ABO WIND AGGENEYS 1 PV (PTY) LTD

THE PROPOSED AGGENEYS 1 – 100MW SOLAR PV FACILITY NEAR AGGENEYS IN THE NORTHERN CAPE PROVINCE

LANDSCAPE & VISUAL IMPACT ASSESSMENT

March 2019

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1 INTRODUCTION

1.1 GENERAL

This Visual Impact Assessment (VIA) study forms part of the Basic Assessment process that is being undertaken for the proposed Aggeneys 1 – 100MW solar photovoltaic (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.

1.2 PROJECT LOCATION AND PROPERTY DESCRIPTION

The proposed solar PV facility will be located on the Remaining Extent of Farm Bloemhoek 61. The Surveyor-general 21 digit code for the property is C05300000000006100000.

The site is located approximately 8.9 km east southeast of Aggeneys. **(Map 1: Site Location Map).**

No site alternatives are under consideration for the proposed development.

The area of the property is 12,378.9705ha.

The project footprint within the property is approximately 250ha.

1.3 BACKGROUND OF SPECIALIST

Jon Marshall qualified as a Landscape Architect in 1978. He also has extensive experience of Environmental Impact Assessments 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

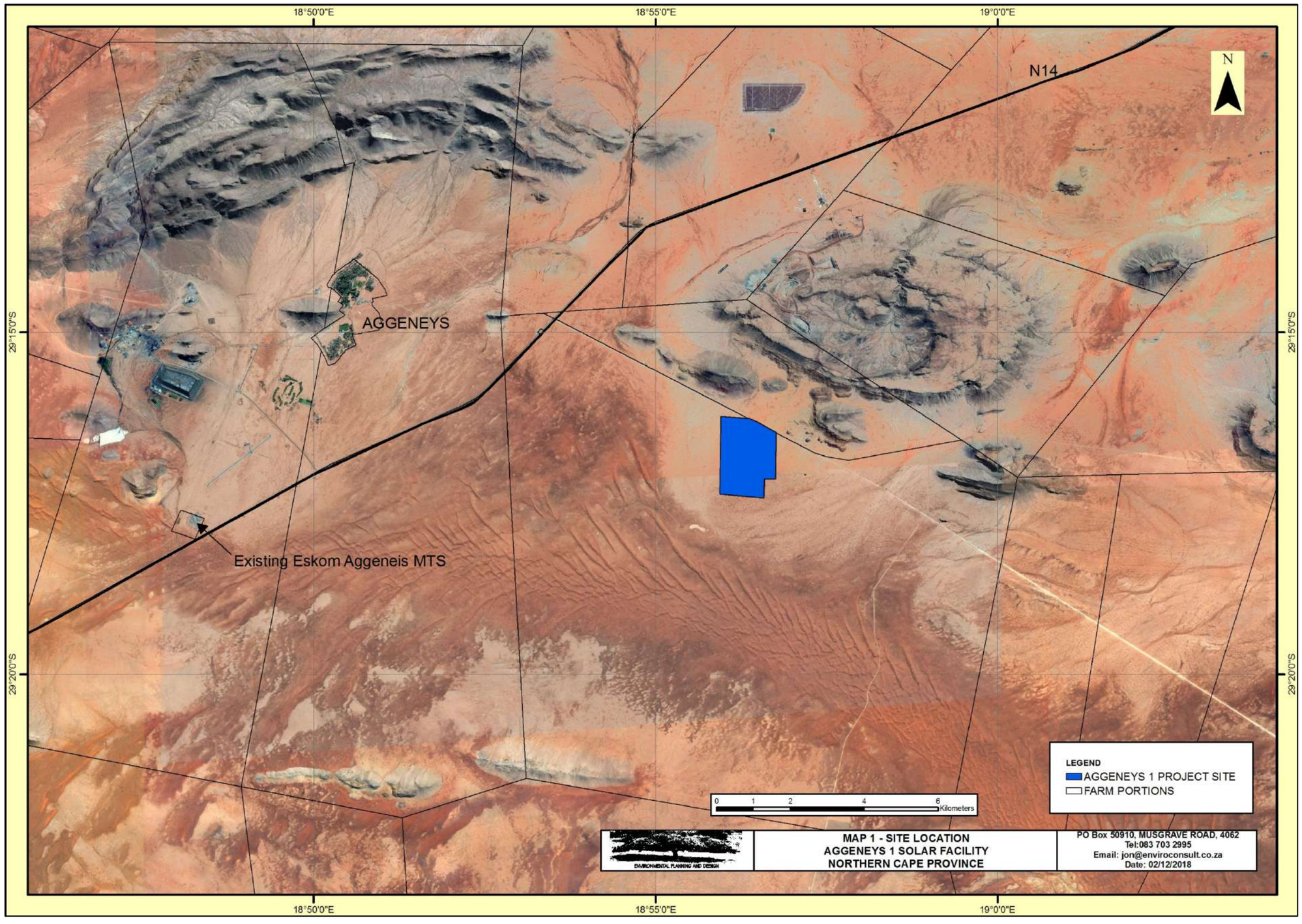
The following limitations and assumptions should be noted:

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 (5th 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. This was to ensure that as much detail as possible was recorded in the photographs.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2. PROJECT DESCRIPTION

2.1 MOTIVATION AND CONTEXT

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

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

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 objective of these REDZ is to focus renewable energy projects within the most suitable areas.

2.2 DESCRIPTION

Refer to Map 2, Site Layout

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

Aggeneys Solar PV Project 1 is one of two solar projects that are proposed within the property.

Separate assessments have been prepared for the proposed Aggeneys Solar PV Project 2 and for the proposed power line corridors that are necessary to connect the facilities to the Aggeneys Substation.

Both proposed projects will be comprised of the following components:

- Arrays of PV panels (either a static or tracking PV system) with a capacity of up to 100MW covering an approximate area of 233ha.
- Mounting structures to support the PV panels (maximum 3.5m high).
- On-site inverters to convert the power from a direct current to an alternating current;
- An on-site (facility) substation, approximately 10m in height with an approximate area of 0.625ha to facilitate the connection between the solar energy facility and the Eskom electricity grid. It should be noted that lightning conductor poles up to 25m high will be included, however, due to their small diameter, these are only likely to be visible within 1km of the facility.
- Cabling between the project components, to be laid underground where practical.
- Auxiliary buildings including offices and workshop areas for maintenance and storage with an approximate combined area of 1ha.

- Temporary laydown areas with an approximate combined area of 5ha.
- Internal access roads approximately 18 - 20km in length and 4-5m in width, and are likely to be comprised of un-surfaced roads; and
- Fencing.

As indicated above, it is possible that the facilities could either be developed as static, fixed mounted PV systems or tracking PV systems.

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

Should a tracking system be used this could slightly increase the height of the PV array when maximum tilt of the panels occurs during early morning and late afternoon. This could make a difference in terms of the ZTV analysis. However this difference will be marginal and will not significantly affect the analysis.

Site access will be directly from the un-surfaced road to the north of the sites. Access will be via an approximately 6m wide road which may be tarred.

2.3 MAIN PROJECT COMPONENTS

A solar energy facility typically uses the following primary components:

2.3.1 Photovoltaic Panels

Solar photovoltaic (PV) panels consist primarily of glass and various semiconductor materials and in a typical solar PV project, will be arranged in rows to form solar arrays. The PV panels are designed to operate continuously for more than 20 years with minimal maintenance required.

2.3.2 Inverters

The photovoltaic effect produces electricity in direct current (DC). Inverters must be used to convert DC to alternating current (AC) for transmission in the national grid.

A "Power Block" is a set of solar panels that feed a dedicated inverter station inclusive of medium voltage transformer. The size of Power Blocks will depend on the detailed design of the plant and final inverter selection. A Power Block is typically in the range of ± 2 – 4MW. This however could vary according to detailed design.

The PV combining switchgear (PVCS), which is dispersed among the arrays, collects the power from the arrays for transmission to the facility substation.

If centralised inverters are used, these are likely to have a height of approximately 3.0m which is lower than the surrounding PV panel height. This will mean that from outside the site they will be hidden behind solar panels.

2.3.3 Transformer and Grid Connection

The inverters feed AC current to the onsite facility substation which steps it up for transmission of the power to the national grid.

It is understood that the facility will be connected to a facility substation which will have a capacity of either 22 or 33 kV, stepping up to 132 or 220 kV to the collector

substation. The collector substation will be connected to the Eskom Aggeneis MTS via a 132kV or 220kV single circuit power line. This substation is located approximately 12.45km to the west of the project boundary.

The facility substation is considered as part of this assessment. Two facility substation alternatives are under consideration. Substation Alternative 1 is located on the south eastern corner of the site, this is the developer's preferred alternative. Substation Alternative 2 is located on the north east corner of the site adjacent to the un-surfaced local road.

The grid connection and collector substation will be subject to a separate Basic Assessment process.

2.3.4 Other Infrastructure

Other infrastructure will include a gate house and security, a small office building, a control centre, warehouses, a staff canteen, a visitor centre, a staff locker room, a boundary fence, water storage tanks and a permanent access road linking to the adjacent local road.

2.3.5 Temporary Works

A lay down area of approximately 5ha will be required during the construction phase.

2. 4 PROJECT CONTEXT

The project is proposed within an area that is a focus for both mining 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 (90 mi) 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[1].

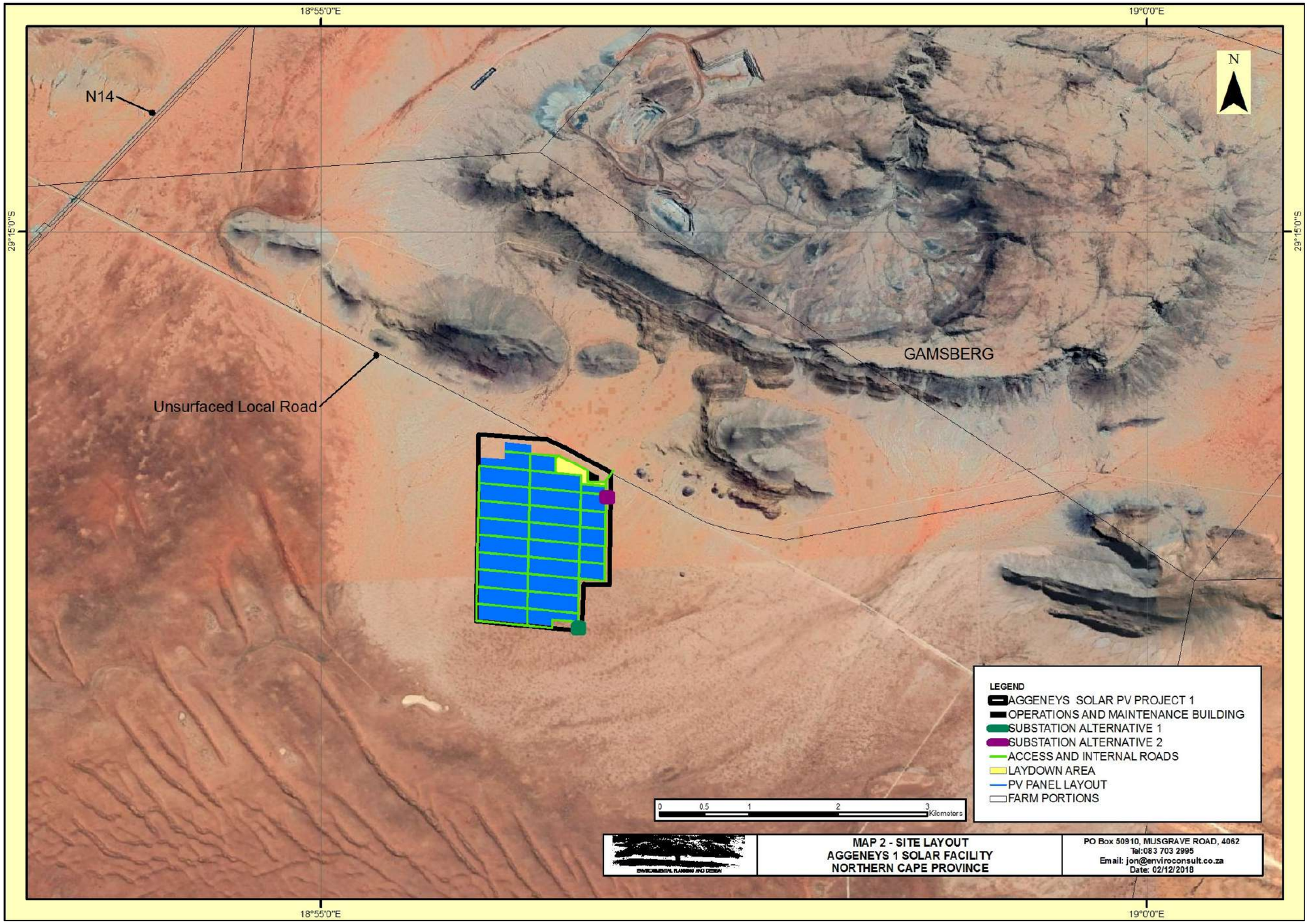
Because of the focus for solar energy projects within the REDZ 8 area there have been numerous projects proposed in this area, some of which have been authorised and others of which authorisation is anticipated in the near future.

Due to the focus on renewable energy projects and mining development in the area, there are also a number of additional power lines proposed.

Map 3, Development Context, indicates the properties within 30km of the proposed site on which other renewable energy projects are proposed.

[1] Engineering News, October 2017.

Plate 1. Fixed mounted PV system. Each unit is fixed in place orientated towards the sun's mid-day position. With a single-axis system each row would be placed in a north-south direction and the panels would be moving to follow the sun's position from sunrise to sunset.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Unsurfaced Local Road
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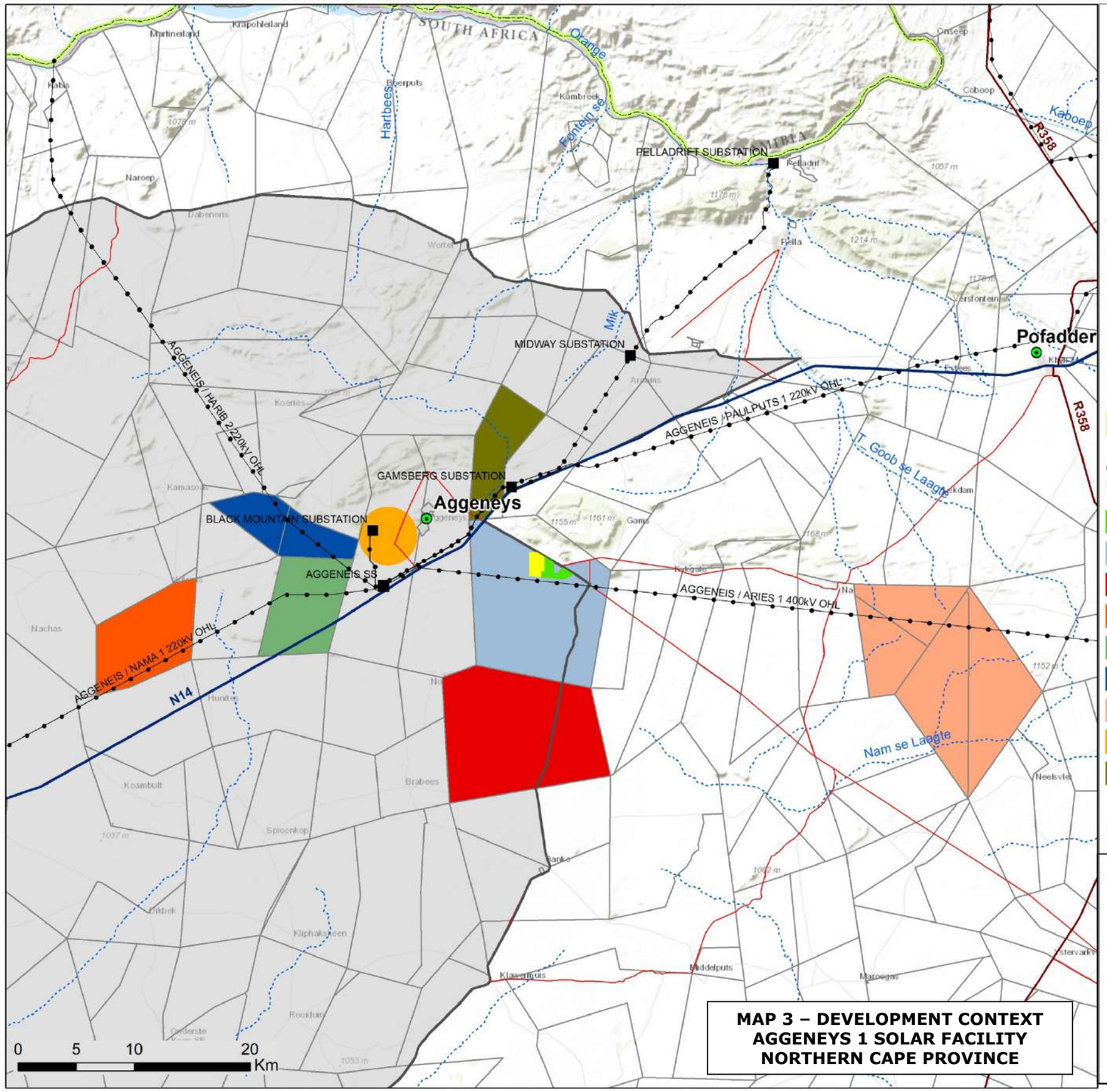


MAP 3 – DEVELOPMENT CONTEXT
AGGENEYS 1 SOLAR FACILITY
NORTHERN CAPE PROVINCE

Aggeneys 1 – 100MW Solar Facility and associated infrastructure, Northern Cape

Cumulative Map

Legend

- Town
- Eskom Substation
- Existing Power Line
- National Route
- Non-perennial River
- Main Road
- Aggeneys 1 – 100MW Solar Facility
- Springbok REDZ 8
- Farm Portion
- National Boundary

Other known renewable energy facilities:
(Illustrations based on affected properties and not project site)

- ABO Wind Aggeneys 2 (1x 100MW PV) - EIA In Process
- Solar Capital Blomhoek (16 x 75MW PV)
- Biotherm Enamandla (4 x 75MW PV) & Letsoai (2 x 150MW CSP)
- Building Energy Sol Invictus (2 x 150MW PV & 4x 75MW)
- Sato Zuurwater (5 x 75MW PV & 1x 60MW PV)
- Boesmanland Solar (1 x 75MW PV)
- Mainstream Solar (1 x 250MW PV/CPV)
- Aurora Power Solution Black Mountain Mine Solar (1 x 19MW PV)
- Biotherm Aggeneys PV Solar Energy Facility (1x 40MW PV) PB4 - Under Construction

Scale: 1:321 345
Projection: LO19
Map Ref: Aggeneys PV 1 - Cumualtive Map - 27.03.19

savannah environmental

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"[2].

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 9km west north west of the proposed site.

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

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

The study area has been defined by the limit of visibility of the tallest element which includes elements associated with the proposed substation that may be in the order of 10m high and visible for approximately 11.3km (See Section 5).

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)[3].

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 affected area comprises fairly flat-lying terrain between Inselbergs or isolated steep rocky outcrops.

[22] UK Guidelines
[3] Almond

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

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 4 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 5 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[4] 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*is 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;

[4] Vegetation of South Africa, Lesotho and Swaziland,2006

- Homesteads around which trees and tall woody vegetation has been allowed to develop. This vegetation often contrasts with the surrounding barren landscape making the location of homesteads obvious from a distance. It can also provide a degree of shelter and screening for the immediate area around buildings; and
- Water points for livestock that are spotted around local farms. Water is generally provided by wind pumps to a surface trough for animals. The availability of water has allowed trees and tall woody vegetation to develop. This also has the benefit of providing shelter and shade for livestock. The contrast between this vegetation and surrounding areas makes the location of water points obvious from a distance.

Refer to Map 6 for Vegetation Types.

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"[5].

Visual Absorption Capacity (VAC) is defined as "the landscape's ability to absorb physical changes without transformation in its visual character and quality"[6].

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

[5] UK Guidelines
[6] Western Cape Guidelines

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 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 7, 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 2, 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.

Plate 3, Mine dump on the north west facing slope of the Gamsberg.

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 6**.

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 projects. 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.

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 sub stations. 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 are seen within the context of natural vegetation and against the backdrop that is provided by the inselbergs. 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 7** which indicates the likely visual influence of proposed Aggeneys 1 project together with the properties on which renewable energy projects are proposed. This indicates that renewable energy projects are likely to significantly influence landscape character change around Aggeneys, should all proposed projects be developed. This change is likely to affect both the Developed and the Rural LCAs.

It is noted in 3.1.4 that the northern side of the Gamsberg escarpment has been heavily modified by mining operations. Because of this, mining operations influence the landscape character of Aggeneys 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[7] 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 III**.

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"[8].

[7] ERM
[8] 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 associated with the mining in the area, it 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 4.8 km to the north west of the proposed 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 that runs adjacent to the northern boundary of the proposed site. This road joins the N14 approximately 4.8km to the north west of the site. 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. In 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. The heritage report indicates that this local road is not considered to be a scenic route.

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 4.6km from the proposed project.

Visual receptors were ground truthed during the site visit. The main receptors that have been identified are indicated on **map 7 (Landscape Character Areas)**.

LANDSCAPE CHARACTER AREAS

Plate 4, 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 5, Developed LCA - This LCA is largely enclosed by the inselbergs to the north, west and east of Aggeneys. Mining infrastructure and settlement is obvious within the context of natural vegetation.

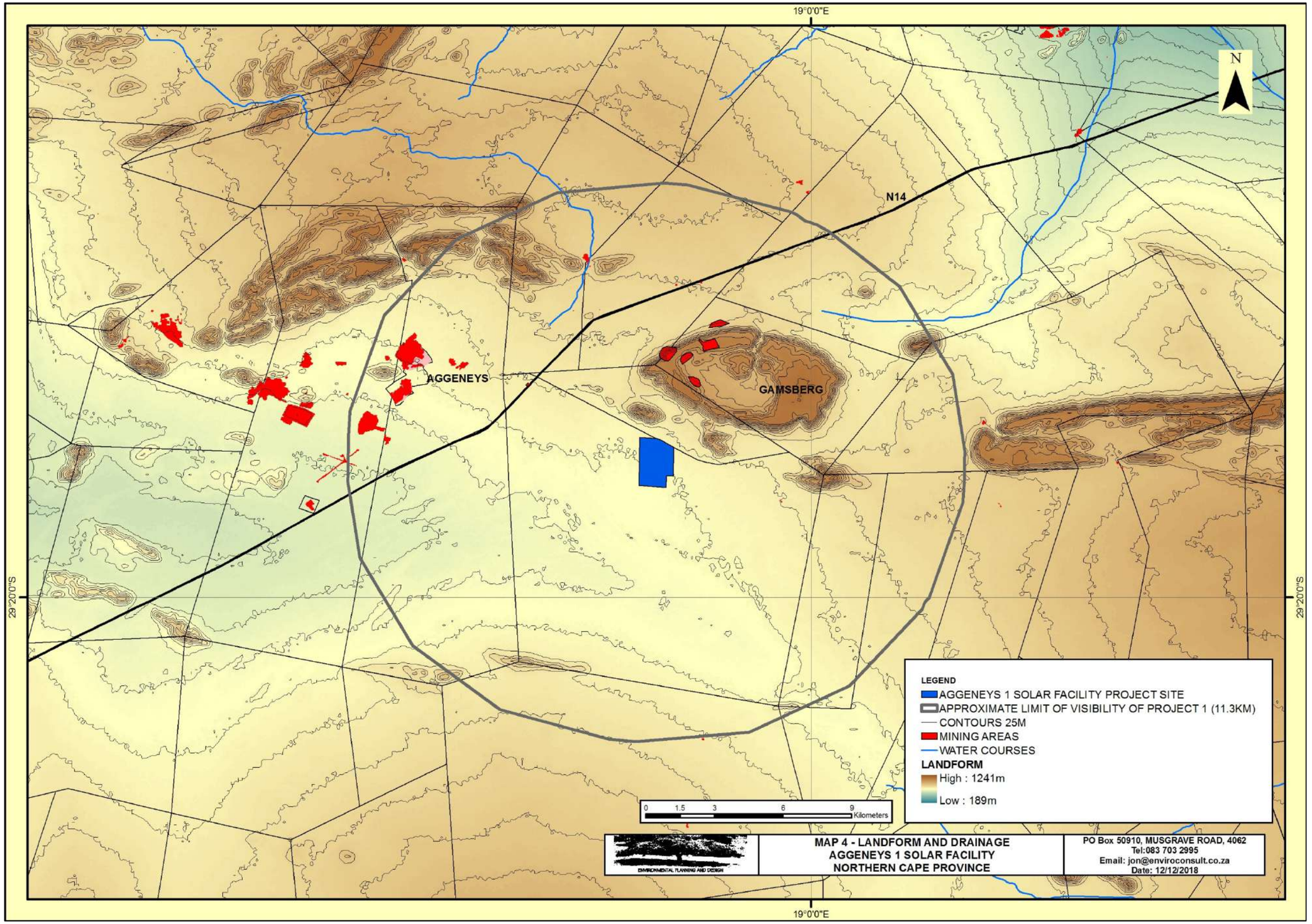
SENSITIVE RECEIVERS

Plate 6, The urban edge of Aggeneys. The density of vegetation and development means that views are largely inward looking.

Plate 7, Isolated Homesteads. These are largely related to the agricultural use of the land.

Plate 8, 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 9, 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.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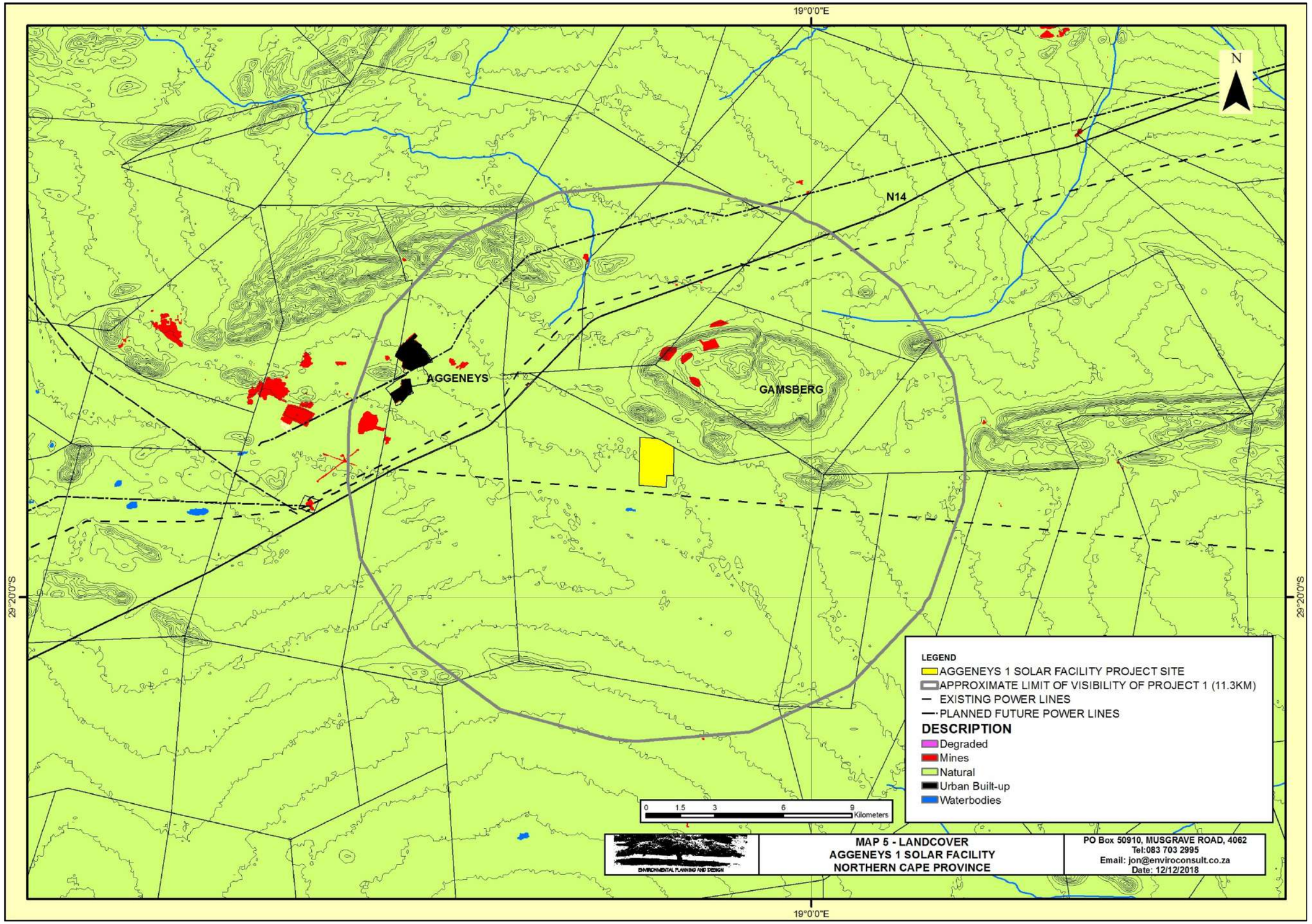
N
N14
AGGENEYS
GAMSBERG
29°20'0"S
LEGEND
AGGENEYS 1 SOLAR FACILITY PROJECT SITE
APPROXIMATE LIMIT OF VISIBILITY OF PROJECT 1 (11.3KM)
CONTOURS 25M
MINING AREAS
WATER COURSES
LANDFORM
High : 1241m
Low : 189m
0 1.5 3 6 9
Kilometers
ENVIRONMENTAL PLANNING AND DESIGN
MAP 4 - LANDFORM AND DRAINAGE
AGGENEYS 1 SOLAR FACILITY
NORTHERN CAPE PROVINCE
PO Box 50910, MUSGRAVE ROAD, 4062
Tel:083 703 2995
Email: jon@enviroconsult.co.za
Date: 12/12/2018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LEGEND
AGGENEYS 1 SOLAR FACILITY PROJECT SITE
APPROXIMATE LIMIT OF VISIBILITY OF PROJECT 1 (11.3KM)
EXISTING POWER LINES
PLANNED FUTURE POWER LINES
DESCRIPTION
Degraded
Mines
Natural
Urban Built-up
Waterbodies
0 1.5 3 6 9 Kilometers
ENVIRONMENTAL PLANNING AND DESIGN
MAP 5 - LANDCOVER
AGGENEYS 1 SOLAR FACILITY
NORTHERN CAPE PROVINCE
PO Box 50910, MUSGRAVE ROAD, 4062
Tel:083 703 2995
Email: jon@enviroconsult.co.za
Date: 12/12/2018
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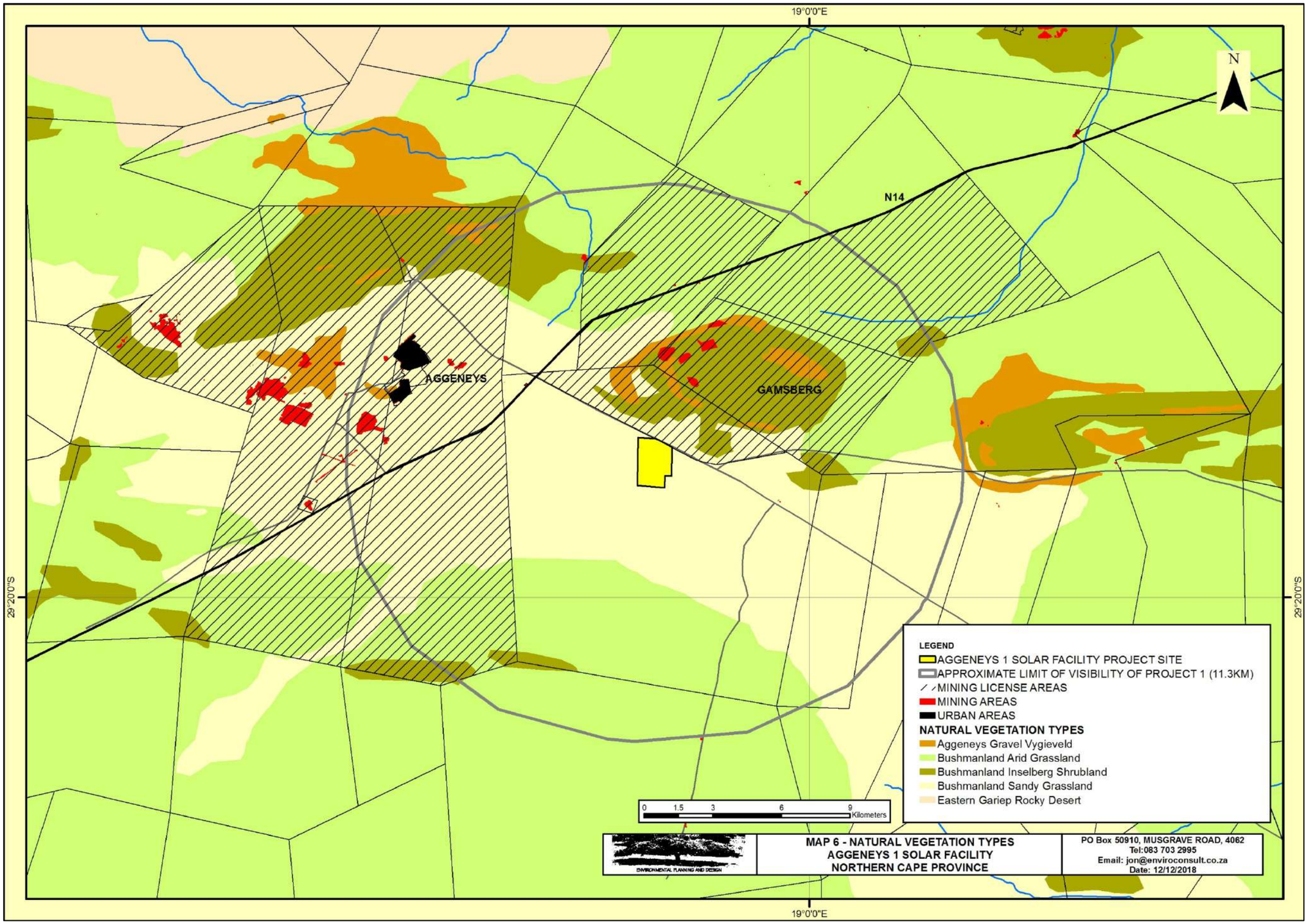
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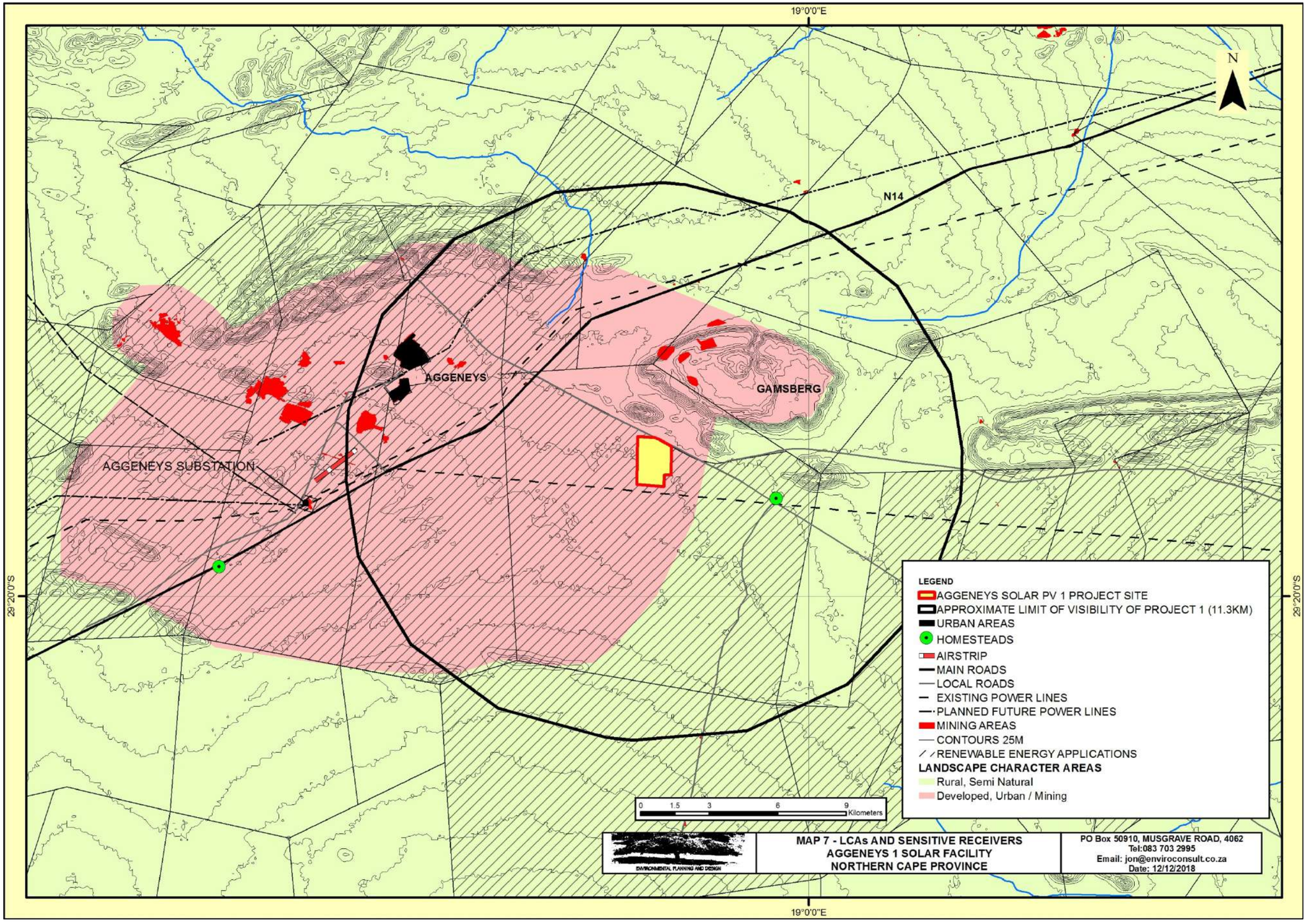
AGGENEYS
GAMSBERG
29°20'0"S
LEGEND
AGGENEYS 1 SOLAR FACILITY PROJECT SITE
APPROXIMATE LIMIT OF VISIBILITY OF PROJECT 1 (11.3KM)
MINING LICENSE AREAS
MINING AREAS
URBAN AREAS
NATURAL VEGETATION TYPES
Aggeneys Gravel Vygieveld
Bushmanland Arid Grassland
Bushmanland Inselberg Shrubland
Bushmanland Sandy Grassland
Eastern Gariep Rocky Desert
0 1.5 3 6 9
Kilometers
ENVIRONMENTAL PLANNING AND DESIGN
MAP 6 - NATURAL VEGETATION TYPES
AGGENEYS 1 SOLAR FACILITY
NORTHERN CAPE PROVINCE
PO Box 50910, MUSGRAVE ROAD, 4062
Tel:083 703 2995
Email: jon@enviroconsult.co.za
Date: 12/12/2018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N14
AGGENEYS
GAMSBERG
AGGENEYS SUBSTATION
29°20'0"S
LEGEND
AGGENEYS SOLAR PV 1 PROJECT SITE
APPROXIMATE LIMIT OF VISIBILITY OF PROJECT 1 (11.3KM)
URBAN AREAS
HOMESTEADS
AIRSTRIP
MAIN ROADS
LOCAL ROADS
EXISTING POWER LINES
PLANNED FUTURE POWER LINES
MINING AREAS
CONTOURS 25M
RENEWABLE ENERGY APPLICATIONS
LANDSCAPE CHARACTER AREAS
Rural, Semi Natural
Developed, Urban / Mining
0 1.5 3 6 9 Kilometers
ENVIRONMENTAL PLANNING AND DESIGN
MAP 7 - LCAs AND SENSITIVE RECEIVERS
AGGENEYS 1 SOLAR FACILITY
NORTHERN CAPE PROVINCE
PO Box 50910, MUSGRAVE ROAD, 4062
Tel:083 703 2995
Email: jon@enviroconsult.co.za
Date: 12/12/2018

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. General 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.

4.2 TYPICAL VISUAL EFFECTS ASSOCIATED WITH PV PROJECTS

4.2.1 Views of the PV Array

The PV units will be set at an acute angle to the ground and orientated in order to maximise power output. If fixed the PV units will be aligned to the north. Each unit could be up to 3.5m high.

In a fixed mounted PV array, units are generally aligned in rows with only sufficient space between the rows to allow access for maintenance and replacement. This means that when an array is viewed from ground level, it appears as a single row of units. However when viewed from a slightly elevated position or if the project is situated on an incline facing the viewer, the individual rows combine to increase visual mass.

A new solar array has been developed adjacent to Upington Airport. This array has been developed in two sections on either side of the airport runway. It is somewhat smaller than the subject project, covering approximately 25ha and the longest edge of the array being approximately 500m long. The PV panels are mounted on fixed frames approximately 2m high. Despite obvious differences compared with the proposed project, it does illustrate the effect of distance in mitigating the visibility of the solid line of solar panels.

Plate 10 indicates the location of the existing array at Upington Airport. **Plates 11, 12 and 13**, illustrate how the array is seen from distances of 700m, 1500m and 5000m respectively.

The following effects are noted;

- From 700m the array is clearly visible. For the same effect relative to a 3.5m high array, this distance will be approximately 1225m.
- From 1500m, the array is visible but even with the minimal vegetation providing screening at the airport, the dark line of panels is starting to blend into the background. The array is clearly visible but might be missed by a casual viewer. For the same effect relative to a 3.5m high array, this distance will be approximately 2712m.
- From 5000m, the line of panels is indistinguishable from the horizon. For the same effect relative to a 3.5m high array, this distance will be approximately 8750m.

A single axis tracking system could slightly increase the height of structures particularly during late afternoon and early morning when the units are tilted to their fullest extent. This could marginally increase the distance at which structures would be visible.

4.2.2 Security Lighting

The facility may be lit by security lights. This could result in the array being obvious at night from surrounding areas.

4.2.3 Glint and Glare

Glint and glare occur when the sun reflects off surfaces with specular (mirror-like) properties. Examples of these include glass windows, water bodies and potentially some solar energy generation technologies (e.g. parabolic troughs and CSP heliostats). Glint is generally of shorter duration and is described as "a momentary flash of bright light", whilst glare is the reflection of bright light for a longer duration.

The visual impact of glint and glare relates to the potential it has to negatively affect sensitive visual receptors in relative close proximity to the source (e.g. residents of neighbouring properties), or aviation safety risk for pilots (especially where the source interferes with the approach angle to the runway). The Federal Aviation Administration (FAA) of the United States of America have researched glare as a hazard for aviation pilots on final approach and may prescribe specific glint and glare studies for solar energy facilities in close proximity to aerodromes (airports, airfields, airbases, etc.). It is generally possible to mitigate the potential glint and glare impacts through the design and careful placement of the infrastructure.

PV panels are designed to generate electricity by absorbing the rays of the sun and are therefore constructed of dark-coloured materials, and are covered by anti-reflective coatings. Indications are that as little as 2% of the incoming sunlight is reflected from the surface of modern PV panels[9].

Because of the nature of tracking arrays that orientate the PV panels to capture as much energy as possible throughout the day, the glare associated with these systems is likely to vary and may be less than the glare associated with a fixed array.

Research indicates that for a fixed system glint and glare problems are most likely to occur to the west and north-west of a facility in the morning, to the east and north-east in the afternoon and evening. Glint and glare that is likely to be most problematic is likely to occur in the early morning and late afternoon/ evening as the sun is lowest in the north and light is reflected at a low level along the PV panels.

Because a tracking system adjusts the angle of solar panels to optimise the amount of energy captured by the system, the potential for glint and glare to be problematic is likely to be significantly lower than that of a fixed system. These systems have panels aligned north to south and track the sun from east to west, so the reflection would be back towards the direction of the sun. During mornings, east and south-east; and during afternoons, west and south-west.

Plate 10 - Existing Solar Arrays at Upington Airport as seen from the air.

[9] *Blue Oak Energy, FAA and Meister Consultants Group*

Plate 11 - Existing array seen in a flat landscape from approximately 700m. The array is clearly visible.

Plate 12 - **Existing array seen in a flat landscape from approximately 1500m**. The array is visible but even with the minimal vegetation providing screening at the airport, the dark line of panels is starting to blend into the background. The array is clearly visible but might be missed by a casual viewer who was not aware of its

existence.

Plate 13 - **Existing array seen in a flat landscape from approximately 5000m**. The line of panels is barely distinguishable. The viewer would have to know where to look to be able to differentiate the array from surrounding landscape features.

Plate 14 - PV array viewed from above. Note the array rows are read as one and have a similar impact as the roof of a large industrial building.

Plate 15 - PV array viewed from behind and the side. The dark face of the PV units are not obvious and subject to the colour of the undersides of the units, the supporting structures are likely to become more apparent. This might appear as a long industrial structure from close quarters. From a distance however, the shadow cast by the structure will be read and will probably appear similar in nature to the front view of the array.

Plate 16 - Glare experienced in the Control Tower at Boston Regional Airport from a PV array

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

5.1 ZONES OF THEORETICAL VISIBILITY

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

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

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

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

5.2 ASSESSMENT LIMIT

The GIS based assessment of Zones of Theoretical Visibility does not take the curvature of the earth or reduction in scale due to distance into account. In order to provide an indication of the likely limit of visibility due to this effect a universally accepted navigational calculation (**Appendix IV**) has been used to calculate the likely distance that the proposed structures might be visible over. This indicates that, in a flat landscape, the main bulk of the proposed development which consists of the solar array and the higher elements associated with the substation could be visible over the following distances.

Approximate limit of Visibility

ELEMENT	APPROXIMATE LIMIT OF VISIBILITY
Array solar PV panels 3.5m high	6.7 kilometres
Facility Substation 10m high	11.3 kilometres

In reality these distances could 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

These distances have been used to define an initial study area and are indicated on mapping.

5.3 APPROACH TO THE ASSESSMENT

The detailed location of the proposed array has been provided by the developer **(Map 2)**.

In order to generate the ZTV for the proposed array which will make up the bulk of the development, it has been assumed that the entire area of the array will be set at a uniform maximum height of 3.5m.

Points have been set at each change in direction of the array boundary plus an additional point at the centre of the array all with appropriate height offsets for the generation of the ZTVs using the Viewshed option in Arc Spatial Analyst.

In order to generate the ZTV for the proposed facility substation alternatives, it has been assumed that this section of the development will be set at a maximum height of 10.0m.

5.4 VISIBILITY

5.4.1 Zones of Theoretical Visibility (ZTV)

The bulk of the development that is comprised of the array and the higher elements that are comprised of electrical infrastructure are likely to be visible over a very similar area.

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

The assessment indicates that;

i. The development may be visible intermittently over approximately 3km of the N14.
ii. The development is unlikely to be visible to the settlement of Aggeneys or the Aggeneys airstrip at a distance of approximately 9.0km and 10.8km respectively.
iii. The development is likely to be visible to approximately 12.9km of the un-surfaced local road that runs past the northern boundary of the site.
iv. The development is likely to be visible to one homestead within the approximate limit of Visibility. This homestead is located approximately 4.6km to the east south east of the proposed project.
v. Visibility of the proposed project is largely contained to the north, west and south by the Gamsberg and inselbergs. In these directions the landscape is already affected by mining development and settlement (Developed LCA). Due to the relatively open landscape to the west of the site, the project is likely to be visible across the relatively natural landscape in this direction (Rural LCA).

Map 9 indicates the ZTV for the proposed facility substations. The ZTV for the substations is near identical so this map is representative of the impact area of both alternatives. The assessment indicates that;

i. The substation may be visible intermittently over approximately 3km of the N14.

ii. The substation is unlikely to be visible to the settlement of Aggeneys or the Aggeneys airstrip at a distance of approximately 9.0km and 10.8km respectively.
iii. The substation is likely to be visible to approximately 12.9km of the un-surfaced local road that runs past the northern boundary of the site. Whilst the two alternatives will be visible over a similar length of this road. Alternative 2 which is located adjacent to the road is likely to be highly obvious whereas Alternative 1 which is located approximately 2km from the road and will be partially screened by the solar array will be significantly less obvious.
vi. The substation is likely to be visible to one homestead within the approximate limit of Visibility. This homestead is located approximately 4.6km to the east south east of the proposed project.
iv. Visibility of the proposed substation is largely contained to the north, west and south by the Gamsberg and inselbergs. In these directions the landscape is already affected by mining development and settlement (Developed LCA). Due to the relatively open landscape to the west of the site, the project is likely to be visible across the relatively natural landscape in this direction (Rural LCA).

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

The Visual Absorption Capacity (VAC) of the landscape is 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.

Within the Developed LCA, views of development are relatively obvious. Whilst views over solar projects are currently not present in the area, this is likely to change soon as REDZ 8 becomes more developed. The proposed development is therefore likely to appear relatively normal within the area.

5.6 THE LIKELY NATURE OF VISUAL IMPACTS ASSOCIATED WITH THE PROPOSED PROJECT

5.6.1 General

The fact that the terrain is relatively flat will mean that the project is likely to be viewed in profile by all identified receptors. It will therefore be seen as a dark line in the landscape. Distance will dictate how obvious the dark line is.

The surrounding landscape has been shown to generally have a relatively low level of VAC. This is likely to mean that relatively unbroken views of the project are likely to be possible.

The fact that the proposed project is located in a REDZ means that a number of additional solar energy projects are likely to be developed in the vicinity. The strategic nature of the REDZ should ensure that there is less demand for similar development in other perhaps more sensitive landscape areas. It is therefore highly likely that solar energy projects will become a common sight in the vicinity of the site. Whilst the

current outlook is natural, this is therefore likely to change relatively rapidly and become progressively more industrialised.

One project, the Orlight PV facility, to the north of the proposed development site is currently under construction.

5.6.2 Timing of Impacts

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

Site preparation will generally include the following activities:

- Vegetation clearance – removal or cutting of any vegetation if present (bush cutting);
- Levelling and grading of areas where the array will be sited would normally occur, the assessment indicates that the land is relatively flat so only minor grading should be required;
- Levelling of hard-standing areas, e.g. for temporary lay-down and storage areas. As indicated above only minor grading is likely to be necessary;
- Construction of the onsite substation;
- Erection of site fencing; and
- Construction of a temporary construction camp which will occur within a lay down area within the overall site.

These activities are only likely to be visible from the immediate vicinity of the site.

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

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

The construction phase is programmed to take approximately 18 months.

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

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

The main visible elements are likely to include the solar array, the onsite substation, the lay down area and minor buildings located within a fence line.

5.6.3 Views from the N14

Due to its tourism importance, the N14 is likely to be one of the most sensitive visual receptors.

At its closest, the N14 is approximately 4.8km from the proposed PV array. This means that the array is likely to have a slightly smaller visual effect than that

indicated in **Plate 12**. The PV array is likely to be seen as a relatively dark line that is unlikely to be highly obvious on the horizon. At this distance and due to the relative transparent nature of taller electrical infrastructure, the substation is not likely to be highly obvious. It may however be visible above the array.

5.6.4 Views from the adjacent local un-surfaced road

This road is likely to be largely used by local people and mine operators but it may also be used by a small percentage of tourism related traffic.

The road runs immediately adjacent to the northern boundary of the project site. The array will be orientated towards the road.

The PV array and onsite substation will therefore be obvious from the road. With the array being highly obvious. The impact of the substation will be subject to the alternative that is selected.

Substation alternative 2, being located adjacent to the road will be highly obvious, whereas alternative 1 being located approximately 2km from the road and partially screened by the solar array, is unlikely to be highly obvious.

5.6.5 Views from Adjacent Homesteads

Probably due to the fact that the majority of adjacent land is subject to mining, there are very few homesteads in the area.

The nearest homestead is approximately 4.6km from the proposed project. This homestead doesn't appear to be inhabited although stock pens adjacent to the homestead appear to be used.

The array is likely to have a slightly smaller visual effect than that indicated in **Plate 12** on the closest homestead. The PV array is likely to be seen as a relatively dark line that is unlikely to be highly obvious on the horizon. At this distance and due to the relative transparent nature of taller electrical infrastructure, the substation is not likely to be highly obvious. It may however be visible above the array.

5.6.6 Views from Settlement areas

Aggeneys is the only settlement in the vicinity, at its closest it is approximately 8.9km from the proposed project. This is outside the Approximate Limit of Visibility of the proposed array. The proposed array is therefore unlikely to be visible. This is borne out by section 4.4.6 and **Plate 13**.

It is within the Approximate Limit of Visibility of taller elements including the substation. However, given the density of development and vegetation within the settlement, even if it were visible from the settlement, it is unlikely to be obvious.

5.6.7 Glare from the PV array potentially affecting adjacent roads and the flight path into the Aggeneys airstrip

There are three areas where glare may be a concern for stakeholders including:

- The Aggeneys aerodrome;
- The un-surfaced road to the north of the project ; and
- The N14

Aggeneys aerodrome is located approximately 10.5km to the west of the proposed array. Due to the location of the facility relative to the airport it would only be possible for reflected light from the array to affect pilots on the northern flight path into the aerodrome.

The sun would have to be a considerable way north in order to create reflected light that would impact on the northern flight path. The worst case scenario would be at sunrise during mid-winter. At sunrise on the 22nd June, the sun has an azimuth of approximately 63°T in the Aggeneys area.[10] Given that, for a fixed system, the solar panels will be orientated to the north, light would reflect at approximately 296°T. At touchdown at the northern end of the runway, an aircraft would be located at an approximate bearing of 270°T relative to the array. This means that during the most likely period for glare to impact, reflected light from the facility may affect an area south of approximately 26°T. This relates to approximately 3km of the northern flight path. The reflection will be at an angle such that it will be behind the pilot's vision on the approach to the runway. However, the reflected light could be in a pilot's peripheral vision on take-off.

Given its inability to optimise its angle to the sun, a fixed system is likely to have greater potential for glint and glare to be problematic than a tracking system.

Given the distance, and given that there is only potential for a pilot to see reflected light from the array in his / her peripheral vision on take-off and will not affect the straight ahead view or the view of instruments, it can be concluded that the proposed facility is highly unlikely to have any significant effect on the aerodrome.

The US Federal Aviation Authority (US FAA) have led the way in terms of assessing the impacts of glare created by solar projects around airports. Because the US FAA has no specific standards for airport solar facilities and potential glare, the type of glare analysis that they require varies. Depending on site specifics (e.g., existing land uses, location and size of the project) an acceptable evaluation could involve one or more of the following levels of assessment:

a) A qualitative analysis of potential impact in consultation with the Air Traffic Control Tower, pilots, and airport officials;
b) A demonstration field test with solar panels at the proposed site in coordination with Air Traffic Control Tower personnel; or
c) A geometric analysis to determine days and times when there may be an ocular impact[11].

The information provided above provides a basic geometric analysis.

From reference to the ZTV, the project could be visible intermittently over a small section of the N14. This section of road however is set at a bearing of approximately 30°T from the proposed project. Given the distance (approximately 5km) and the bearing, it is highly unlikely that the N14 will be affected by glare from the proposed project.

[10] Sun angle calculator https://www.suncalc.org
[11] US FAA

Because glare is reflected light from an inclined panel, it will generally affect areas above the level of the panel surface.

As the un-surfaced local road that runs adjacent to the northern boundary of the site gradually rises from the site towards the N14, it is possible that glare could affect this section of the road particularly during early mornings during winter months. The road also runs along an approximate bearing of 26°T which means that it could be affected during mid-winter. As the sun moves further south however areas affected by reflected light will also move south away from the road.

Should glare prove problematic on this road, mitigation might include the implementation of a screen fence along the northern edge of the array. It might also include a slight adjustment to the angle of repose of solar panels. A small adjustment is likely to be sufficient to mitigate possible impacts.

The applicant has indicated that an adjustment of the angle could have a large consequence in terms of energy production and that a screen might be the best mitigation measure.

5.6.8 Lighting Impacts

The facility will be lit by security lights to a level sufficient to ensure that security cameras can operate at night. This is likely to result in the array being obvious at night from surrounding areas. The area to the south and east of the proposed site has no lighting obvious at night whereas areas to the west the town of Aggeneys and the existing mining operations are well lit. Lighting from passing traffic on the N14 is also obvious. There is potential therefore for the project to extend the influence of lighting into an area that would otherwise be relatively dark at night.

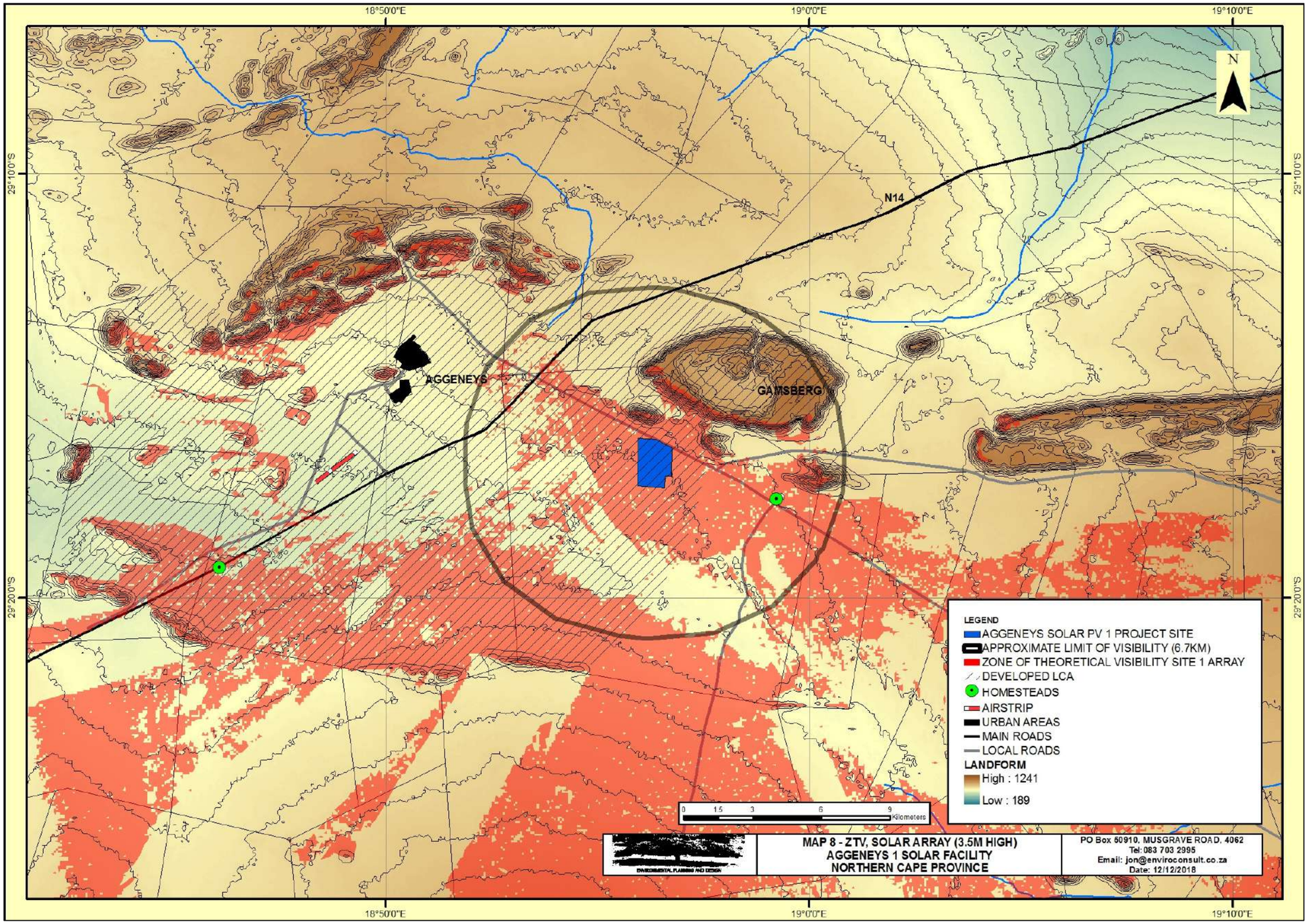
5.7 SITE SENSITIVITY

The overview of likely impacts (5.6) indicates that the main receptor that is likely to be affected by the proposed project is the un-surfaced local road that runs adjacent to the northern boundary of the site.

This road is likely to be mainly used by local people, however it could also be used occasionally by tourists. It is therefore not likely to be highly sensitive to landscape changes associated with the proposed project.

Considering the location of the proposed project on the project site, it is likely to be visible from the road.

Whilst the road may not be highly sensitive, it is still important to protect the general visual amenity of the area. The key consideration is locating the project as far from the road as possible. An undeveloped natural buffer area should be maintained adjacent to the road reserve. The wider this buffer is the more effective this mitigation measure is likely to be. A minimum buffer of 100m was proposed at the outset of the project and has been incorporated into the layout.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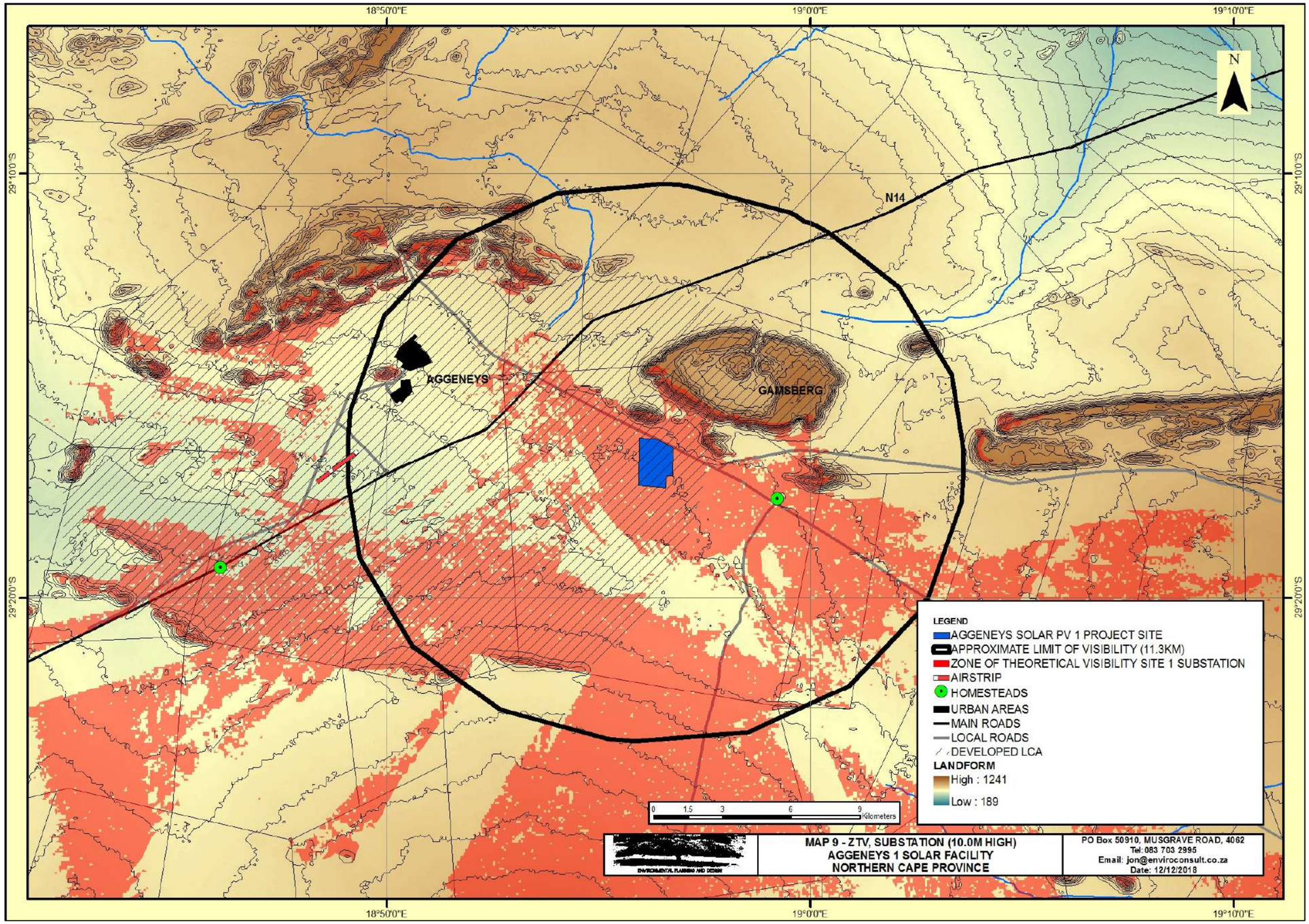
GAMSBERG
LEGEND
AGGENEYS SOLAR PV 1 PROJECT SITE
APPROXIMATE LIMIT OF VISIBILITY (6.7KM)
ZONE OF THEORETICAL VISIBILITY SITE 1 ARRAY
DEVELOPED LCA
HOMESTEADS
AIRSTRIP
URBAN AREAS
MAIN ROADS
LOCAL ROADS
LANDFORM
High : 1241
Low : 189
0 1.5 3 6 9
Kilometers
MAP 8 - ZTV, SOLAR ARRAY (3.5M HIGH)
AGGENEYS 1 SOLAR FACILITY
NORTHERN CAPE PROVINCE
PO Box 50910, MUSGRAVE ROAD, 4062
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 12/12/2018


18°50'0"E
19°0'0"E
19°10'0"E
29°10'0"S
29°20'0"S
N
N14
AGGENEYS
GAMSBERG
LEGEND
AGGENEYS SOLAR PV 1 PROJECT SITE
APPROXIMATE LIMIT OF VISIBILITY (11.3KM)
ZONE OF THEORETICAL VISIBILITY SITE 1 SUBSTATION
AIRSTRIP
HOMESTEADS
URBAN AREAS
MAIN ROADS
LOCAL ROADS
DEVELOPED LCA
LANDFORM
High : 1241
Low : 189
0 1.5 3 6 9 Kilometers
MAP 9 - ZTV, SUBSTATION (10.0M HIGH)
AGGENEYS 1 SOLAR FACILITY
NORTHERN CAPE PROVINCE
PO Box 50910, MUSGRAVE ROAD, 4062
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 12/12/2018

VISUAL IMPACT ASSESSMENT

6.1 ISSUES TO BE ADDRESSED

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

a) The proposed development could change the character of a relatively natural area to the south and east of the proposed site;
b) The proposed development could change the character of the landscape as seen from the N14;
c) The proposed development could change the character of the landscape as seen from the un-surfaced local road that runs to the north of the site;
d) The proposed development could change the character of the landscape as seen from local homesteads;
e) The proposed development could change the character of the landscape as seen from local settlement areas;
f) Glare could affect travellers on the un-surfaced local road that runs to the north of the site;
g) Glare could affect the northern flight path of Aggeneys Aerodrome; and
h) Lighting impacts.

6.2 ASSESSMENT METHODOLOGY

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

The methodology for the assessment of potential visual impacts includes:

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

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

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

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

6.2 VISUAL IMPACT ASSESSMENT

6.2.1 The proposed development could change the character of a relatively natural area to the south and east of the proposed site (Landscape Change)

Nature of impact:

The proposed solar project is located on the eastern edge of a landscape character area that is influenced by development. To the south and east, the landscape becomes increasingly less influenced by development. There is a possibility that the proposed development will extend the influence of development into this relatively natural area.

The proposed project is relatively low with the bulk of the development not exceeding 3.5m in height. This could be visible for up to 6.7km and could extend the influence of development into the more natural area to the east by up to approximately 6km.

No high level overview of the project is possible. The array will be seen in profile as a dark line on the horizon which will start to visually blend with the background around 2.7km from the development.

Electrical infrastructure relating to the on-site substation will be in the order of 10m high that could potentially be visible for approximately 11.3km, however, this is likely to be comprised of relatively slim structures that are unlikely to be obvious at this distance.

The above factors will result in the project being seen as an obvious hard geometric form extending the visual influence of development to the east. It is obvious therefore that the rural character of the landscape is likely to be affected. This is only likely to modify the Rural LCA over a relatively small area extending the visual influence of development approximately 2km into the Rural LCA.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Small to Minor, **(1)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low, **(24)**	Low, **(21)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase.	**No irreplaceable loss**

	There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	
Can impacts be mitigated?	**Yes**	**N/A**

Mitigation / Management:

Planning:

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

Operations:

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

Decommissioning:

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

Cumulative Impacts:

The proposed project will extend the general influence of development and specifically solar projects into a relatively natural rural area to the south and east of the proposed site.

The overall cumulative impact is assessed as having a medium significance, however, the contribution of the proposed project to this cumulative impact is assessed as low.

See appendix IV.

Residual Risks:

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

rehabilitation is undertaken.

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

Nature of impact:

The ZTV analysis indicates that the proposed PV array could be visible intermittently over approximately 1.7km of the road at a distance of approximately 4.8km. The proposed array forming the bulk of the development is relatively low not exceeding 3.5m in height. Whilst this could be visible for up to 6.7km the array will be seen in profile as a dark line on the horizon which will start to visually blend with the background around 2.7km from the development.

Taller electrical infrastructure is likely to be visible over a similar section of the road and at the same distance. It is however not likely to be highly obvious.

No high level overview of the project is possible. Therefore, whilst the development is likely to be visible from a short section of the N14, it is highly unlikely to be obvious.

It also needs to be understood that the section of the N14 in question is located within an area where the landscape character is heavily influenced by development. This influence is likely to increase due to expanding mining operations and the possibility that other solar projects are likely to be obvious from this section of the road. A glimpse of the proposed project that is unlikely to be obvious will therefore not change the character of the view from the road in any significant way.

There is likely to be a relatively high proportion of tourism related traffic on this road which elevates the sensitivity to the possible change in view.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small **(0)**	Small **(0)**
Probability	Very improbable **(1)**	Very improbable **(1)**
Significance	Low **(6)**	Low **(6)**
Status	The character of the rural outlook from the road is highly unlikely to be modified in any significant way. **Neutral**	**Neutral**
Reversibility	High	High

Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	**Yes** but this is highly unlikely to change the level of impact.	

Mitigation / Management:

Planning:

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

Operations:

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

Decommissioning:

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

Cumulative Impacts:

The proposed project is very unlikely to have any significant impact on the N14.

A detailed visual analysis of other solar projects in the area has not been undertaken, however, it is possible that other solar projects may be closer to the N14 in which case they could have a significantly higher impact.

The overall cumulative impact is assessed as having a medium significance, however, the contribution of the proposed project to this cumulative impact is assessed as low.

See Appendix IV.

Residual Risks:

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

rehabilitation is undertaken.

6.2.3 The proposed development could change the character of the landscape as seen from the un-surfaced local road that runs to the north of the site.

Nature of impact:

No high level overview of the project is possible. It will be seen from a relatively low level and it will appear as a dark line in the landscape

The proposed array forming the bulk of the development is relatively low - not exceeding 3.5m in height. Whilst this could be visible for up to approximately 12km of the road, the array will start to visually blend with the background around 2.7km from the development.

Taller electrical infrastructure relating to the on-site substation will be in the order of 10m high that could potentially be visible for approximately 11.3km, however, this is likely to be comprised of relatively slim structures that are unlikely to be obvious at this distance. The substation alternative 2 being located adjacent to the road, is likely to be highly obvious from the road whereas alternative 1 being located approximately 2km from the road and being partially screened by the array is not likely to be highly obvious.

Given the location of other planned solar projects it is likely that other solar developments could be visible from this section and adjacent sections of the road.

The proposed project will therefore be obvious from approximately 6km of the road although it may be visible over approximately 12km.

The majority of affected travellers are likely to be local people as well as people working and transporting equipment to and from the adjacent mine. These people are unlikely to be sensitive to the change in view associated with the development. There is however likely to be a small proportion of tourism related travellers on the road who will be sensitive.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	**Array with Substation Alternative 1** Low **(4)** **Array with Substation Alternative 2** Low to moderate **(5)**	**Array with Substation Alternative 1** Minor to Low **(3)** **Array with Substation Alternative 2** Low **(4)**

Probability	Probable **(3)**	Probable **(3)**
Significance	**Array with Substation Alternative 1** Medium **(30)** **Array with Substation Alternative 2** Medium **(33)**	**Array with Substation Alternative 1** Low **(27)** **Array with Substation Alternative 2** Medium **(30)**
Status	It is unlikely that all travellers on the road will consider the change in view as negative. It is likely however that a proportion of local people as well as tourists will consider the change as a negative impact. **Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	Yes, however, due to the proximity of the project to the road and the low VAC of the landscape, mitigation can only visually soften views of the project and not hide it.	

Mitigation / Management:

Planning:

- Plan to set back the development from the road as far as possible. During initial work, a 100m setback was proposed. This will ensure that the array associated infrastructure and the security fence does not crowd the road. It will also ensure that there is a band of natural vegetation beside the road providing a link with the surrounding natural landscape.
- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible; and
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;

- Monitor rehabilitated areas post-construction and implement remedial actions; and
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area particularly the development setback area from the local road.

Decommissioning:

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

Cumulative Impacts:

Whilst a detailed visual analysis of other solar projects in the area has not been undertaken, it is possible that the proposed and the neighbouring project (2) within the same property could have a similar or lower impact than those projects further to the east. This will be subject to the location of the other projects relative to the road.

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

See Appendix IV.

Residual Risks:

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

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

Nature of impact:

Only one homestead could potentially be affected. The homestead does not appear to be inhabited although the stock pens around it appear to be used. There is certainly no secondary tourism use associated with the structure. Therefore the owners / inhabitants are unlikely to be sensitive to the possible landscape change.

There are other structures apparent on on-line mapping;

- One group of structures approximately 8.5km to the south; and
- A number of structures to the north of the N14.

From the site visit it was confirmed that the structures to the south are comprised of a number of stock pens and the structures to the north of the N14 are all associated with construction or industrial activities.

The homestead is located approximately 4.6km to the south east of the proposed project. It is set at a slightly higher level than the site but not so high that an overview of the project will be possible.

The proposed array forming the bulk of the development is relatively low - not exceeding 3.5m in height. Whilst this could be visible for up to approximately 12km of the road to the north of the site, the array will start to visually blend with the background around 2.7km from the development. The proposed facility substation is unlikely to be highly obvious from this distance.

It is therefore possible that the proposed project may be visible from this homestead however it is unlikely to be obvious.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor to Low, **(3)**	Minor, **(2)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low, **(18)**	Low, **(16)**
Status	Given that the property is not inhabited and has no secondary tourism related use, the impact is unlikely to be seen as negative. **Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be no irreplaceable loss. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	Yes	

Mitigation / Management:

Planning:

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

Operations:

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

Decommissioning:

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

Cumulative Impacts:
Whilst a detailed assessment of the impact of other projects has not been undertaken, from review of online mapping, there do not appear to be any homesteads that are likely to be affected by potential projects.

The cumulative impact is therefore also likely to be improbable with a low significance.

See appendix IV.

Residual Impacts:
The residual risk relates to the infrastructure being left in place on decommissioning of the solar project. It is therefore critical that effective rehabilitation is undertaken.

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

Nature of impact:

The only settlement area that might be affected is the small town of Aggeneys.

The ZTV assessment indicates that elements associated with the proposed development are unlikely to be visible from Aggeneys.

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

Status	It is unlikely that there will be a significant change in the character of the view from Aggeneys. **Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	No mitigation is necessary	
Mitigation / Management: No mitigation is necessary		
Cumulative Impacts: Whilst a detailed assessment of other projects has not been undertaken, it is possible that they may impact on this settlement. However, views of the surrounding landscape from within Aggeneys are difficult to see due to the density of development and roadside / garden vegetation. Where external views are possible they are also highly influenced by development, particularly mining operations. Cumulative impacts are therefore anticipated to be low. **See appendix IV.**		
Residual Risks: No residual risks.		

6.2.6 Glare could affect travellers on the un-surfaced local road that runs to the north of the proposed site.

Nature of impact: As the un-surfaced local road that runs adjacent to the northern boundary of the site gradually rises from the site towards the N14, it is possible that glare could affect this section of the road particularly during winter months. The road immediately east of the site also rises slightly. The angle of the array relative to the road means that glare may affect this section of the road in the immediate vicinity of the site.		
	Without mitigation	**With mitigation**

Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Small **(0)**
Probability	Probable **(3)**	Very improbable **(1)**
Significance	Low **(24)**	Low **(6)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	**no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	Yes	

Mitigation / Management:

Operations:

Should glare prove problematic on this road, mitigation might include the implementation of a screen fence along the northern edge of the array.

Another option could be to include a slight adjustment to the angle of repose of solar panels, however, the applicant has indicated that this is not feasible because it would impact negatively on power production; a screen fence is therefore the preferred mitigation method.

Cumulative Impacts:

It is possible that glare associated with the proposed project could add to glare associated with other projects. With mitigation however, glare associated with this project is highly unlikely to impact. The likely contribution to cumulative impacts is therefore assessed as **low**.

See appendix IV.

Residual Risks:

There are no residual risks.

6.2.7 Glare could affect the northern flight path of Aggeneys Aerodrome.

Nature of impact:

Aggeneys Aerodrome is approximately 10.5km to the west of the proposed project.

It is possible but given the distance unlikely that reflected light from the array could be visible from the northern flight path particularly during early mornings during

winter months. It will however not affect the straight ahead pilot's view or the view of instruments.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site and immediate surroundings **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Small **(0)**
Probability	Improbable **(2)**	Very improbable **(1)**
Significance	Low **(16)**	Low **(6)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	**no irreplaceable loss**.	**No irreplaceable loss.**
Can impacts be mitigated?	Yes	

Mitigation / Management:

Operations:

If glare proves to be problematic, the only mitigation possible would be adjustment of the angle of repose of the panels. Due to distance, a minor adjustment in the angle is likely to be all that is needed. The applicant has indicated that adjusting the angle of the panels is not economically feasible given the potential for reduction in energy production. As indicated, if glare does occur it will only affect the peripheral vision of a pilot and it is therefore not anticipated to be problematic (low significance). However, the applicant is consulting with the mine (the owner of the landing strip) and with CAA on this matter and they will aim to find a practical solution with the mine, should glint and glare be a problem.

Cumulative Impacts:

It is possible that glare associated with the proposed project could add to glare associated with other projects. With mitigation however, glare associated with this project is highly unlikely to impact. The likely contribution to cumulative impacts is therefore assessed as **low**.

See appendix IV.

Residual Risks:

There are no residual risks.

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

Nature of impact:

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

To the south and east of the proposed site there is no lighting obvious at night whereas to the west the town of Aggeneys and the existing mining operations are well lit. Lighting from passing traffic on the N14 is also obvious.

There is potential therefore for the project to extend the influence of lighting into an area that would otherwise be relatively dark at night.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Small to minor **(1)**
Probability	Definite **(5)**	Improbable **(2)**
Significance	Medium **(50)**	Low **(12)**
Status	The appearance of a large lit area may be accepted by most people because it is so close to the N14, major mining operations as well as Aggeneys, all of which are well lit. It is likely however that some people will see the expansion of lighting as a **negative** impact.	If the lights are generally not visible then the occasional light is unlikely to be seen as negative. **Neutral**
Irreplaceable loss	It would be possible to change the lighting / camera system so the impact cannot be seen as an irreplaceable loss.	No irreplaceable loss
Reversibility	High	High
Can impacts be mitigated?	Yes	

Mitigation / Management:

- Use low key lighting around buildings and operational areas that is triggered only when people are present;
- Plan to utilise infra-red security systems or motion sensor triggered security

lighting;

- Ensure that lighting is focused on the development with no light spillage outside the site; and
- Keep lighting low, no tall mast lighting should be used.

Cumulative Impact:

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

See appendix IV.

Residual Risks:

No residual risk has been identified.

7 IMPACT STATEMENT

7.1 VISIBILITY

The visual impact of the proposed project will be limited by both minor undulations in topography as well as the larger inselbergs that enclose the landscape to the north, south and east.

The limited height of the bulk of the proposed development which is comprised of the arrays not exceeding 3.5m also helps to limit visibility. The exception to this is the facility substation which includes equipment up to 10m high. However, this equipment is likely to be relatively transparent being comprised largely of lattice structures and bus bars. From closer views this equipment will be seen above the array. From distances greater than approximately 3km however, it is unlikely to be highly obvious.

The development is located on the northern side of a broad NE – SW running shallow valley. Due to the fact that the project is located on a relatively flat area on the upper valley slope from which the valley side slopes away, the development is largely screened from the valley floor. Visibility is focused on the northern and southern upper valley slopes. Within the approximate limit of visibility of the array, the main area of impact is focused on the band of visibility on the upper northern slopes.

This band of visibility is loosely centred on an un-surfaced local road that runs along the upper valley slope linking into the N14 near Aggeneys close to the Approximate Limit of Visibility of the array.

At its widest this band of visibility is approximately 4km in width, it tapers to the northwest to nothing towards the N14 and is relatively consistent in width to the south east.

To the west and northwest the character of the affected area is influenced by large scale mining operations and settlement. To the south and south east the character of the landscape becomes progressively more natural as the viewer moves away from these areas of large scale development.

7.2 LANDSCAPE CHARACTER AREAS AND VISUAL ABSORPTION CAPACITY

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

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

  Throughout this LCA, VAC of the landscape is only likely to be provided by landform which includes minor ridgelines and tall inselbergs. The inselbergs provide enclosure creating a series of discrete landscape areas enclosed by the tall rocky landforms.

  Within these enclosed landscapes, 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.

This LCA is centred on a broad shallow valley between the Gamsberg to the north and a series of minor inselbergs to the south. To the east the valley runs into relatively an un-enclosed and relatively natural area.

- **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.

  The character of this area is heavily influenced by development including major mining operations, infrastructure and settlement. The extent is limited to areas from where these elements are visible.

  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 a degree of screening.

  Views of development within this LCA are largely limited by the same landform features that define its extent.

  The exception to this includes 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.

7.3 VISUAL IMPACT

Visual impacts are likely to include;

a) The general change in character of the landscape due to the proposed development was assessed as low to medium significance without mitigation and low significance with mitigation. This is due to the fact that the undeveloped nature of the Rural Character Area to the south and east of the proposed project site will be affected, extending the Developed Landscape Character Area by approximately 2km.
b) The possible change in view as seen from the N14 was assessed as very improbable with a low significance. This is due to the fact that the project is only likely to be visible over a relatively short length of the road, and the change in view is unlikely to be obvious to travellers on the road.
c) Visual impacts on the un-surfaced road that runs adjacent to the northern boundary of the proposed site were assessed as having a medium significance without mitigation and a low significance with mitigation. The project may be visible over approximately 12 km and is likely to be obvious over approximately 6km of this road. Key mitigation includes the setting back of the project from the road to ensure that the project doesn't monopolise views from the road and a band of natural vegetation softens the view. The selection of Alternative Substation 1 is also important in minimising impacts on this road. Alternative 1 is located approximately 2km from the road and is partially screened by the array and is therefore unlikely to be highly obvious. By comparison, Alternative Substation 2 is located adjacent to the road and it will be highly obvious.

d) Visual impacts on homesteads are assessed as improbable with a low significance. The impact is also likely to have a neutral significance due to the only possible affected homestead being uninhabited.
e) Visual impact on the settlement of Aggeneys is assessed as very improbable with a low significance. This is due to the fact that the project is unlikely to be visible from the settlement.
f) The impact on glare on travellers on the un-surfaced road to the north of the proposed site is assessed as an improbable impact with a low significance without mitigation and a very improbable impact with a low significance with mitigation. This is due to the orientation of the proposed array to the road and the relatively simple mitigation measures that are possible should glare prove problematic.
g) The impact on glare on the northern flight path into the Aggeneys Aerodrome was also assessed as an improbable impact with a low significance without mitigation and a very improbable impact with a low significance with mitigation. This is due to the orientation of the proposed array to the flight path.
h) The impact of lighting is assessed as possibly having a medium significance without mitigation. With mitigation which includes careful planning including the use of motion sensors or infrared security technology the significance is likely to reduce to low.

7.4 CUMULATIVE IMPACTS

Due to the fact that the proposed project and other proposed projects to the east will extend the visual influence of development into an area that currently appears relatively natural, the cumulative impact on landscape character is assessed as having a medium significance. However, the cumulative contribution that can be attributed to the proposed project is low due to the relatively small extent of impact associated with it.

Cumulative visual impacts affecting the N14 are also assessed as likely to have a medium significance due to the location of other proposed projects. The cumulative contribution of the project is also assessed as low due to the fact that it is unlikely to be obvious from this road.

Cumulative visual impacts affecting the un-surfaced road to the north of the project are also assessed as likely to have a medium significance due to the location of this and other proposed projects. The cumulative contribution of the project is also assessed as low due to the relatively small impact extent and the nature of the road.

Cumulative visual impacts that are likely to be experienced within the settlement of Aggeneys, from local homesteads as well as impacts associated with lighting and glare are assessed as having a low significance.

7.5 CONCLUSION

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

Identified visual impacts are generally assessed as low with the exception of impacts on the un-surfaced local road that runs immediately adjacent to the northern

boundary of the proposed site. With appropriate setbacks, the selection of Substation Alternative 1 however, and due to the nature of traffic on this road, the impact significance with mitigation is likely to be low.

Other key mitigation measures required to minimise visual impacts include the careful management of vegetation within and around the site.

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

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APPENDIX I

SPECIALIST'S BRIEF CV

Name	JONATHAN MARSHALL
Nationality	British
Year of Birth	1956
Specialisation	Landscape Architecture / Landscape & Visual Impact Assessment / Environmental Planning / Environmental Impact Assessment.
Qualifications	
Education	Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979)
	Environmental Law, University of KZN (1997)
Professional	Registered Professional Landscape Architect (SACLAP) Chartered Member of the Landscape Institute (UK) Member of the International Association of Impact Assessment, South Africa
Languages	English - Speaking - Excellent - Reading - Excellent - Writing - Excellent
Contact Details	Post: 13 Askew Grove Glenwood Durban 4001 Cell: +27 83 7032995

General

Jon qualified as a Landscape Architect (Dip LA) at Cheltenham (UK) in 1979. He has been a chartered member of the Landscape Institute UK since 1986. He is also a Registered Landscape Architect and has had extensive experience as an Environmental Assessment Practitioner within South Africa.

During the early part of his career (1981 - 1990) He worked with Clouston (now RPS) in Hong Kong and Australia. During this period he was called on to undertake visual impact assessment (VIA) input to numerous environmental assessment processes for major infrastructure projects. This work was generally based on photography with line drawing superimposed to illustrate the extent of development visible.

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

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

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

Select List of Visual Impact Assessment Projects

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

of strategic Eskom infrastructure near Saldanha in the Western Cape.

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

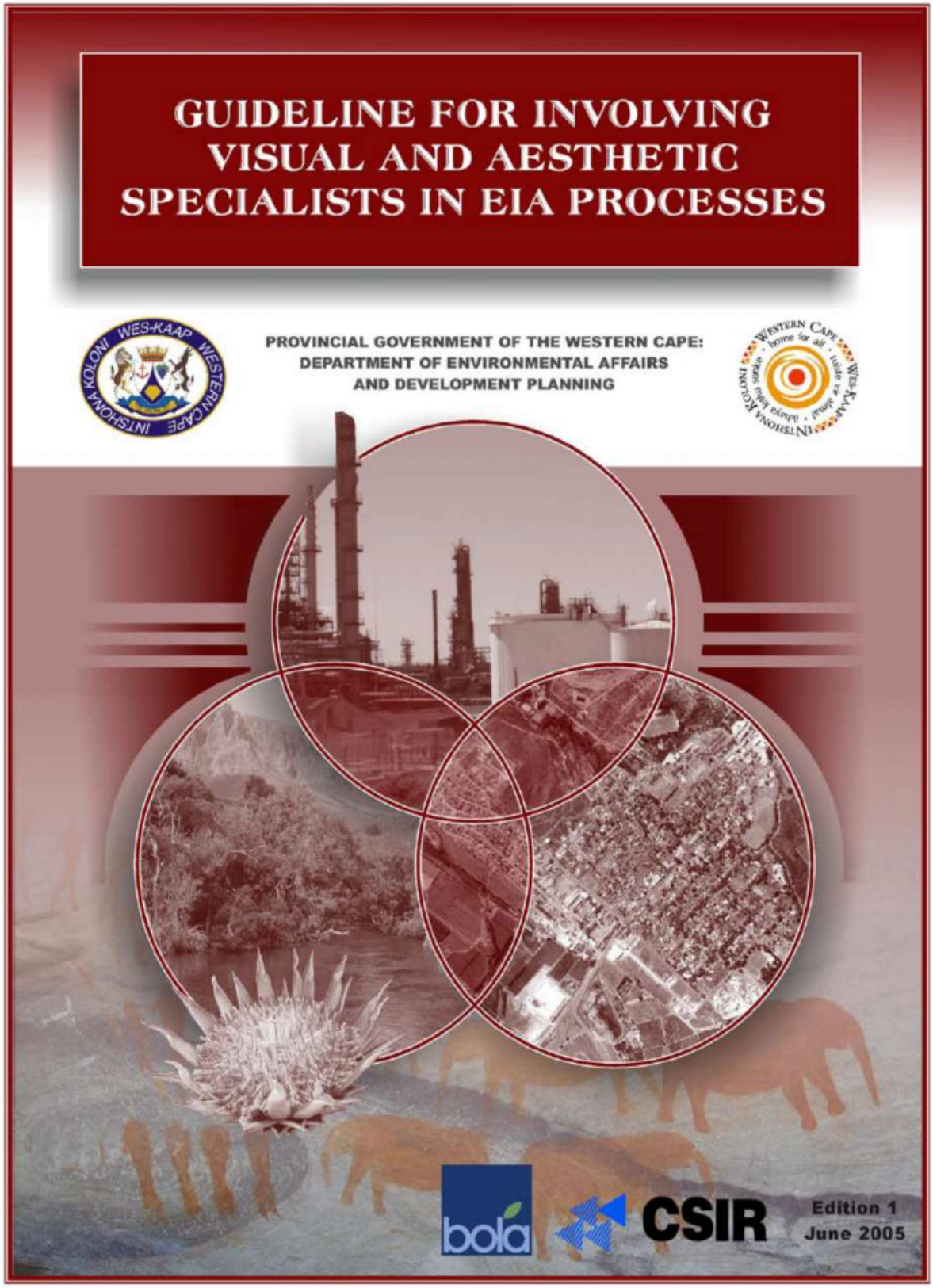
developments for Blast Media.

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

APPENDIX II

GUIDELINES FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

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


GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES
PROVINCIAL GOVERNMENT OF THE WESTERN CAPE:
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
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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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PREFACE

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

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

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

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

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

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

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

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

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

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

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

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

Who is the target audience for these guidelines?

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

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

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

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

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

What will these guidelines not do?

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

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

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

How are these guidelines structured?

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

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

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

SUMMARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

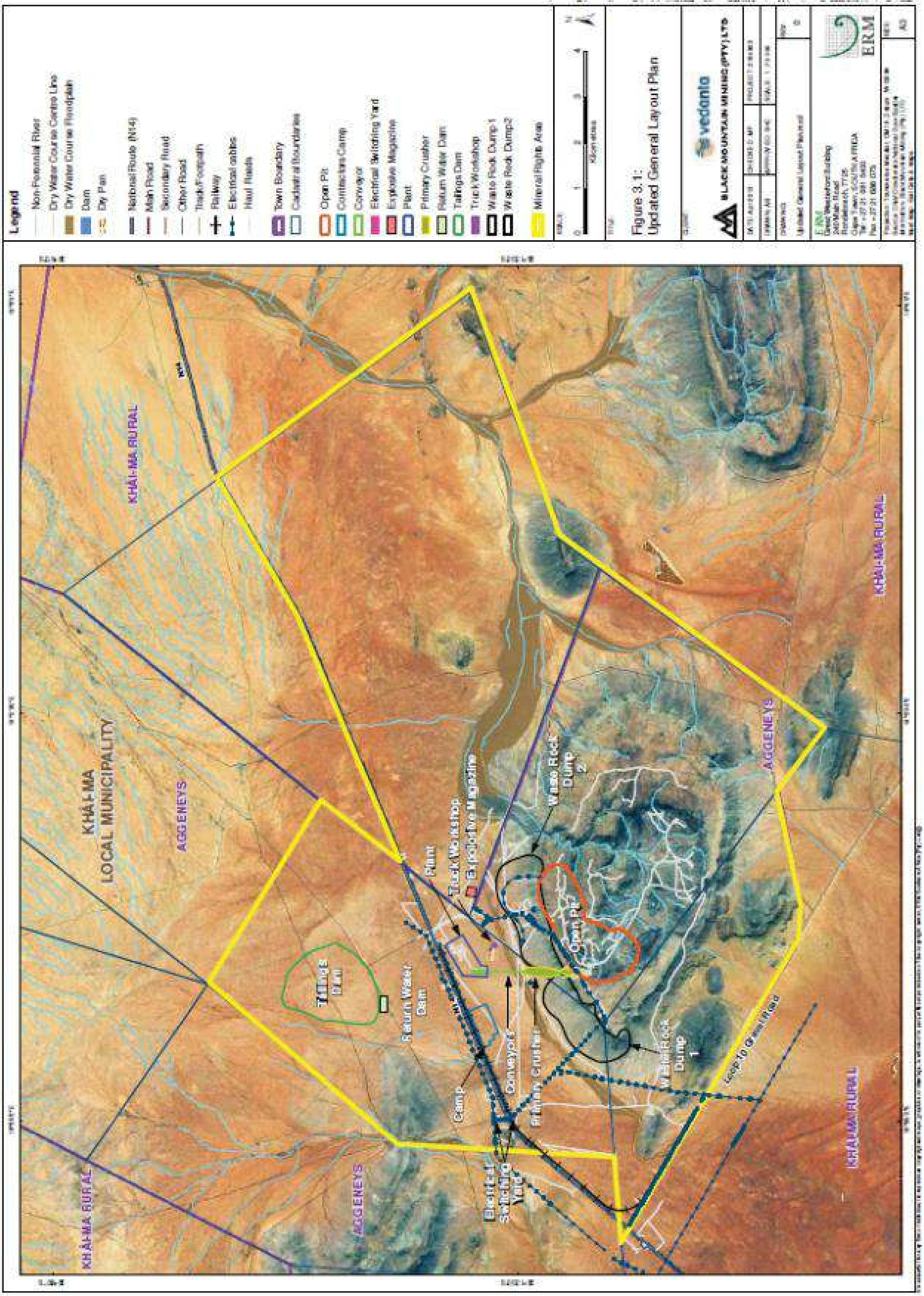
Part E lists specific evaluation criteria for reviewing visual input by a specialist, where this becomes necessary. Further guidance on this is given in the document on *Guideline for the review of specialist input in EIA processes.*

CONTENTS

APPENDIX III

BLACK MOUNTAIN MINING GAMSBERG GENERAL LAYOUT PLAN

(extracted from ERM Environmental Management Programme 2013)

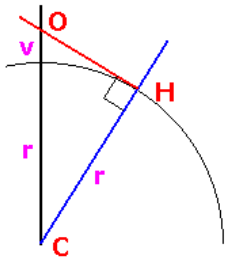

Legend
Non-Perennial River
Dry Water Course Centre Line
Dry Water Course Floodplain
Dam
Dry Pan
National Route (N14)
Main Road
Secondary Road
Other Road
Track/Footpath
Railway
Electrical cables
Haul Roads
Town Boundary
Cadastral Boundaries
Open Pit
Contractors Camp
Conveyor
Electrical Switching Yard
Explosive Magazine
Plant
Primary Crusher
Return Water Dam
Tailings Dam
Truck Workshop
Waste Rock Dump1
Waste Rock Dump2
Mineral Rights Area
Kilometres
Figure 3.1:
Updated General Layout Plan
vedanta
BLACK MOUNTAIN MINING (PTY) LTD
ERM
KHAI-MA
LOCAL MUNICIPALITY
AGGENEYS
KHAI-MA RURAL
N14
Tailings Dam
Return Water Dam
Camp
Conveyors
Primary Crusher
Electrical Switching Yard
Plant
Truck Workshop
Explosive Magazine
Open Pit
Waste Rock Dump 2
Waste Rock Dump 1

APPENDIX IV

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 V

CUMULATIVE IMPACT ASSESSMENT

1 Landscape Change

Nature:
The proposed project will extend the general influence of development and specifically solar projects into a relatively natural rural area to the south and east of the proposed site.

The project is one of two proposed projects on the same property.

In addition there are solar projects proposed on fourteen properties within 30km of the proposed site eight of which are located within the relatively natural Rural Landscape Character Area.

Whilst a detailed visual analysis of other solar projects in the area has not been undertaken, the combined effect of all proposed solar projects could be significant. Because the proposed project will largely affect the Developed Landscape Character Area, it is only likely to have a relatively small contribution to landscape change which largely relates to introducing development into the more natural Rural Landscape Character Area.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and surroundings **(2)**	Region **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Moderate **(6)**
Probability	Probable **(3)**	Probable **(3)**
Significance	**Low (21)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Unknown

Mitigation:
Planning:

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

Operations:

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

Decommissioning:

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

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

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

2 Character of the landscape as seen from the N14.

Nature:
The proposed project is very unlikely to have any significant impact on the N14.

A detailed visual analysis of other solar projects in the area has not been undertaken, however given the location of other projects in closer proximity to the road, it seems likely that other solar projects in the area could have a significant impact.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Region, **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Small **(0)**	Moderate to low, **(5)**
Probability	Very improbable **(1)**	Probable, **(3)**
Significance	**Low (6)**	**Medium, (36)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Unknown

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

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

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

Residual Impacts:

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

3 Change in the character of the landscape as seen from the un-surfaced local road that runs to the north of the proposed site.

Nature:
Because the road runs adjacent to the northern boundary of the development area, it will be visible from the road. Key mitigation includes including a setback between the road and the project. Due to the fact that the project will be visible for a relatively short section of the road and due to the nature of traffic on the road, if the setback is put in place the probable impact of the project is likely to be low.

It is also possible that other solar projects will be developed within 30km and to the east of Aggeneys 1, that are serviced by this road all of which fall within and are likely to affect the relatively natural Rural Landscape Character Area. Whilst detailed assessments have not been undertaken, the project areas within the Rural Landscape Character Area could result in greater landscape change than those within the Developed Landscape Character Area.

The overall cumulative impact could therefore have a medium significance. Aggeneys 1 is likely to result in a relatively low contribution to this overall impact.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Regional **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Minor to Low **(3)**	Moderate to Low, **(5)**
Probability	Probable **(3)**	Probable, **(3)**
Significance	**Low (27)**	**Medium (36)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No
Can impacts be mitigated?	Yes	Unknown

Mitigation:
Planning:

- Plan to set back the development from the road. During initial work, a 100m setback was proposed. This will ensure that the array associated infrastructure and the security fence does not crowd the road. It will also ensure that there is a band of natural vegetation beside the road providing a link with the surrounding natural landscape.
- Plan levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible; and
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;

- Monitor rehabilitated areas post-construction and implement remedial actions; and
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area particularly the development setback area from the local road.

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

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

4 Cumulative impact on local homesteads

Nature:
The proposed project was assessed as likely to have an improbable, neutral impact with a low significance on views from local homesteads. This was due to the fact that only one homestead will be affected that is some distance from the project. The homestead also appears to be uninhabited.

Whilst a detailed assessment of the impact of other projects has not been undertaken, from review of online mapping, there do not appear to be any homesteads that are likely to be affected by potential projects.

The cumulative impact is therefore also likely to be improbable with a low significance.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings, **(2)**	Regional, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Minor, **(2)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	**Low, (16)**	**Low, (18)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No
Can impacts be mitigated?	Yes	Unknown

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

Operations:
- Reinstate any areas of vegetation that have been disturbed during

construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions; and
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.

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

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

5 Cumulative impact on Settlement

Nature:
The only settlement area that might be affected is the small town of Aggeneys.

The proposed project was assessed as likely to have a very improbable impact of low significance on this settlement.

Whilst a detailed assessment of other projects has not been undertaken, it is possible that they may impact on this settlement. However, views of the surrounding landscape from within Aggeneys are difficult to see due to the density of development and roadside / garden vegetation. Where external views are possible they are also highly influenced by development, particularly mining operations.

Cumulative impacts are therefore anticipated to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small **(0)**	Small **(0)**
Probability	Very improbable **(1)**	Improbable **(2)**
Significance	Low **(6)**	Low **(14)**
Status	**Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	No mitigation is necessary	Unknown

Mitigation:
No mitigation is necessary.

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

6 Cumulative impact of glare on the unsurfaced road to the north of the proposed site

Nature of impact:
It is possible that glare from the proposed project could affect travellers on the road during early evening and early morning.

Whilst a detailed assessment of other projects has not been undertaken, it is possible that the proposed project within the same property as the proposed project and other projects on different properties to the east cause additional impact. The probability of glare being an issue will increase to "probable" and due to the spread of the possible projects the extent increases to "regional".

The impact of glare should however be reasonably easily mitigated by screening.

With mitigation, cumulative impacts should therefore have a low significance.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Minor **(2)**
Probability	Improbable **(2)**	Probable **(3)**
Significance	**Low (16)**	**Low (27)**
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated	Yes	

Mitigation / Management:
Should glare prove problematic on this road, mitigation might include the implementation of a screen fence along the edge of an array.

Another option could be to include a slight adjustment to the angle of repose of solar panels, however, the applicant has indicated that this is not feasible because it would impact negatively on power production; a screen fence is therefore the preferred mitigation method.

Residual Impacts:
None

7 Cumulative impact of glare affecting Aggeneys Aerodrome.

Nature:

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

The proposed project is unlikely to add significantly to glare issues associated with solar PV development in the area relating to the aerodrome, due to the distance from Aggeneys 1.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surroundings **(2)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Minor **(2)**
Probability	Improbable **(2)**	Probable **(3)**
Significance	Low **(16)**	Low **(27)**
Status (positive or negative)	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	
Mitigation: Should glare prove problematic, mitigation might include a slight adjustment to the angle of repose of solar panels, however, the applicant has indicated that this is not a feasible mitigation method and they will investigating alternative methods with the owner of the air strip if glare proves problematic.		
Residual Impacts: None		

8 Night Time Lighting Impacts

Nature:
Currently lighting in the area is focused within the Developed Landscape Character Area. It is comprised of lighting within the settlement of Aggeneys, lighting around mining operations as well as traffic on the N14.

There is a risk that the proposed project will extend the influence of lighting into the more natural Rural Landscape Character Area although it will largely affect areas that are currently influenced by development.

If additional solar development does occur on the sites to the east, it is highly possible that these developments will extend lighting into the Rural Landscape Character Area. If appropriate mitigation measures are applied as recommended for the subject project then cumulative impacts are anticipated to be low.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site **(1)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Small to minor **(1)**
Probability	Improbable **(2)**	Improbable **(3)**
Significance	Low **(12)**	**Low (24)**
Status (positive or negative)	If the lights are generally not visible then the occasional light is unlikely to be seen as negative. **Neutral**	**Neutral**
Reversibility	High	High

Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	
Mitigation: 1) Use low key lighting around buildings and operational areas that is triggered only when people are present; 2) Plan to utilise infra-red security systems or motion sensor triggered security lighting; 3) Ensure that lighting is focused on the development with no light spillage outside the site; and 4) Keep lighting low, no tall mast lighting should be used.		
Residual Impacts: No residual risk has been identified.		

APPENDIX V
ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Aggeneys 1 Solar Facility, Construction, Operation and Decommissioning		
Potential Impact	Change in Landscape Character: • Extending the influence of development into relatively natural areas; • Changing the nature of views from the N14, local roads, homesteads and the urban area of Aggeneys; • Extending lighting impacts into natural areas that are currently dark during the hours of darkness; • Glint and glare affecting the adjacent local road and the northern flight path into Aggeneys Aerodrome.		
Activity/risk source	• Engineered change in landform being obvious against natural contours. • Vegetation clearance and lack of rehabilitation during construction and decommissioning making the development more obvious particularly from a distance. • The development dominating the view from the adjacent local road. • Lighting extending into natural areas that are currently dark during the hours of darkness. • Glare affecting drivers on local roads and pilots approaching and leaving the Aggeneys Aerodrome.		
Mitigation: Target/Objective	• Plan platforms and earthworks to blend into surrounding natural contours. • Develop as far from the local road as possible and maintain an undeveloped buffer between the road and the development; • Minimise and reinstate vegetation loss. • Maintain and plant the buffer area along the northern boundary in order to soften views of the development and maintain continuity with the surrounding natural landscape. • Remove structures and rehabilitate site to its natural condition on decommissioning. • Ensuring that the development does not create more night time lighting than necessary. • Ensure PV panels use non reflective surfaces in order to minimise the potential for glint and glare. • Monitor glint and glare impacts on the adjacent local road as well as the Aggeneys Aerodrome and undertake additional mitigation as necessary such as the creation of a screen.		
Mitigation: Action/control		**Responsibility** Contractor (C) Environmental Officer (EO) Environmental Liaison Officer (ELO)	**Timeframe** Construction Phase (C) Operational Phase (O) Decommissioning Phase (D)
Ensure that lighting and security system are		C, EO	C, O

designed, installed and maintained in a manner that minimises lighting impacts.		
Ensure that the face of panels have the most effective non reflective surface possible at the time of ordering.	C, EO	C
Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.	C, EO	C
Reinstate any areas of vegetation that have been disturbed during construction.	C, EO	C
Maintain and augment vegetation within the buffer between the development and the local road to the north of the site.	C, EO	C
Rehabilitate disturbed areas to their natural state on decommissioning.	EO	D
Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	C, EO	C, D
Monitor for impacts of glint and glare affecting the local road to the north of the site and Aggeneys Aerodrome. It will be necessary to liaise with the operator of the aerodrome in order to that he / she can report glare issues that may be experienced by pilots.	EO	O
Undertake mitigation measures for glare impacts as necessary possibly including a screen fence and / or adjusting the angle of PV panels. The applicant has indicated that the adjustment of the angle of panels is not the preferred mitigation method.	EO	O
Remove all temporary works.	C, EO	D
Remove infrastructure not required for the post-decommissioning use of the site.	C, ECO	D
Performance Indicators	Natural contours rather than rigid engineered land form. Vegetation presence and density. Minimal night time lighting. Visibility of the development from the N14.	

	Presence of unnecessary infrastructure. Observing glare on the un-surfaced road to the north of the project / complaints from drivers and pilots.
Monitoring	Evaluate vegetation before, during and after construction. Evaluate vegetation growth and reinstatement during decommissioning and for a year thereafter. Monitor glare on the adjacent road through visual observations during early evenings particularly during summer months. Monitor glare affecting the aerodrome through liaison with the operator. Visually monitor the effect of night time lighting on the surrounding landscape. Take regular time-line photographic evidence. Responsibility: EO and ELO. Prepare regular reports.