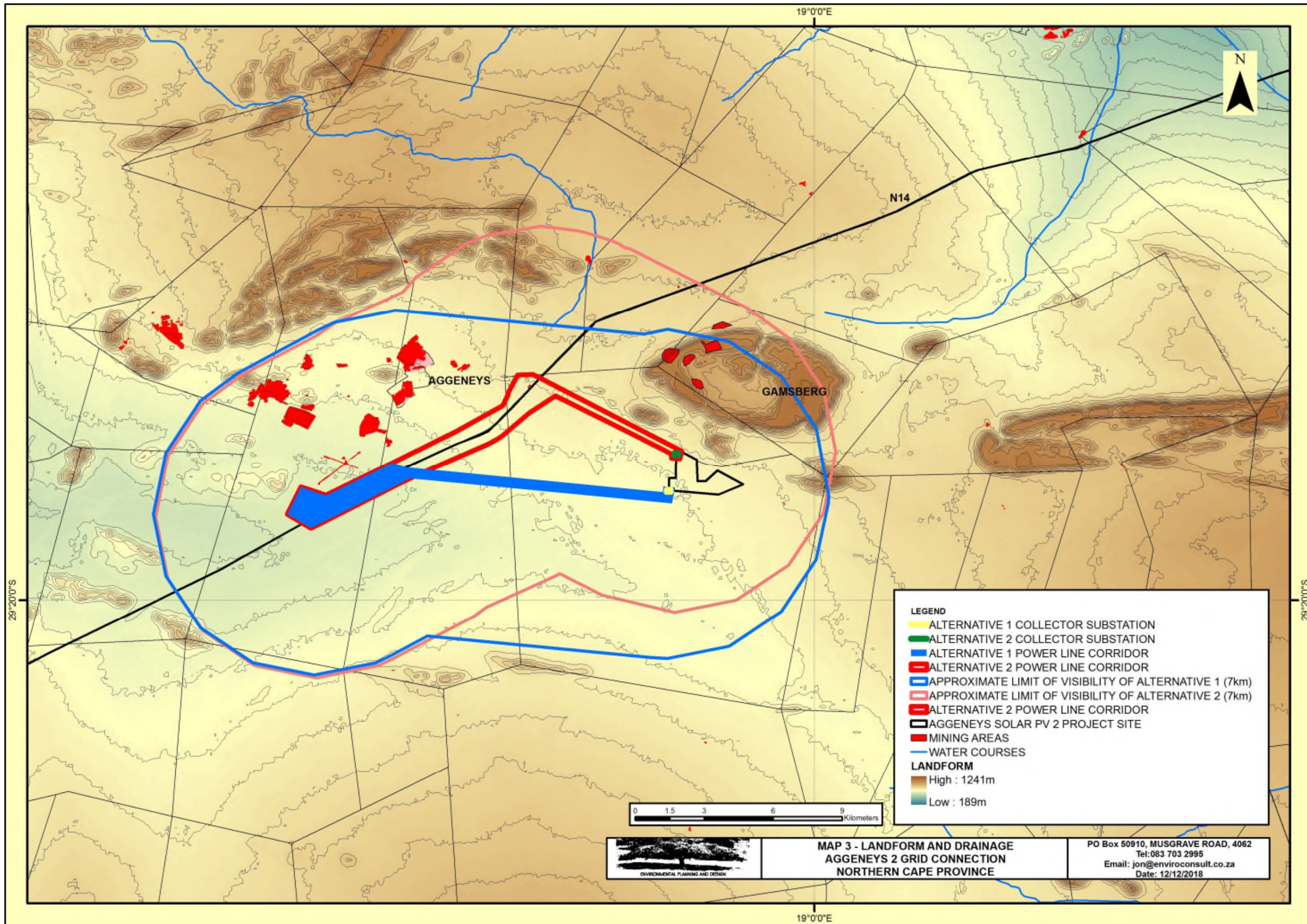
**Plate 12, Isolated Homesteads.** These are largely related to the agricultural use of the land.



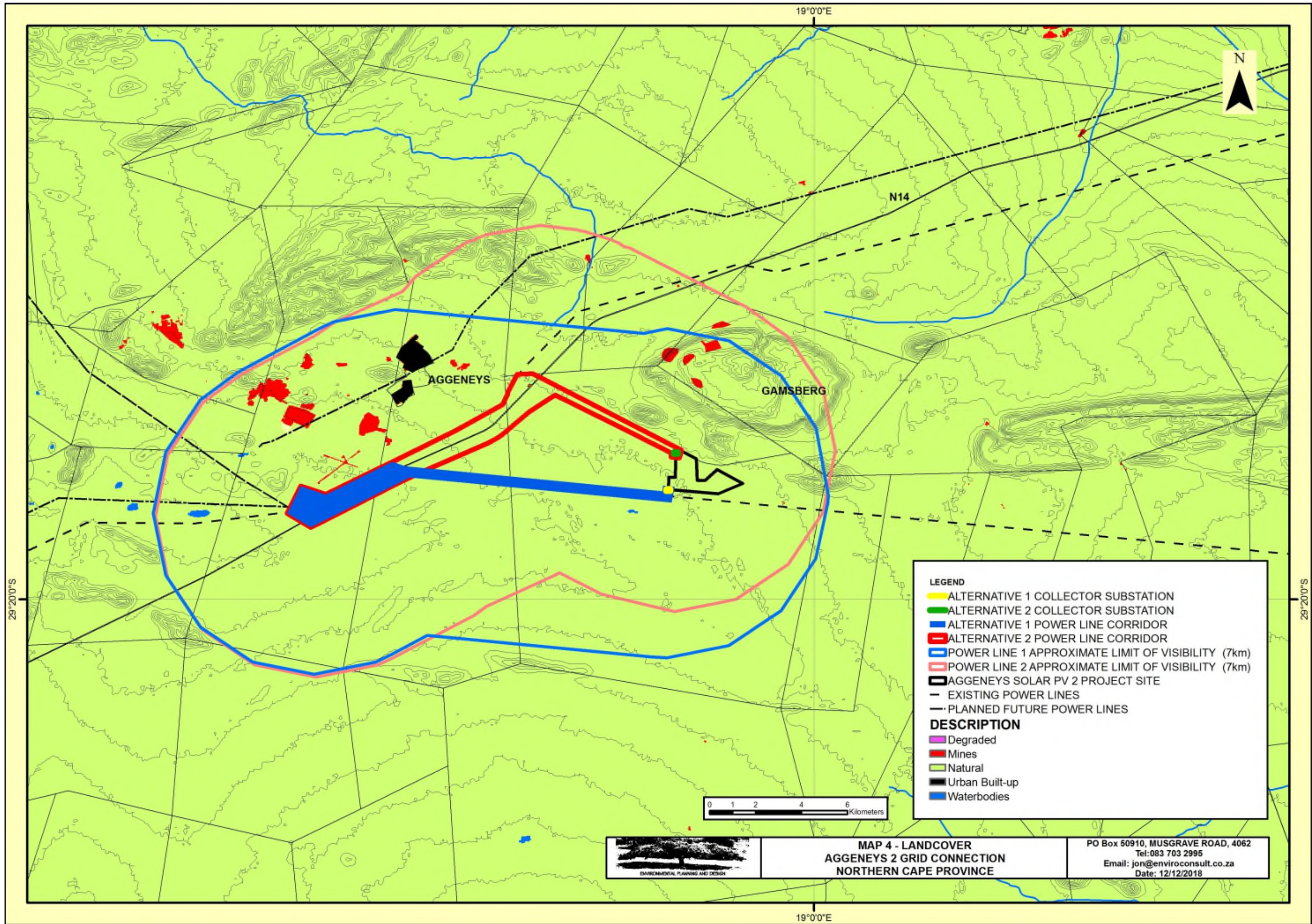
**Plate 13, The N14.** This is a major regional route that runs to the west of the proposed project area. It is an important regional tourism route

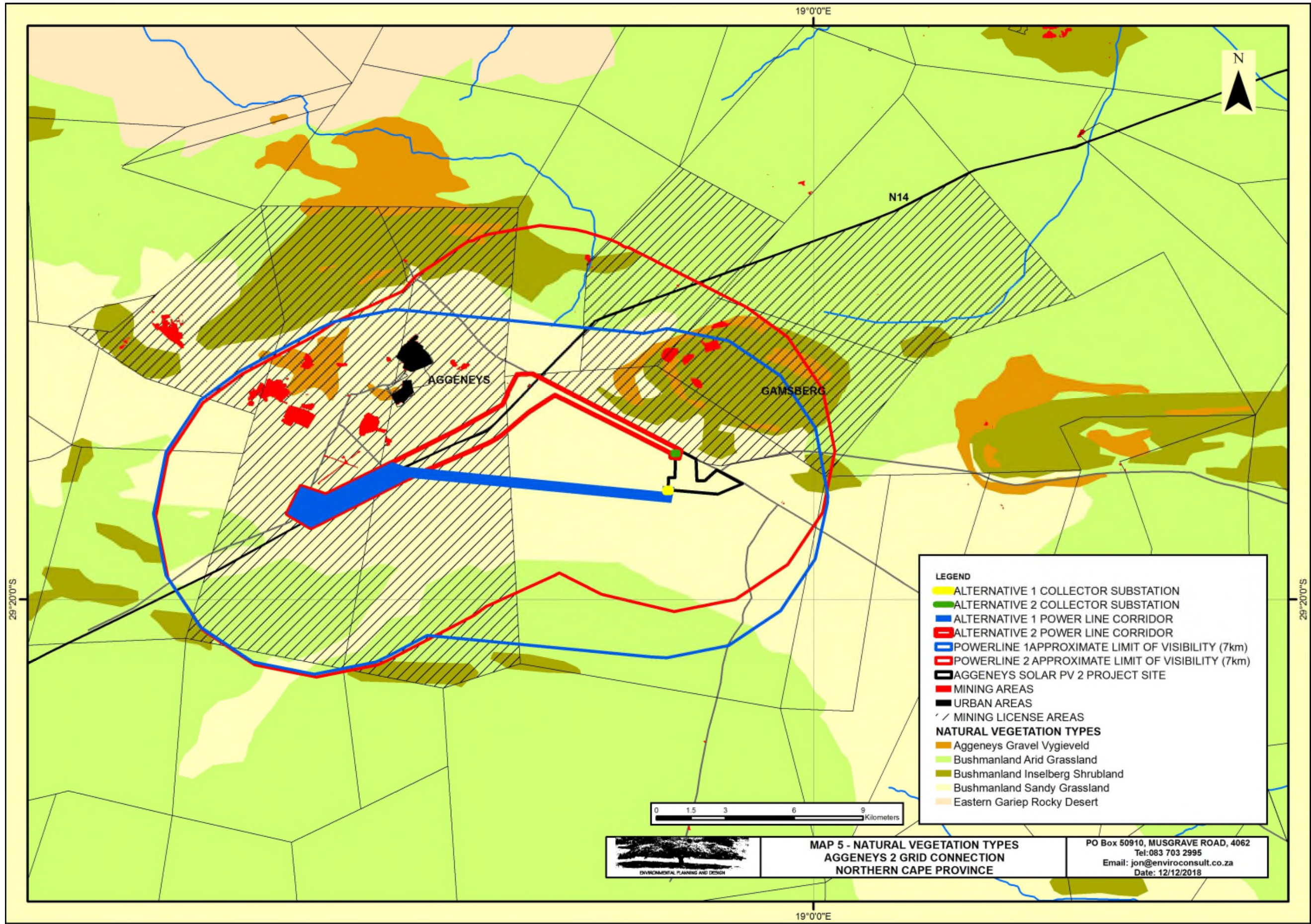


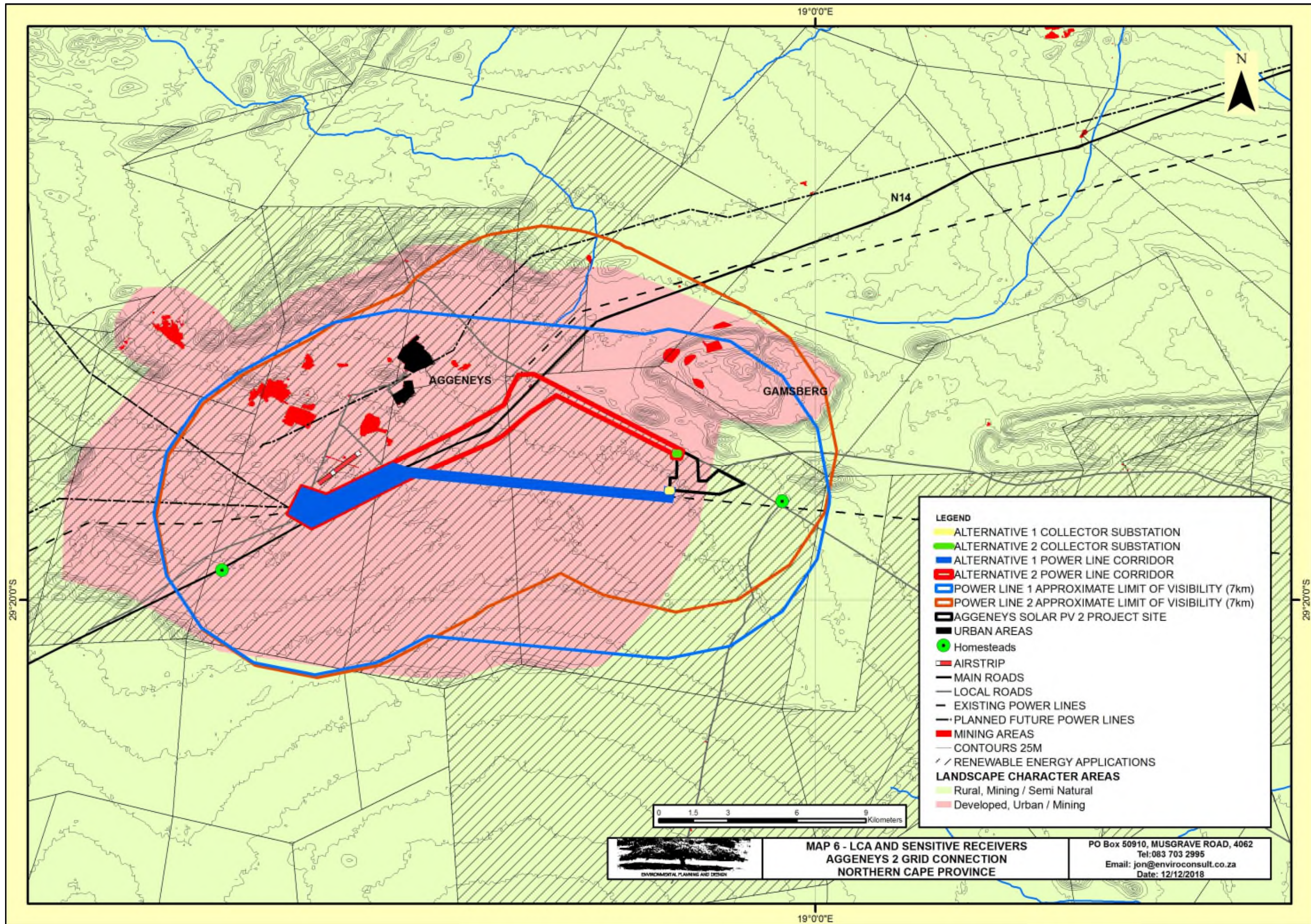
**Plate 14, Local un-surfaced road.** Whilst it is classified as a local road, it is a long distance cross country route. It is likely to largely be used by local people.











## **4 THE NATURE OF POTENTIAL VISUAL IMPACTS**

### **4.1 GENERAL**

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

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

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

Landscape and visual assessment can be a subjective choice. 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 totally 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 GIS based assessment of Zones of Theoretical Visibility does not take the curvature of the earth or reduction in scale due to distance into account. In order to provide an indication of the likely limit of visibility due to this effect, a universally accepted navigational calculation (**Appendix 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 substation, will both be visible over the following distances.

The proposed development will consist of a single circuit overhead power line with a transmitting capacity of up to 220kV. The height of a 220kV power line is approximately 32m with a span between towers of up to 350m.

### Approximate Limit of Visibility (ALV)

ELEMENT	APPROXIMATE LIMIT OF VISIBILITY
220kV Power line, up to 40m high	22.6 kilometres

Because the taller and slender elements within the proposed Collector Substation, such as separate lightning conductor poles and bus bars being comprised of lattice structures, will be slightly lower than the proposed power line, the ALV of the substation will fall within the ALV of the proposed power line. 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 (5m) and more solid elements within the proposed Collector Substation such as electrical infrastructure, minor buildings and outdoor transformers may have an ALV of up to 8km which also falls within the ALV of 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 and the proposed power line, 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 substation.

In reality these 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 400kV power lines. These are similar in scale to the proposed 220kV overhead transmission line. The images indicate the types of impact that might be expected from these structures. From these photographs the following conclusions can be drawn:

From this review it is obvious that whilst the theoretical distance that a 220kV power line may be visible from is 22.6km, in reality they aren't likely to be obvious to the human eye past 7km.

It is possible that either lattice or mono pole 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 have been drawn from these observations:

- a) The power lines are obvious in the landscape at a distance of up to 4km.
- b) At distances between 4km and 7km the power lines may be visible but are unlikely to be highly obvious.
- c) At distances greater than 7km, the lines are not obvious.

The more solid elements of the proposed collector substation that may be visible for up to 8km are likely to marginally extend these limits in their vicinity.



**Plate 15 - Existing 400kV double overhead transmission lines, obvious in the landscape at a distance of 1km to approximately 3-4km.**



**Plate 16 - Existing 400kV overhead transmission lines. Towers are obvious in the mid distance (approximately 2-3km) but are not highly conspicuous at a distance (approximately 4-6km).**

## **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”.

ZTVs 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 GIS based assessment of Zones of Theoretical Visibility does not take the curvature of the earth or reduction in scale due to distance into account. In order to provide an indication of the likely limit of visibility due to this effect a universally accepted navigational calculation (**Appendix IV**) has been used to calculate the likely distance that the proposed structures might be visible over. This indicates that in a flat landscape a structure 40m high could be visible at a distance of approximately

22.6km. However due to the slender nature of the structural elements, at this distance, limitations of the human eye will not be able to distinguish elements of the project from other landscape features.

As indicated in Section 4, from observations of similar overhead power lines, the proposed up to 220kV powerline and collector substation is unlikely to be obvious at a distance greater than 4km and is unlikely to be visible at a distance greater than 7km.

The assessment therefore focuses on an area within 7.0km of the 220kV power line and collector substation alternatives.

### **5.3 APPROACH TO THE ASSESSMENT**

The detailed location of the alternative corridors has been provided by the developer (**Map 1**).

#### **5.3.1 220kV Power Line Corridors and Collector Substations Alternatives 1 and 2**

In order to generate the ZTV, it has been assumed that support towers will be spaced 350m apart and will be up to 40m high.

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

### **5.4 VISIBILITY OF THE PROPOSED ALTERNATIVES**

#### **5.4.1 General**

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

- a) Both alternatives will impact almost the entire area over which they are likely to be obvious (4km) as well as the entire area over which is likely to be visible (7km)
- b) Both alternatives will largely affect the Developed LCA.

#### **5.4.2 Alternative Power Line Corridors and Collector Substations**

- a) Alternative 2 is likely to be obvious from a longer section of the N14 than Alternative 1. Alternatives 1 and 2 will impact on 16km and 18km of the N14 respectively. It will only be the power line section of each alternative that will create this level of impact;
- b) It is likely that both Alternative 1 and Alternative 2 could be visible from the southern edges of Aggeneys town. However, impacts associated with Alternative 1 are likely to be significantly smaller than those associated with Alternative 2 as a greater portion of the town falls within the approximate limit of visibility of Alternative 2. It will only be the power line section of each alternative that will create this level of impact. It will only be the power line section of each alternative that will create this level of impact;
- c) Both Alternative corridors run adjacent to existing power line corridors. Where this happens, proposed power lines are likely to largely impact areas from which power lines are already visible. However Alternative 1 runs beside an existing power line servitude for its entire length whereas Alternative 2 runs along-side existing power lines for a little over half its length. This means that Alternative 2 is more likely to impact on areas from which current views of power lines are either not possible or from which only distance views are possible.



- d) Power Line Alternative 2 will run directly alongside the un-surfaced road. This section of the road is only impacted by distance views of power lines which from most areas are not obvious. Alternative Power Line Corridor 1 will also only be viewed in the distance against these existing lines. Alternative 2 therefore will have a greater impact on this road than Alternative 1. The Collector Substation will contribute to the impact of the power line for the distance over which it is likely to be obvious (4km).
- i. The Collector Substation Alternative 1 will be approximately 1.7km to the south of the un-surfaced road. It will be viewed across the proposed solar PV array and is therefore unlikely to be highly obvious from the un-surfaced road.
  - ii. The Collector Substation Alternative 2 will be located less than 150m to the south of the un-surfaced road. It will therefore be highly obvious from the un-surfaced road

## **5.5 CUMULATIVE IMPACTS**

Power Line Corridor Alternative 1 follows existing power line servitudes. This alternative will therefore not extend the area that is currently impacted by electrical infrastructure. However, it is likely to intensify existing visual impacts associated with the existing power lines.

Power Line Corridor Alternative 2 deviates from existing power line servitudes for a section of its length and then follows existing servitudes. This alternative is therefore likely to extend the area that is currently affected by views of electrical infrastructure. It will also intensify existing visual impacts of the power lines that it follows.

The Collector Substation Alternatives are likely to add to the visual impacts of the PV projects adjacent to which they are located.

## **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**

Key viewpoints have been selected to investigate and illustrate the likely visual impact for receptors.



**Plate 17, VP1 – View looking to the northwest along the un-surfaced road to the north of the PV project.** The viewpoint is immediately adjacent to the proposed Aggeneys 2 PV project which will be located to left of the road. Power line Corridor Alternative 2 will run immediately adjacent to the left side of the road. The area to the north east is currently not impacted by views of power lines.



**Plate 18, VP 2 – View looking to the west along the existing 400kV Aggeneys Aries power line that runs along the southern edge of the proposed Aggeneys 2 PV projects.** Power Line Corridor Alternative 1 is centred on this existing power

line. The proposed Aggeneys 2 PV project will be located to the right of the picture.



**Plate 19, VP 3 – View looking to the south east along the un-surfaced road that runs to the north of the proposed Aggeneys 2 PV project.** This viewpoint is close to the junction with the N14. Power Line Corridor Alternative 2 is located immediately adjacent to the right hand side of the road as pictured. It should be noted that no other power lines are obvious in this view, although the 400kV Aggeneis-Aries power line runs approximately 4.5km to the south of the road at this point.



**Plate 20, VP 4 – View looking to the south west along the N14 from close to the junction with the un-surfaced road that runs to the north of the proposed Aggeneys 1 PV project and approximately 8.5km north east of the Aggeneys MTS.** It should be noted that there are power lines obvious beside this section of the N14, however they are not as obvious as they are close to the town of Aggeneys where lines seem to converge as they approach the Aggeneys MTS. Power Line Corridor Alternative 2 is centred on this section of the road.



**Plate 21, VP 5 – View looking to the south west along the N14 from approximately half way between the junction with the un-surfaced road and the Aggeneys MTS.** At this point existing overhead power lines are visible but are not highly obvious. The existing 400kV Aggeneys - Aries power line is just visible crossing the N14 just past the curve in the road. Power Line Corridor Alternative 2 will be centred on this section of the road. Power Line Corridor Alternative 1 joins Alternative 2 at the location where the 400kV Aggeneys - Aries power line crosses the road.



**Plate 22, VP 6 – View looking to the south west along the N14 from close to Aggeneys.**

At this position major existing electrical infrastructure is obvious on both sides of the road. Both Power Line Alternative Corridors will be centred on the N14 at this location.

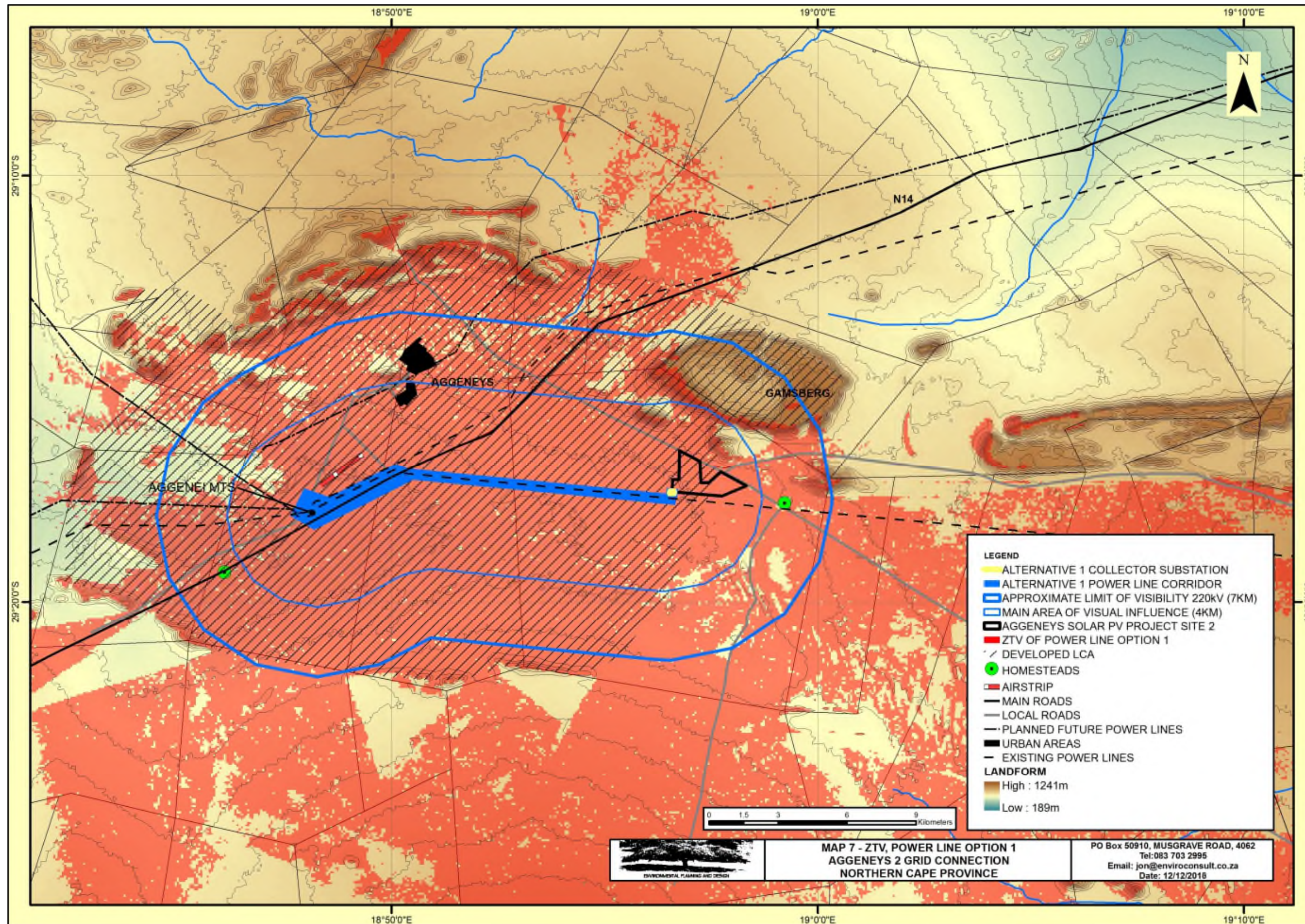


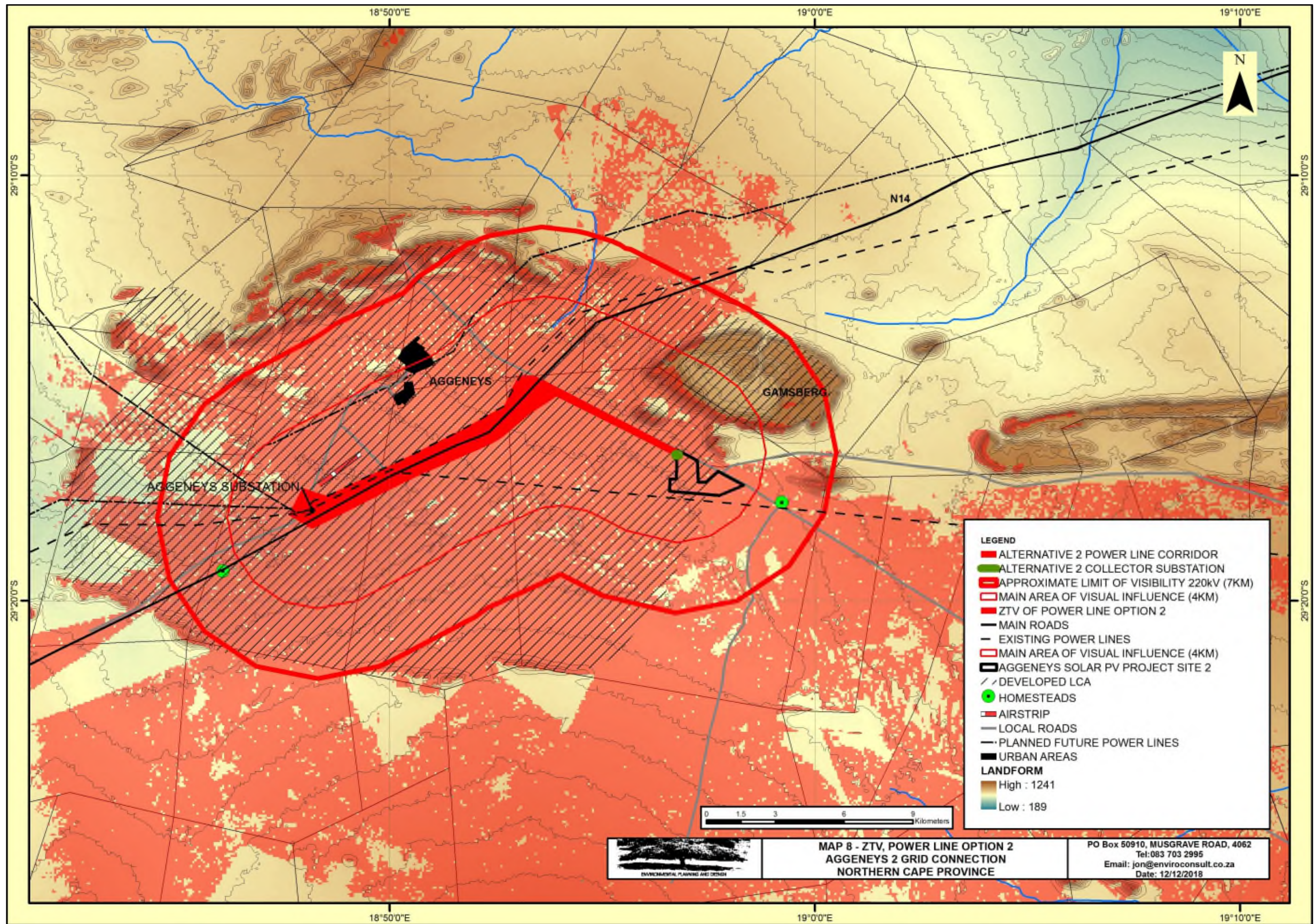
**Plate 23, VP 7 – View looking to the north towards Aggeneys from the N14.**

At this position major existing electrical infrastructure is obvious on both sides of the road. Both Power Line Alternative Corridors will be centred on the N14 at this location. Existing overhead power lines are obvious close to the urban edge.



**Plate 24, VP 8 – View looking to the south west along the N14 from close to the access road to Aggeneys town.** At this position major existing electrical infrastructure is obvious on both sides of the road. Both Power Line Alternative Corridors will be centred on the N14 at this location.







# VISUAL IMPACT ASSESSMENT

## 6.1 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).

## 6.2 ASSESSMENT

The following assessment focuses first on general landscape change that will occur due to the proposed development which provides context for the assessment of impacts on identified sensitive receptors. Key receptors that are considered include;

- General landscape change;
- Travellers on the N14;
- Travellers on the un-surfaced road immediately to the north of the Aggeneys PV project;
- Homesteads; and
- residents of Aggeneys.

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

### 6.2.1 Impact of the Proposed Development on General Landscape Character

#### Nature of impact:

Both proposed power line corridor alternatives will largely affect the Developed LCA.

Within the Developed LCA however there are areas where electrical infrastructure is more obvious than in others. The section of the un-surfaced road between the proposed Aggeneys 2 PV project and the N14 is a case in point, as electrical infrastructure is visible from this road but it is not obvious.

Electrical infrastructure is obvious from the section of the N14 between its junction with the un-surfaced road and the location that the existing 400kV Aggeneis – Aries power line joins the N14 but the scale is relatively small as larger power lines are some distance from the road.

Between the point that the existing Aggeneis – Aries power line joins the N14 and the Aggeneis MTS, larger infrastructure gradually converges and becomes far more obvious from the road.

Power Line Corridor Alternative 2 and the associated Collector Substation Alternative 2 affect a larger area in general. They also affect a section of the landscape that is currently relatively unaffected by power line and electrical

infrastructure development. This corridor is therefore likely to have a more significant impact than Power Line Corridor Alternative 1 and the associated Collector Substation Alternative 1.

Due to the nature of the infrastructure and the fact that the majority of the affected area is also currently impacted by existing development and future planned electrical infrastructure, the magnitude of the impact of both alternatives is assessed as minor to low, resulting in impacts associated with both alternatives of low significance. This rating of low significance is regardless of the technology alternative or route alternative selected.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, (2)	<b>Both Alternatives</b> Immediate surroundings, (2)
<b>Duration</b>	<b>Both Alternatives</b> Long term, (4)	<b>Both Alternatives</b> Long term, (4)
<b>Magnitude</b>	<b>Alternative 1</b> Minor (2)  <b>Alternative 2</b> Minor to low (3)	<b>Alternative 1</b> Minor (2)  <b>Alternative 2</b> Minor to low (3)
<b>Probability</b>	<b>Both Alternatives</b> Probable, (3)	<b>Both Alternatives</b> Probable, (3)
<b>Significance</b>	<b>Alternative 1</b> Low (24)  <b>Alternative 2</b> Low (27)	<b>Alternative 1</b> Low (24)  <b>Alternative 2</b> Low (27)
<b>Status</b>	The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and particularly electrical infrastructure is not as obvious. Within these areas the impact is more likely to be seen as negative.  In areas where electrical infrastructure is more pronounced particularly closer to the Aggeneis MTS the impact is less likely to be seen in a negative light.  <b>Neutral - negative</b>	<b>Neutral - negative</b>
<b>Reversibility</b>	High	High
<b>Irreplaceable loss</b>	<b>No irreplaceable loss</b>	<b>No irreplaceable loss</b>
<b>Can impacts be mitigated?</b>	Yes to a small degree but it will not significantly affect the level of impact.	

**Mitigation / Management:**

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude to reduce the extent of a scarring effect in the landscape.
- » Ensure that vegetation is not unnecessarily removed during the construction period to ensure erosion control and to reduce the extent of a scarring effect in the landscape.
- » 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 to reduce the viewer incidence.

**Residual Risks:**

Lack of rehabilitation on decommissioning could result in degraded areas.

**6.2.2 Impact of the Proposed Development on Identified Sensitive Receptors**

Potential visual impacts on sensitive receptors that have been identified through the site visit include;

- a) The visibility of the facility to and visual impact on the N14.
- b) The visibility of the facility to and visual impact on the un-surfaced road immediately to the north of the proposed Aggeneys 2 PV project.
- a) The visibility of the facility to and visual impact on Local homesteads.
- b) The visibility of the facility to and visual impact on urban residential areas.

**a) The impact of the proposed power line on views from the N14.****Nature of impact:**

The section of the N14 that will be affected by both alternatives runs through the Developed LCA.

Due to distance, the alternative power line corridors will have the most significant influence on views from this receptor. The proposed Collector Substation alternatives 1 and 2 being approximately 6.8km and 6.0km from the road, respectively, will have negligible influence.

Within the Developed LCA there are areas where electrical infrastructure is more obvious than others.

Electrical infrastructure is obvious from the section of the N14 between its junction with the un-surfaced road and the location where the existing Aggeneis – Aries power line joins the N14 but the scale is relatively small as larger power lines are some distance from the road.

Between the point that where the existing Aggeneis – Aries power line joins the N14 and the Aggeneis MTS, larger infrastructure gradually converges on the MTS and becomes closer to and more obvious from the road.

Power Line Corridor Alternative 2 affects a larger section of the N14. It also affects a section of the landscape that is relatively unaffected by power line development to the north of the location where the existing Aggeneis – Aries power line joins the N14. This corridor is therefore likely to have a larger impact than Power Line

Corridor Alternative 1.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, (2)	<b>Both Alternatives</b> Immediate surroundings, (2)
<b>Duration</b>	<b>Both Alternatives</b> Long term, (4)	<b>Both Alternatives</b> Long term, (4)
<b>Magnitude</b>	<b>Alternative 1</b> Minor (2)  <b>Alternative 2</b> Low (4)	<b>Alternative 1</b> Minor (2)  <b>Alternative 2</b> Low (4)
<b>Probability</b>	<b>Both Alternatives</b> Probable, (3)	<b>Both Alternatives</b> Probable, (3)
<b>Significance</b>	<b>Alternative 1</b> Low (24)  <b>Alternative 2</b> Medium (30)	<b>Alternative 1</b> Low (24)  <b>Alternative 2</b> Medium (30)
<b>Status</b>	The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and particularly electrical infrastructure is not as obvious. Within these areas the impact is more likely to be seen as negative.  In areas where electrical infrastructure is more pronounced particularly closer to the Aggeneis MTS the impact is less likely to be seen in a negative light.  <b>Neutral - negative</b>	<b>Neutral - negative</b>
<b>Reversibility</b>	High	High
<b>Irreplaceable loss</b>	<b>No irreplaceable loss</b>	<b>No irreplaceable loss</b>
<b>Can impacts be mitigated?</b>	Yes to a small degree but it will not significantly affect the level of impact.	
<b>Mitigation / Management:</b>		
<ul style="list-style-type: none"> <li>» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction period.</li> <li>» 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.</li> <li>» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.</li> </ul>		

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

**Residual Risks:**

Lack of rehabilitation on decommissioning could result in degraded areas.

**b) The impact of the proposed power line on views from the un-surfaced road to the north of the proposed Aggeneys 2 solar PV project.**

**Nature of impact:**

Both proposed alternatives will largely affect the Developed LCA.

Within the Developed LCA however there are areas where electrical infrastructure is more obvious than others. The section of the un-surfaced road between the proposed PV projects and the N14 is a case in point, as electrical infrastructure is visible from this road but it currently is not obvious.

Alternative 2 will directly impact this road and will be highly obvious whereas Alternative 1 is likely to be visible but will not be obvious.

This will mean that with Alternative 2, the power line could run close to the road and the collector substation would be developed in close proximity to the road. Both are therefore likely to be highly obvious from approximately 10km of this road.

By comparison, Alternative 1 will be seen at a minimum distance of approximately 1.7km from the road. The Collector Substation Alternative 1 will also be seen at a similar minimum distance to the proposed power line and will be partly screened by the Aggeneys 2 solar PV facility. The solar facility being significantly closer to the road is likely to be the most obvious element to travellers on the road.

The nature of this road being relatively minor road with relatively low vehicle volumes being comprised largely of local and mining traffic has been taken into account in this assessment.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, <b>(2)</b>	<b>Both Alternatives</b> Immediate surroundings, <b>(2)</b>
<b>Duration</b>	<b>Both Alternatives</b> Long term, <b>(4)</b>	<b>Both Alternatives</b> Long term, <b>(4)</b>
<b>Magnitude</b>	<b>Alternative 1</b> Small to minor <b>(1)</b>  <b>Alternative 2</b> Minor to low <b>(3)</b>	<b>Alternative 1</b> Small to minor <b>(1)</b>  <b>Alternative 2</b> Minor to low <b>(3)</b>
<b>Probability</b>	<b>Alternative 1</b> Improbable <b>(2)</b>  <b>Alternative 2</b> Highly probable <b>(4)</b>	<b>Alternative 1</b> Improbable <b>(2)</b>  <b>Alternative 2</b> Highly probable <b>(4)</b>
<b>Significance</b>	<b>Alternative 1</b> Low <b>(14)</b>	<b>Alternative 1</b> Low <b>(14)</b>

	<b>Alternative 2 Medium (36)</b>	<b>Alternative 2 Medium (36)</b>
<b>Status</b>	<p>The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and particularly electrical infrastructure is not as obvious.</p> <p>The affected area is one of the areas within the study area that is least affected by development in general and particularly by electrical infrastructure.</p> <p><b>Alternative 1</b> is unlikely to be obvious from this road and so the impact is likely to have a <b>neutral</b> consequence.</p> <p><b>Alternative 2</b> is unlikely to be highly obvious from this road and so the impact is likely to have a <b>negative</b> consequence.</p> <p><b>Neutral - negative</b></p>	<p><b>Alternative 1</b> neutral</p> <p><b>Alternative 2</b> negative</p>
<b>Reversibility</b>	High	High
<b>Irreplaceable loss</b>	<b>No irreplaceable loss</b>	<b>No irreplaceable loss</b>
<b>Can impacts be mitigated?</b>	Yes to a small degree but it will not significantly affect the level of impact.	
<b>Mitigation / Management:</b>		
<ul style="list-style-type: none"> <li>» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction period.</li> <li>» 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.</li> <li>» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.</li> <li>» Align the power line as far from roads as possible within the identified corridor.</li> </ul>		
<b>Residual Risks:</b>		
Lack of rehabilitation on decommissioning could result in degraded areas.		

**c) The impact of the proposed power line on views from the local homesteads.**

**Nature of impact:**

There is only one homestead that could potentially be affected that is approximately 4.2km to the east of the eastern end of both alternative power line corridors and

alternative collector substations.

From this distance the power lines and collector substations associated with both alternatives are likely to be highly obvious.

Both Alternatives will be viewed in the context of the Aggeneys 2 solar PV facility as well as the existing Aggeneys – Aries power line that is located within approximately 200m of the homestead and is highly obvious from the homestead.

The homestead doesn't appear to be inhabited however, stock pens surrounding the building appear to be well used. It is likely therefore that the owners may be more concerned with agricultural production than aesthetics.

Taking into account the nature of the homestead and the nature of existing views, both alternatives will add to existing visual influence of infrastructure, however this additional impact is likely to be relatively small compared with existing and it is highly unlikely to impact current uses.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, (2)	<b>Both Alternatives</b> Immediate surroundings, (2)
<b>Duration</b>	<b>Both Alternatives</b> Long term, (4)	<b>Both Alternatives</b> Long term, (4)
<b>Magnitude</b>	<b>Alternative 1</b> Minor (2)  <b>Power Line Corridor 2</b> Minor (2)	<b>Alternative</b> Minor (2)  <b>Power Line Corridor 2</b> Minor (2)
<b>Probability</b>	<b>All Power Line Alternatives</b> Improbable, (2)	<b>All Power Line Alternatives</b> Improbable, (2)
<b>Significance</b>	<b>Alternative 1</b> Low (16)  <b>Alternative 2</b> Low (16)	<b>Alternative 1</b> Low (16)  <b>Alternative 2</b> Low (16)
<b>Status</b>	Due to distance, the relatively low level of impact and the likelihood that the homestead is uninhabited it is unlikely that the impact will be seen in a negative light. <b>Neutral</b>	<b>Neutral</b>
<b>Reversibility</b>	High	High
<b>Irreplaceable loss</b>	<b>No irreplaceable loss</b>	<b>No irreplaceable loss</b>
<b>Can impacts be mitigated?</b>	Yes to a small degree but it will not significantly affect the level of impact.	
<b>Mitigation / Management:</b>		
<ul style="list-style-type: none"> <li>» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction period.</li> </ul>		



- » 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.

**Residual Risks:**

Lack of rehabilitation on decommissioning could result in degraded areas.

**d) The impact of the proposed power line on views from the settlement of Aggeneys**

**Nature of impact:**

Due to the density of development and vegetation within the settlement, the power line is only likely to be visible from the southern edge of Aggeneys.

At its closest, Power Line Corridor Alternative 1 is located approximately 2.6km from the settlement whereas Power Line Corridor Alternative 2 is located approximately 2.0km from the settlement.

Both collector substation alternatives are located in excess of 10km from the settlement and are highly unlikely to be visible and will not impact.

Power Line Corridor Alternative 2 also has a greater extent of corridor that is likely to be visible as it runs along the N14 from north of the settlement to south of the settlement.

Power Line Corridor Alternative 1 joins the N14 south of the settlement and so is less visually exposed to the settlement.

The landscape between Aggeneys and both power line corridor alternatives is already heavily impacted by electrical infrastructure which means that the view from the urban edge is already highly industrialised. The addition of a new power line will slightly intensify this influence but given the distance this is likely to be a relatively minor addition to an existing impact.

Given that urban edge is more exposed to Power Line Corridor Alternative 2, this alternative is likely to have a marginally greater impact than Alternative 1.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, <b>(2)</b>	<b>Both Alternatives</b> Immediate surroundings, <b>(2)</b>
<b>Duration</b>	<b>Both Alternatives</b> Long term, <b>(4)</b>	<b>Both Alternatives</b> Long term, <b>(4)</b>
<b>Magnitude</b>	<b>Alternative 1</b> Small to minor <b>(1)</b>  <b>Power Line Corridor 2</b> Minor <b>(2)</b>	<b>Alternative 1</b> Small to minor <b>(1)</b>  <b>Power Line Corridor 2</b> Minor <b>(2)</b>
<b>Probability</b>	<b>Both Alternatives</b> Improbable, <b>(2)</b>	<b>Both Alternatives</b> Improbable, <b>(2)</b>

<b>Significance</b>	<b>Alternative 1</b> Low <b>(14)</b>	<b>Alternative 1</b> Low <b>(14)</b>
	<b>Alternative 2</b> Low <b>(16)</b>	<b>Alternative 2</b> Low <b>(16)</b>
<b>Status</b>	Due to the nature of the surrounding landscape which is heavily industrialised and the relatively insular nature of the settlement it is unlikely that the impact will be seen in a negative light. <b>Neutral to negative</b>	<b>Neutral to negative</b>
<b>Reversibility</b>	High	High
<b>Irreplaceable loss</b>	<b>No irreplaceable loss</b>	<b>No irreplaceable loss</b>
<b>Can impacts be mitigated?</b>	Yes to a small degree but it will not significantly affect the level of impact.	
<b>Mitigation / Management:</b>		
<ul style="list-style-type: none"> <li>» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction period.</li> <li>» 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.</li> <li>» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.</li> <li>» Align the power line as far from roads as possible within the identified corridor.</li> </ul>		
<b>Residual Risks:</b>		
Lack of rehabilitation on decommissioning could result in degraded areas.		

### 6.2.3 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 infrastructure development.

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

#### a) **General cumulative landscape change and degradation of natural / urban landscape characteristics.**

Nature:  
The proposed overhead power line and collector substation alternatives will mainly impact the Developed LCA. They will have marginal influence on the more natural Rural LCA however.

Due to the nature of existing industry in the area, existing electrical infrastructure has already heavily impacted the general area.

The proposed development will therefore not extend the cumulative area over which

development impacts the landscape.

Because Corridor Alternative 2 deviates from existing lines over approximately half its length and then follows existing servitudes over the remainder will extend the visual influence of electrical infrastructure within the Developed LCA as well as intensifying existing impacts.

Corridor Alternative 1 will only intensify existing impacts as it follows existing lines.

The proposed substation locations also have the potential to increase the extent of electrical infrastructure, however, the area impacted by substations will fall within the ZTV of the power line corridors and so will not extend impacts further.

	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, <b>(2)</b>	<b>Both Alternatives</b> Regional <b>(3)</b>
<b>Duration</b>	<b>Both Alternatives</b> Long term, <b>(4)</b>	<b>Both Alternatives</b> Long term <b>(4)</b>
<b>Magnitude</b>	<b>Alternative 1</b> Minor <b>(2)</b>  <b>Alternative 2</b> Minor to low <b>(3)</b>	<b>Both Alternatives</b> Moderate to High <b>(7)</b>
<b>Probability</b>	<b>Both Alternatives</b> Probable, <b>(3)</b>	<b>Both Alternatives</b> Definite <b>(5)</b>
<b>Significance</b>	<b>Alternative 1</b> Low <b>(24)</b>  <b>Alternative 2</b> Low <b>(27)</b>	<b>Both Alternatives</b> High <b>(70)</b>
<b>Status (positive or negative)</b>	<b>Both Alternatives</b> Negative	<b>Both Alternatives</b> Negative
<b>Reversibility</b>	<b>Both Alternatives</b> High	<b>Both Alternatives</b> High
<b>Irreplaceable loss of resources?</b>	<b>Both Alternatives</b> No irreplaceable loss.	<b>Both Alternatives</b> No irreplaceable loss.
<b>Can impacts be mitigated?</b>	Yes to a small degree but this will not have a significant effect.	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 on views from the N14.**

Nature:  
The section of the N14 that will be affected by both alternatives runs through the Developed LCA.

Due to distance, the alternative power line corridors will have the most significant influence on views from this receptor. The proposed Collector Substation alternatives 1 and 2 being approximately 6.8km and 6.0km respectively from the road will have negligible influence.

Within the Developed LCA there are areas where electrical infrastructure is more obvious than others.

Electrical infrastructure is obvious from the section of the N14 between its junction with the un-surfaced road and the location that the existing Aggeneis – Aries power line joins the N14 but the scale is relatively small as larger power lines are some distance from the road.

Between the point that that the existing Aggeneis – Aries power line joins the N14 and the Aggeneis MTS, larger infrastructure gradually converges on the MTS and becomes closer to and more obvious from the road.

Power Line Corridor Alternative 2 affects a larger section of the N14. It also affects a section of the landscape that is relatively unaffected by power line development to the north of the location that the existing Aggeneis – Aries power line joins the N14. This corridor is therefore likely to have a larger impact than Corridor Alternative 1.

	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, (2)	<b>Both Alternatives</b> Regional (3)
<b>Duration</b>	<b>Both Alternatives</b> Long term, (4)	<b>Both Alternatives</b> Long term (4)
<b>Magnitude</b>	<b>Alternative 1</b> Minor (2)  <b>Alternative 2</b> Low (4)	<b>Both Alternatives</b> Moderate to High (7)
<b>Probability</b>	<b>Both Alternatives</b> Probable, (3)	<b>Both Alternatives</b> Definite (5)
<b>Significance</b>	<b>Alternative 1</b> Low (24)  <b>Alternative 2</b> Medium (30)	<b>Both Alternatives</b> High (70)

<b>Status (positive or negative)</b>	<b>Both Alternatives</b> Negative	<b>Both Alternatives</b> Negative
<b>Reversibility</b>	<b>Both Alternatives</b> High	<b>Both Alternatives</b> High
<b>Irreplaceable loss of resources?</b>	<b>Both Alternatives</b> No irreplaceable loss.	<b>Both Alternatives</b> No irreplaceable loss.
<b>Can impacts be mitigated?</b>	Yes to a small degree but this will not have a significant effect.	Unknown
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» Planning: Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction period.</li> <li>» 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.</li> <li>» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.</li> <li>» Align power line as far from roads as possible within the identified corridor.</li> </ul>		

**c) The cumulative impact of the proposed power line on views from the un-surfaced road to the north of the proposed Aggeneys 2 solar PV project.**

<p>Nature: Views from the un-surfaced road are currently relatively un-affected by electrical infrastructure although overhead power lines become more obvious as the traveller approached the N14.</p> <p>The 400kV Aggeneys - Aries overhead power line also crosses the road to the east of the proposed Aggeneys 2 solar PV project. Both proposed power line corridor alternatives will largely affect the Developed LCA.</p> <p>Power Line Corridor and Collector Substation Alternative 2 will significantly more obvious from this road than Alternative 1.</p> <p>Power Line Corridor and Collector Substation Alternative 1 is likely to be visible but will not be obvious from the road.</p> <p>Taking into account the nature of this road being a relatively minor road with low vehicle volumes being comprised largely of local and mining traffic the significance of impact of both alternatives with mitigation is low.</p> <p>The key mitigation measure is to move the overhead power line as far from the road as possible within the proposed corridor.</p>		
	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, <b>(2)</b>	<b>Both Alternatives</b> Immediate surroundings <b>(2)</b>
<b>Duration</b>	<b>Both Alternatives</b> Long term, <b>(4)</b>	<b>Both Alternatives</b> Long term <b>(4)</b>

<b>Magnitude</b>	<p><b>Alternative 1</b> Minor (2)</p> <p><b>Alternative 2</b> Low (4)</p>	<p><b>Alternative 1</b> Low (4)</p> <p><b>Alternative 2</b> Low to moderate (5)</p>
<b>Probability</b>	<b>Both Alternatives</b> Probable, (3)	<b>Both Alternatives</b> Probable (3)
<b>Significance</b>	<p><b>Alternative 1</b> Low (24)</p> <p><b>Alternative 2</b> Medium (30)</p>	<p><b>Alternative 1</b> Medium (30)</p> <p><b>Alternative 2</b> Medium (33)</p>
<b>Status (positive or negative)</b>	<p>The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and particularly electrical infrastructure is not as obvious.</p> <p>The affected area is one of the areas within the study area that is least affected by development in general and particularly by electrical infrastructure.</p> <p><b>Alternative 1</b> is unlikely to be obvious from this road and so the impact is likely to have a <b>neutral</b> consequence.</p> <p><b>Alternative 2</b> is unlikely to be highly obvious from this road and so the impact is likely to have a <b>negative</b> consequence.</p>	<p><b>Alternative 1</b> neutral</p> <p><b>Alternative 2</b> negative</p>
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No irreplaceable loss.	No irreplaceable loss.
<b>Can impacts be mitigated?</b>	Yes to a small degree but this will not have a significant effect.	Unknown
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction</li> </ul>		

- 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.

**d) The cumulative impact of the proposed power line on views from the local homesteads.**

Nature:  
 Due to the fact that the local mine owns the majority of land in the area and probably due to the fact that the stock carrying capacity of the land is relatively low, there are very few homesteads in the area.

There is only one homestead that could potentially be affected the alternatives under assessment which is approximately 4.2km to the east of the proposed Aggeneys 2 solar PV facility.

The significance of the direct impact on this homestead associated with both power line and collector substation alternatives, taking into account its use, and existing impacts associated with electrical infrastructure was assessed as low.

The homestead doesn't appear to be inhabited however, stock pens surrounding the building appear to be well used. It is likely therefore that the owners may be more concerned with agricultural production than aesthetics.

The existing 400kV Aggeneys - Aries power line crosses in close proximity (within 200m) to the homestead so views from the homestead are impacted by existing large scale electrical infrastructure.

Due to the relative proximity of existing electrical infrastructure, the significance of the cumulative impact is assessed as high.

	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, (2)	<b>Both Alternatives</b> Immediate surroundings, (2)
<b>Duration</b>	<b>Both Alternatives</b> Long term, (4)	<b>Both Alternatives</b> Long term, (4)
<b>Magnitude</b>	<b>Alternative 1</b> Minor (2)  <b>Alternative 2</b> Minor (2)	<b>Alternative 1</b> Moderate, (6)  <b>Alternative 2</b> Moderate, (6)
<b>Probability</b>	<b>Both Alternatives</b> Improbable, (2)	<b>Both Alternatives</b> Definite, (5)
<b>Significance</b>	<b>Alternative 1</b> Low (16)	<b>Alternative 1</b> High, (60)

	<b>Alternative 2 Low (16)</b>	<b>Alternative 2 High, (60)</b>
<b>Status (positive or negative)</b>	<p>The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and particularly electrical infrastructure is not as obvious.</p> <p>The affected area is one of the areas within the study area that is least affected by development in general and particularly by electrical infrastructure.</p> <p><b>Alternative 1</b> is unlikely to be obvious from this road and so the impact is likely to have a <b>neutral</b> consequence.</p> <p><b>Alternative 2</b> is unlikely to be highly obvious from this road and so the impact is likely to have a <b>negative</b> consequence.</p>	<b>Both Alternatives</b> negative
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No irreplaceable loss.	No irreplaceable loss.
<b>Can impacts be mitigated?</b>	Yes to a small degree but this will not have a significant effect.	Unknown
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction period.</li> <li>» 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.</li> <li>» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.</li> <li>» Align the power line as far from roads as possible within the identified corridor.</li> </ul>		

**e) The cumulative impact of the proposed power line on views from the settlement of Aggeneys**

Nature:



The landscape between Aggeneys and both power line corridors is already heavily impacted by electrical infrastructure.

Due to the density of development and vegetation within the settlement, the power line is only likely to be visible from the southern edge of Aggeneys.

At its closest, Power Line Corridor Alternative 1 is located approximately 2.6km from the settlement whereas Power Line Corridor Alternative 2 is located approximately 2.0km from the settlement.

Alternative 2 also has a greater extent of corridor that is likely to be visible as it runs along the N14 from north of the settlement to south of the settlement.

Alternative 1 joins the N14 south of the settlement and so is likely to be less exposed.

Both collector substation alternatives are located in excess of 10km from the settlement and are highly unlikely to be visible and will not add to cumulative impacts.

The landscape between Aggeneys and both power line corridor alternatives is already heavily impacted by electrical infrastructure which means that the view from the urban edge is already highly industrialised. The addition of a new power line will slightly intensify this influence but given the distance this is likely to be a relatively minor addition to existing impacts.

	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	<b>Both Alternatives</b> Immediate surroundings, (2)	<b>Both Alternatives</b> Immediate surroundings, (2)
<b>Duration</b>	<b>Both Alternatives</b> Long term, (4)	<b>Both Alternatives</b> Long term, (4)
<b>Magnitude</b>	<b>Alternative 1</b> Small to minor (1)  <b>Alternative 2</b> Minor (2)	<b>Alternative 1</b> Low to moderate, (5)  <b>Alternative 2</b> Low to moderate, (5)
<b>Probability</b>	<b>Both Alternatives</b> Improbable, (2)	<b>Both Alternatives</b> Probable, (3)
<b>Significance</b>	<b>Alternative 1</b> Low (14)  <b>Alternative 2</b> Low (16)	<b>Alternative 1</b> Moderate, (33)  <b>Alternative 2</b> Moderate, (33)
<b>Status (positive or negative)</b>	The intensity of development within the Developed LCA is likely to intensify particularly in areas where development and particularly electrical infrastructure is not as	<b>Both Alternatives</b> negative

	<p>obvious.</p> <p>The affected area is one of the areas within the study area that is least affected by development in general and particularly by electrical infrastructure.</p> <p><b>Alternative 1</b> is unlikely to be obvious from this road and so the impact is likely to have a <b>neutral</b> consequence.</p> <p><b>Alternative 2</b> is unlikely to be highly obvious from this road and so the impact is likely to have a <b>negative</b> consequence.</p>	
<b>Reversibility</b>	High	High
<b>Irreplaceable loss of resources?</b>	No irreplaceable loss.	No irreplaceable loss.
<b>Can impacts be mitigated?</b>	Yes to a small degree but this will not have a significant effect.	Unknown
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude.</li> <li>» Ensure that vegetation is not unnecessarily removed during the construction period.</li> <li>» 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.</li> <li>» Reduce the construction period as far as possible through careful logistical planning and productive implementation of resources.</li> <li>» Align the power line as far from roads as possible within the identified corridor.</li> </ul>		

## 7 IMPACT STATEMENT

### 7.1 PROJECT DESCRIPTION

The proposed grid connection infrastructure is required for the transmission of electricity generated from the Aggeneys 2 solar PV facility to the Aggeneis MTS, which is located approximately 13.5km to the east of the Aggeneys 2 solar PV facility.

The grid connection infrastructure for Aggeneys 2 will have a transmitting capacity of up to 220kV, whilst the collector substation will have a footprint of approximately 1.25ha. Two alternatives are assessed for both the powerline (including the corridors) and the collector substation component.

The height of the 220kV powerlines is anticipated to be up to 40m, and either monopole or lattice towers might be used for each alternative during the construction phase.

### 7.1 VISIBILITY

The Visual Absorption Capacity of the landscape is relatively low considering the height of the structures associated with the alternative corridors.

The visibility of the proposed project is largely limited by the relatively slender nature of the structures and 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
220kV	4km	7km

The ZTV analysis indicates that both power line options for each corridor alternative are likely to be visible throughout the majority of the Approximate Limit of Visibility. The ALV of the collector substation alternatives will also fall within this limit.

### 7.1 LANDSCAPE CHARACTER

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

- **A Rural LCA** which is generally used for low intensity grazing. There are occasional homesteads within the LCA, also small scale infrastructure including un-surfaced roads and LV powerlines. Due to the low key agricultural activities, the outlook across the LCA is one of a relatively natural landscape.
- **A Developed LCA** which is the area within which large scale development has visual influence. This influence is generally comprised of views of mining operations and mining infrastructure, large scale electrical infrastructure and settlement

The proposed power line will mainly influence the Developed LCA and will have negligible influence over the Rural LCA.

No protected areas are likely to be affected.

### **7.3 SENSITIVE RECEPTORS**

Identified visual receptors include:

- Area Receptors which includes the small urban settlement area of Aggeneys.
- Linear Receptors or routes through the area that include the N14 and an un-surfaced road that runs immediately to the north of the proposed Aggeneys 2 solar PV project linking it with the N14 to the north west. The N14 is a major strategic route with obvious tourism importance. The un-surfaced road is predominantly used by local people;
- Point Receptors include a single homestead that is located close to the un-surfaced road approximately 4.2km to the south east of the eastern end of both proposed alternative corridors.

### **7.4 VISUAL IMPACT AND MITIGATION POTENTIAL**

#### **7.4.1 General Landscape Character**

Because Power Line Corridor Alternative 1 runs close to existing electrical servitudes for its entire length, it is likely to have only a low impact in terms of intensifying the visual influence of electrical infrastructure within the Developed LCA.

Power Line Corridor Alternative 2 is aligned for more than half its length away from existing power line servitudes. Because of this it will extend the visual influence of electrical infrastructure into new areas. Whilst its impact is likely to be more significant than Alternative 1, the level of impact is also assessed as Low, because the area is affected by views of other development including mining operations and settlement.

#### **7.4.2 The impact of the proposed power line on views from the N14**

Because Power Line Corridor Alternative 1 only affects the N14 from approximately 8.0km from the connection point at Aggeneis MTS, and because the character of views from this section of the road are already heavily influenced by power lines and other electrical infrastructure, the impact on the road is assessed as having a low significance.

Power Line Corridor Alternative 2 will affect approximately 16.2km the N14. Over approximately 10km the character of views from the road is currently relatively lightly impacted by power lines. The remainder is however heavily impacted. Visual impact that is likely to be experienced by travellers on the N14 was therefore assessed as being higher than Alternative 1 with a significance of medium.

Due to distance, collector substation alternatives are unlikely to contribute to visual impacts.

#### **7.4.3 The impact of the proposed power line on views from the un-surfaced road to the north of the proposed Aggeneys 2 solar PV project**

Because Power Line Corridor Alternative 1 is aligned away from this road and Collector Substation Alternative 1 will have little influence on views from the road due to distance and screening provided by the PV project, the impact is assessed as having a low significance.

Power Line Corridor Alternative 2 is aligned along this road for approximately 6.3km and will affect views for up to 11.3km. Collector Substation Alternative 2 is also

located in close proximity to and will impact directly on the road. The impact is therefore assessed as having a medium significance.

#### **7.4.4 The impact of the proposed power line on views from the local homesteads.**

There is only one homestead that is potentially affected that is located approximately 4.2km to the south east of the eastern end of the alternative corridors.

This homestead appears to be unoccupied. Views from the structure are also already impacted by the existing 400kV Aggeneis - Aries power line which is located approximately 250m from the building.

Due to the distance and the existing impact, the likely visual impacts of both alternative corridors and collector substations are assessed as having a low significance.

#### **7.4.5 The impact of the proposed power line on views from the settlement of Aggeneys**

The proposed alternative power line corridors are only likely to affect the southern edge of the settlement areas.

Because views from Aggeneys are already affected by heavy industry as well as large scale electrical infrastructure including HV power lines and the Aggeneis MTS and because views from the edge of the settlement are largely screened by vegetation, the likely impact on views from Aggeneys was assessed as low for both alternative corridors.

Due to distance the alternative collector substations will not influence this impact.

### **7.5 CUMULATIVE IMPACTS**

The alternative power line corridors will both impact an area that is largely already impacted by development including mining operations and large scale electrical infrastructure.

Cumulative visual impacts have therefore generally been assessed as having a contribution of low or medium significance to medium to high overall cumulative impacts.

### **7.7 CONCLUSION**

As Alternative 1 is likely to generally have a lesser impact on the Landscape and on the views of sensitive receptors, on landscape and visual grounds it is favoured over Alternative 2.

However, impacts associated with Alternative 2 are not so significant that it is unacceptable.

Cumulative impacts are assessed as having a medium to high significance. This is largely due to the extent of existing and authorised development within the area which includes extensive areas of mining, and infrastructure as well as planned renewable energy projects and power lines. The assessed contribution to these impacts that can be attributed to the possible alternatives considered is generally low.

Within a REDZ it must be anticipated that cumulative visual impacts might be higher than surrounding areas due to the focus on development.

There are various mitigation measures that can be employed to minimise levels of impact, the majority of which are associated with site housekeeping. The most important from a visual perspective however, is to try to locate the powerline as far from receptors as the corridor will allow.

From a landscape and visual impact perspective, there is no reason why either power line corridor and the associated collector substation should not be authorised.

## REFERENCES

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

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

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

John E. Almond 2016, Letsoai and Enamandla Solar Energy Facilities on Farm Hartebeestvlei near Aggenys, Northern Cape: Palaeontological Heritage.

ERM, 2013, Draft Environmental Management Programme for the Gamsberg Zinc Mine and Associated Infrastructure in the Northern Cape. Black Mountain Mining (Pty) Ltd.

**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**

<u>English</u> -	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 iSimangaliso Wetland Park World Heritage Site.
- **Palesa Power Station** - VIA for a new 600MW power station near Kwamhlanga in Mpumalanga for a private client.
- **Heuningklip PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Kruispad PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Doornfontein PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Olifantshoek Power Line and Substation** – VIA for a new 10MVA 132/11kV substation and 31km powerline, Northern Cape Province, for Eskom.
- **Noupoort Concentrating Solar Plants** - Scoping and Visual Impact Assessments for two proposed parabolic trough projects.
- **Drakensberg Cable Car** – Preliminary Visual Impact Assessment and draft terms of reference as part of the feasibility study.
- **Paulputs Concentrating Solar Plant (tower technology)** – Visual Impact Assessment for a new CSP project near Pofadder in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5** – Scoping and Visual Impact Assessments for the proposed extension of five authorised CSP projects including parabolic trough and tower technology within the Karoeshoek 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 Karoeshoek 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.
- **Moorreesburg Wind Energy Facility** – Visual Impact Assessment for a proposed WEF near Moorreesburg 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, Dokiwa (Ghana)** – Visual Impact Assessment for proposed new Tailings Storage Facility at a mine site working with SGS as part of their EIA team.
- **Gateway Shopping Centre Extension (Durban)** – Visual Impact Assessment for a proposed shopping centre extension in Umhlanga, Durban.
- **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
- **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
- **Telkom Towers** – Visual impact assessments for numerous Telkom masts in KwaZulu Natal.
- **Eskom Isundu Substation** – Visual Impact Assessment for a proposed major new Eskom substation near Pietermaritzburg in KwaZulu Natal.
- **Eskom St Faiths Power Line and Substation** – Visual Impact Assessment for a major new substation and associated power lines near Port Shepstone in KwaZulu Natal.
- **Eskom Ficksburg Power Line** – Visual Impact Assessment for a proposed new power line between Ficksburg and Cocolan in the Free State.
- **Eskom Matubatuba to St Lucia Power Line** – Visual Impact Assessment for a proposed new power line between Mtubatuba and St Lucia in KwaZulu Natal.
- **Dube Trade Port, Durban International Airport** – Visual Impact Assessment
- **Sibaya Precinct Plan** – Visual Impact Assessment as part of Environmental Impact Assessment for a major new development area to the north of Durban.
- **Umdloti Housing** – Visual Impact Assessment as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
- **Tata Steel Ferrochrome Smelter** - Visual impact assessment of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
- **Durban Solid Waste Large Landfill Sites** – Visual Impact Assessment of proposed development sites to the North and South of the Durban Metropolitan Area. The project utilised 3d computer visualisation techniques.
- **Hillside Aluminium Smelter, Richards Bay** - Visual Impact Assessment of proposed extension of the existing smelter. The project utilised 3d computer visualisation techniques.
- **Estuaries of KwaZulu Natal Phase 1** – Visual character assessment and GIS mapping as part of a review of the condition and development capacity of eight estuary landscapes for the Town and Regional Planning Commission. The project was extended to include all estuaries in KwaZulu Natal.
- **Signage Assessments** – Numerous impact assessments for proposed signage

developments for Blast Media.

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

## **APPENDIX II**

### **GUIDELINES FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES**

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

# GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES



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



# GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

*Edition 1*

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## *Stakeholders engaged in the guideline development process:*

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

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## *Finalisation of report figures and formatting:*

Magdel van der Merwe and Elna Logie, DTP Solutions

## PREFACE

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

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

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

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

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

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

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

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

	ISSUES
TIMING	<ul style="list-style-type: none"> <li>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?</li> </ul>
SCOPE	<ul style="list-style-type: none"> <li>Which aspects must be addressed through specialist involvement; i.e. what is the purpose and scope of specialist involvement?</li> <li>What are appropriate approaches that specialists can employ?</li> <li>What qualifications, skills and experience are required?</li> </ul>
QUALITY	<ul style="list-style-type: none"> <li>What triggers the review of specialist studies by different roleplayers?</li> <li>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?</li> </ul>

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 interleaving 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 environmental 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*.

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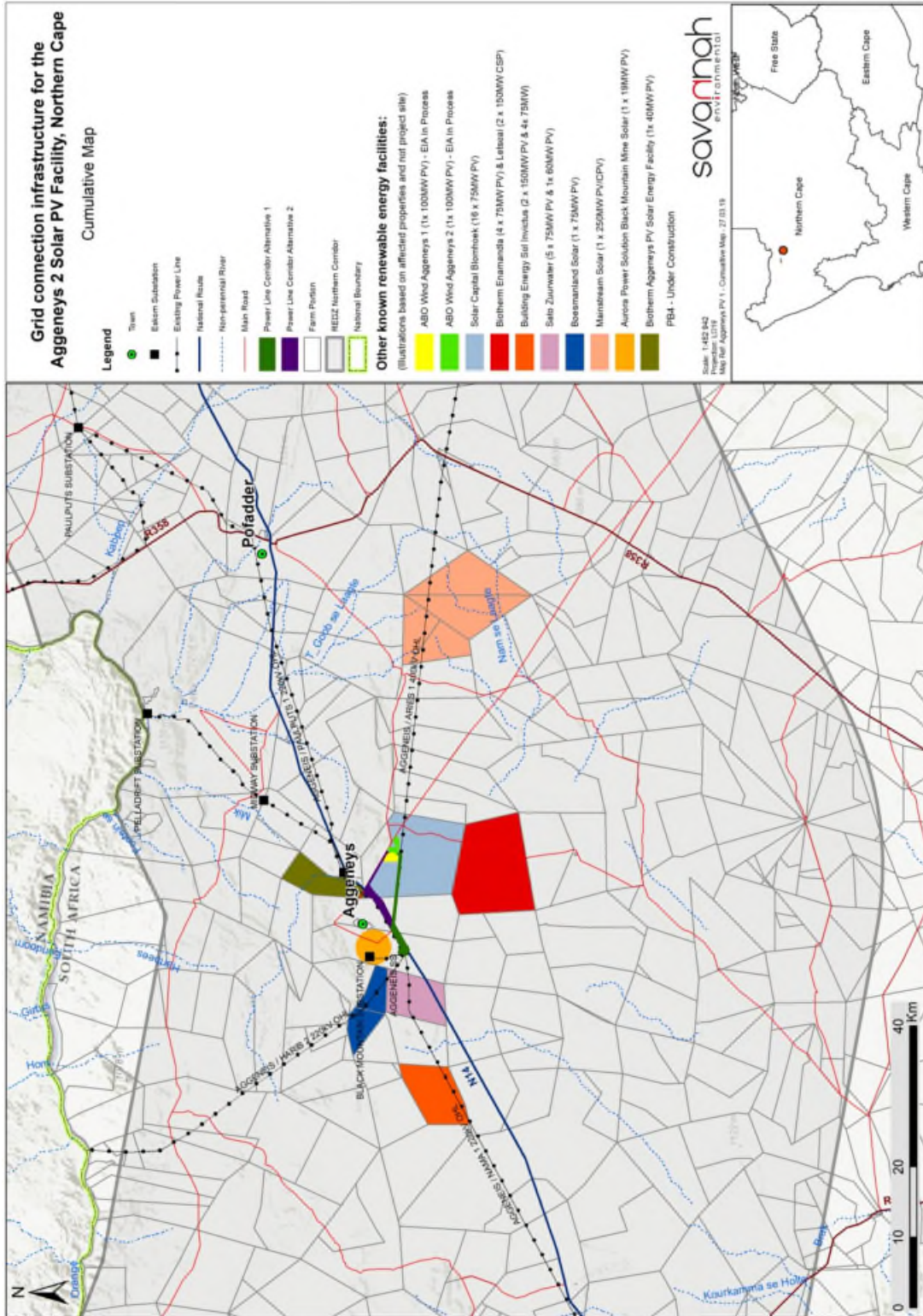
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**APPENDIX III**

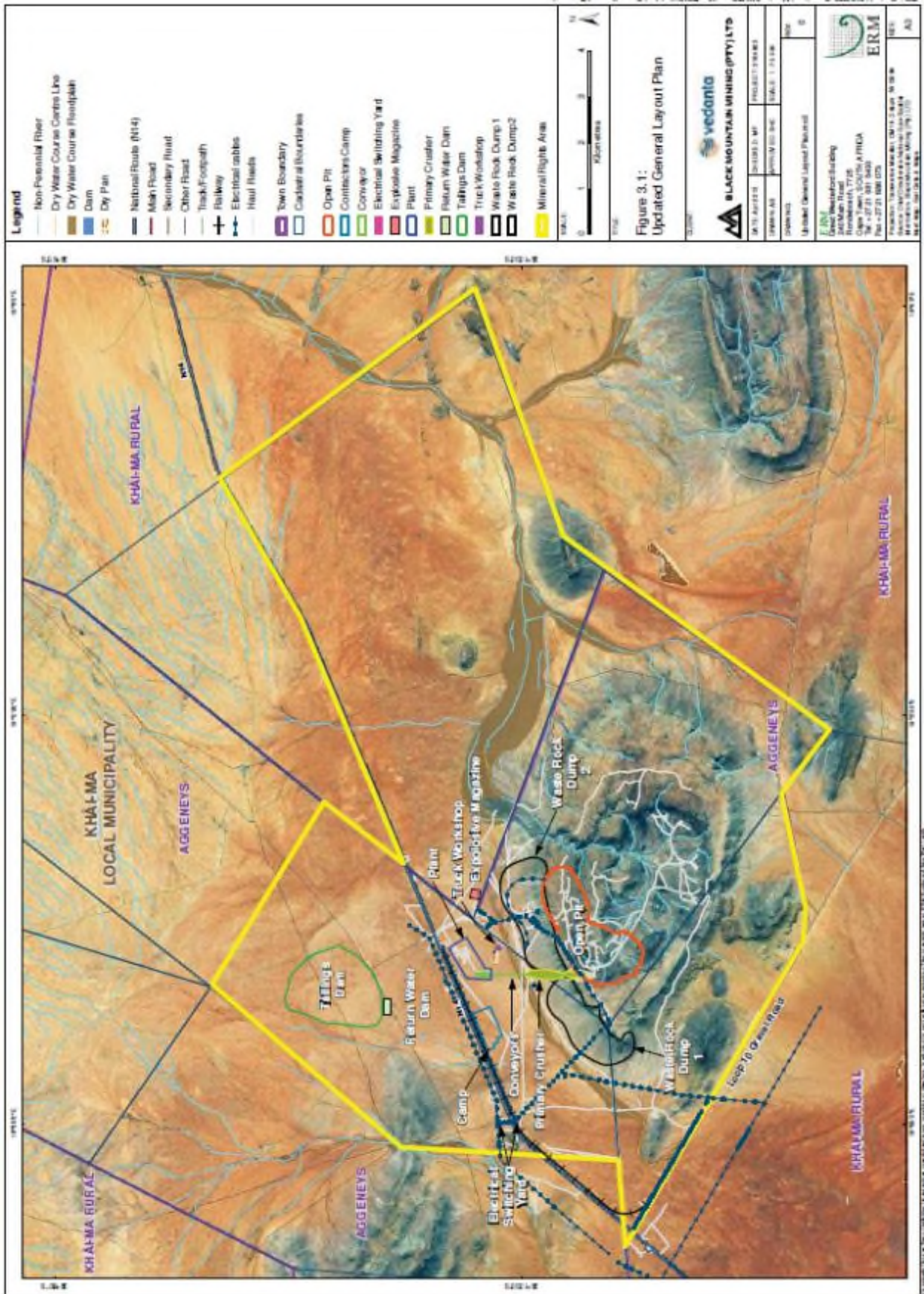
**AUTHORISED AND PROPOSED SOLAR PROJECTS IN THE VICINITY OF THE  
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**APPENDIX IV**

**BLACK MOUNTAIN MINING GAMSBERG GRNRTAL LAYOUT PLAN**

**(extracted from ERM Environmental Management Programme 2013)**



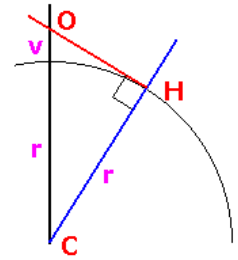
## **APPENDIX V**

### **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 VI**  
**ENVIRONMENTAL MANAGEMENT PLAN**

<b>Project component/s</b>	Bloemhoek 1 Grid Connection Infrastructure for the Aggeneys 2 Solar PV Facility – Powerline / Collector Substation Construction, Operation and Decommissioning	
<b>Potential Impact</b>	<p>Change in Landscape Character</p> <p>Visual impact affecting rural homesteads</p> <p>Visual impact affecting travellers on the N14</p> <p>Visual impact affecting travellers on the adjacent un-surfaced road</p> <p>Visual impact affecting residents of Aggeneys</p>	
<b>Activity/risk source</b>	<p>Vegetation clearance and rehabilitation during construction and decommissioning resulting in degradation and further loss of character.</p> <p>Unnecessary impact due to lack of consideration of visual impacts on sensitive receivers</p> <p>Residual risk of un-necessary impact should infrastructure not be removed on decommissioning.</p>	
<b>Mitigation: Target/Objective</b>	<p>Minimise and reinstate vegetation loss.</p> <p>Place structures as far from sensitive receivers as corridors will allow.</p> <p>Remove structures and rehabilitate site on decommissioning.</p>	
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
	Contractor (C)	Construction Phase (C)
	Environmental (EO)	Operational Phase (O)
	Environmental Liaison Officer (ELO)	Decommissioning Phase (D)
Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.	C, ECO, ELO	C
Reinstate any areas of vegetation that have been disturbed during construction.	C, ECO, ELO	C
Rehabilitate areas to their natural state	C, ECO, ELO	C, D



<p>on decommissioning.</p> <p>Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.</p> <p>Remove all temporary works.</p> <p>Remove infrastructure not required for the post-decommissioning use of the site.</p>	<p>C, ECO, ELO</p> <p>C, ECO, ELO</p> <p>C, ECO, ELO</p>	<p>C, D</p> <p>C, D</p> <p>C, D</p>
<p><b>Performance Indicators</b></p>	<p>Vegetation presence and density.</p> <p>Presence of unnecessary infrastructure.</p> <p>Location of structures closer to sensitive receivers than is necessary</p>	
<p><b>Monitoring</b></p>	<p>Review layout drawings to ensure that towers are placed as sensitively as possible with regard to the views of sensitive receivers.</p> <p>Evaluate vegetation before, during and after construction.</p> <p>Check to ensure that all structures are removed and rehabilitation is undertaken during decommissioning.</p> <p>Responsibility: ECO and ELO.</p> <p>Prepare regular reports.</p>	