PROPOSED KOMATI POWER STATION SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS), MPUMALANGA PROVINCE

VISUAL ASSESSMENT – INPUT FOR SCOPING REPORT

Produced for:

Eskom Holdings SOC (Ltd)

On behalf of:

WSP Group Africa (Pty) Ltd

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Lourens du Plessis (t/a LOGIS) is a *Professional Geographical Information Sciences (GISc) Practitioner* registered with The South African Geomatics Council (SAGC) and specialises in Environmental GIS and Visual Impact Assessments (VIA).

Lourens has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modeling, and digital mapping, and applies this knowledge in various scientific fields and disciplines. His GIS expertise are often utilised in Environmental Impact Assessments, Environmental Management Frameworks, State of the Environment Reports, Environmental Management Plans, tourism development and environmental awareness projects.

He holds a BA degree in Geography and Anthropology from the University of Pretoria and worked at the GisLAB (Department of Landscape Architecture) from 1990 to 1997. He later became a member of the GisLAB and in 1997, when Q-Data Consulting acquired the GisLAB, worked for GIS Business Solutions for two years as project manager and senior consultant. In 1999 he joined MetroGIS (Pty) Ltd as director and equal partner until December 2015. From January 2016 he worked for SMEC South Africa (Pty) Ltd as a technical specialist until he went independent and began trading as LOGIS in April 2017.

Lourens has received various awards for his work over the past two decades, including EPPIC Awards for ENPAT, a Q-Data Consulting Performance Award and two ESRI (Environmental Systems Research Institute) awards for *Most Analytical* and *Best Cartographic Maps*, at Annual International ESRI User Conferences. He is a co-author of the ENPAT atlas and has had several of his maps published in various tourism, educational and environmental publications.

He is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments.

1. INTRODUCTION

Eskom Holdings SOC (Ltd) (Eskom) is a South African utility that generates, transmits and distributes electricity. Several of Eskom's coal-fired power stations are reaching the end of life. These power stations will go into extended cold reserve and are most likely to be fully decommissioned in the future (2035). Eskom is considering a shutdown, dismantling and repurposing of some of its fleet as it reaches its end of life. Komati Power Station, situated in Mpumalanga will reach its end-of-life expectancy in September 2022.

Eskom is proposing the establishment of a solar electricity generating facility and associated infrastructure as part of its repurposing programme for the Komati Power Station. The plan is to install 100MW of Solar Photovoltaics (PV) and 150MW of Battery Energy Storage System (BESS).

The Komati Power Station is situated about 37km from Middelburg, 43km from Bethal and 40km from Emalahleni, via Vandyksdrift in the Mpumalanga Province of South Africa. The power station has a total of 9 units, five 100MW units on the east (Units 1 to 5) and four 125 MW units on the west (Units 6 to 9), with a total installed capacity of 1000 MW. Its units operated on a simple Rankine Cycle without reheat and with a low superheat pressure, resulting in a lower thermodynamic efficiency (efficiency up to 27%). Komati units are small and have a higher operating & maintenance cost per megawatt generated compared to more modern power stations.

The specifications of the Solar PV and BESS project are outlined below:

- The total site area for PV installation is approximately 200-250 hectares to allow for the construction of a PV facility with capacity up to 100 MW and BESS up to 150 MW.

- Solar PV modules, up to a total of approximately 720,000 m^2 that converts solar radiation directly into electricity. The solar PV modules will be elevated above the ground, and will be mounted on either fixed tilt systems or tracking systems (comprised of galvanised steel and aluminium). The Solar PV modules will be placed in rows in such a way that there is allowance for a perimeter road and security fencing along the boundaries, and O&M access roads in between the PV module rows.

- Inverter stations, each occupying a footprint up to approximately 30 m^2, with up to 100 Inverter stations installed on the identified sites. Each Inverter station will contain an inverter step-up transformer, and switchgear. The Inverter stations will be distributed on the site, located alongside its associated Solar PV module arrays. The Inverter station will perform conversion of DC (direct current) to AC (alternating current), and step-up the LV voltage of the inverter to the appropriate voltage to allow the electricity to be fed into the appropriate substation / grid point of connection (PoC). Inverter stations will connect several arrays of Solar PV modules and will be placed along the internal roads for easy accessibility and maintenance.

- Below ground electrical cables with trenching for connecting PV arrays, Inverter stations, O&M buildings, and Combiner Substations.

- Above ground overhead lines for connecting Combiner Substations to grid PoC.

- Adequately designed foundations and mounting structures that will support the Solar PV modules and Inverter stations.

- Access roads that provide access to the Komati PV sites.

- Perimeter roads around the PV sites.

- Internal roads for access to the Inverter stations.

- Internal roads/paths between the Solar PV module rows, to allow access to the Solar PV modules for operations and maintenance activities.

- Infrastructure required for the operation and maintenance of the Komati PV installations:

    - Meteorological Station

    - O&M Building – comprising control room, server room, security equipment room, offices, boardroom, kitchen, and ablution facilities (including water supply and sewage infrastructure)

    - Spares warehouse and workshop

    - Hazardous chemical store – approx. 30 m2

    - Security building

    - Parking areas and roads

- Small diameter water supply pipeline from existing supply infrastructure.

- Fire water supply during construction and operation.

- Sewage interconnection to existing infrastructure.

- Storm water channels.

- Perimeter fencing of the Komati PV sites, with access gates.

- Temporary laydown area, occupying a footprint up to approx. 10 hectares. The laydown area will be used during construction and rehabilitated thereafter.

- Temporary concrete batching plant, occupying a footprint up to approx. 1 hectare. The concrete batching plant area will be used during construction and rehabilitated thereafter.

- Temporary site construction office area, occupying a footprint up to approx. 1 hectare. This area will accommodate the offices for construction contractors during construction and rehabilitated thereafter.

Figure 1: Regional locality of the study area.

The Solar PV Energy Facility and BESS will take up to 12 months to construct. The operational lifespan of the facility is estimated at up to 25 years. The proposed development sites identified for the Solar PV Energy Facility and associated infrastructure are indicated on the maps within this report. Sample images of similar PV technology and Battery Energy Storage System (BESS) facilities are provided below.

Figure 2: Photovoltaic (PV) solar panels. (*Photo: SunPower Solar Power Plant – Prieska)*.

Figure 3: Aerial view of PV arrays. (*Photo: Scatec Solar South Africa*).

Figure 4: Aerial view of a BESS facility (*Photo: Power Engineering International)*.

Figure 5: Close up view of a BESS facility *(Photo: Greenbiz.com).*

2. SCOPE OF WORK

The scope of the work includes a scoping level visual assessment of the issues related to the visual impact. The scoping phase is the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an impact assessment. The main purpose is to focus the impact assessment on a manageable number of important questions on which decision-making is expected to focus and to ensure that only key issues and reasonable alternatives are examined.

The study area for the visual assessment encompasses a geographical area of approximately 220km² (the extent of the full-page maps displayed in this report) and includes a minimum 6km buffer zone (area of potential visual influence) from the proposed project infrastructure.

The study area includes predominantly mining and industrial land, farm land and sections of the R35 and R542 arterial roads.

3. METHODOLOGY

The study was undertaken using Geographical Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed facility. A detailed Digital Terrain Model (DTM) for the study area was created from topographical data provided by the Japan Aerospace Exploration Agency (JAXA), Earth Observation Research Centre, in the form of the ALOS Global Digital Surface Model "ALOS World 3D - 30m" (AW3D30) elevation model.

The methodology utilised to identify issues related to the visual impact included the following activities:

- The creation of a detailed digital terrain model of the potentially affected environment.

- The sourcing of relevant spatial data. This included cadastral features, vegetation types, land use activities, topographical features, site placement, etc.

- The identification of sensitive environments or receptors upon which the proposed facility could have a potential impact.

- The creation of viewshed analyses from the proposed project sites in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analyses take into account the dimensions of the proposed structures and activities.

This report (scoping report) sets out to identify the possible visual impacts related to the proposed Komati Power Station Solar PV and BESS from a desktop level.

4. THE AFFECTED ENVIRONMENT

The Komati Power Station is situated about 37km from Middelburg, 43km from Bethal and 40km from Emalahleni within the Highveld region of the Mpumalanga Province. It falls within the Steve Tshwete Local Municipality of the Nkangala District Municipality. The larger region is considered as the power generation hub of South Africa with extensive coal fields that cover almost all of the area, numerous large coal mines and an additional seven coal-fired power stations located within a 60km radius of the Komati Power Station.

These are:

- Kusile
- Kendal
- Duvha
- Hendrina
- Arnot
- Kriel
- Matla

The study area for the VIA is centred on the Komati Power Station and includes a 6km buffer zone (zone of potential visual influence) from the Eskom PV project area. Two PV plant development sites are being considered for the Komati Power Station Solar Facility. Site A is located immediately north of the R542 arterial road, approximately 1.6km south-west of the power station. Site B is located immediately west of the Komati residential area, approximately 1.2km west of the power station. This site includes the Komati airstrip. Both sites are considered for development and they are not considered as alternative developments sites.

The BESS development sites are located within the power station property; in very close proximity to the existing power station infrastructure i.e. the core power plant, cooling towers and substations.

Figure 6: Aerial view of the proposed Solar PV Energy Facility Development Footprints (orange PV Site A and white PV Site B) and BESS (blue).

Topography, hydrology and vegetation

The study area is situated on land that ranges in elevation from approximately 1,530m (in the south-west of the study area) to 1,700m to the east. The project site itself is located at an average elevation of approximately 1,626m above sea level (see **Map 1**). The terrain morphological unit identified for the entire study area is described as *undulating plains*. The most prominent elevated topographical units are the ash dumps, slimes dams and mine dumps surrounding the power station and the Goedehoop Colliery located west of the power station.

There are two perennial rivers in the study area, the Koringspruit River (traversing north of the project site) and the Olifants River to the far south-west. Besides these rivers there are a number of non-perennial rivers or streams feeding into the previously mentioned rivers. The study area is characterised by flat or gently undulating terrain, grasslands and has a tropical or subtropical climate. This area also contains pans. A pan is defined as a large, shallow, flat-floored depression found in arid and semi-arid regions and may be flooded seasonally or permanently. There are also a number of man-made dams either related to the agricultural or mining activities of the region.

The vegetation type for the entire study area is *Eastern Highveld Grassland* within the *Mesic Highveld Grassland Bioregion* of the *Grassland Biome*. It should be noted that most of the natural grassland has been transformed by either agricultural or mining activities. Wetlands occur along the rivers and drainage lines mentioned above. Other than the natural grassland and wetlands there are very limited additional land cover types, such as woodland in places. There are also very limited exotic plantations. These planted trees are generally associated with farm residences or homesteads throughout the region. Refer to **Map 2** for the land cover types and broad land use patterns.

Land use and settlement patterns

The majority of the study area is relatively sparsely populated with a population density of less than approximately 33 people per km^2. Most of these people are located within the towns of Komati (at the power station) or at Blinkpan north of the Goedehoop Colliery. Other than these towns, or residential areas, the rest of the study area is dotted with farm residences or homesteads. These residences are inhabited by the farmers producing mainly maize crops (dryland agriculture) within the region. Other than the agricultural activities the most prominent land use within the area is the mining and the associated power generation activities at the power station.

Some of the homesteads within the study area include[1]:

- Rooiblom
- Welverdiend (1, 2 and 3)
- Broodsnyersplaas
- Blinkpan
- Geluk
- Bultfontein (1 – 8)
- Willmansrust
- Goedehoop (1, 2 and 3)
- Koornfontein

It is uncertain whether all of these farmsteads are inhabited or not. It stands to reason that farmsteads that are not currently inhabited will not be visually impacted upon at present. These farmsteads do, however retain the potential to be affected visually should they ever become inhabited again in the future. For this reason, the author of this document operates under the assumption that they are all inhabited.

The R35 and R542 arterial roads provide motorised access to the project site from respectively the N4 and N12 national roads traversing north and north-west of the larger region.

There are no identified tourist attractions of designated protected areas within the study area.[2]

In spite of the overall rural character of the region, there are a large number of power lines and substations in the study area, mostly associated with the Komati Power Station, the coal mines and the railway lines traversing the study area. These include:

- Camden-Duvha 400kV
- Komati-Matla 275kV
- Arnot-Kruispunt 275kV
- Camden-Komati 275kV
- Komati-Kruispunt 275kV

[1] The names listed below are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name.
[2] Sources: DEAT (ENPAT Mpumalanga), NBI (Vegetation Map of South Africa, Lesotho and Swaziland), NLC2018 (ARC/CSIR), REEA_OR_2021_Q1 and SAPAD2021 (DFFE).

- Halfgewonnen-Kudu 88kV
- Kudu-Export 132kV
- Broodsnyersplaas-Spoornet 132kV
- Aberdeen-Gloria Colliery 132kV
- Export-Duvha Colliery 132kV
- Kudu-Nasarete 132kV
- Hendrina-Aberdeen 132kV
- Aberdeen-Kudu 132kV
- Aberdeen-Ysterkop 132kV
- Duvha Colliery-Kudu 132kV
- Abina 132kV Overhead Line
- Kudu-Dorstfontein 88kV
- Komati-Kudu 1 and 2 132kV
- Aberdeen-Spoornet 132kV
- Klicoal-Kudu 132kV
- Aberdeen-Gloria Shaft 132kV

These power lines and substations are indicated on the maps below.

There are no additional solar energy generation plants (or applications) within the study area. The closest approved application is the proposed installation of a solar photovoltaic power plant at the Eskom Duvha Power Station, some 18km north-west of the project site.

The photographs below aid in describing the general environment within the study area and surrounding the proposed project infrastructure.

Figure 7: View of the PV Site A from the R542 arterial road.

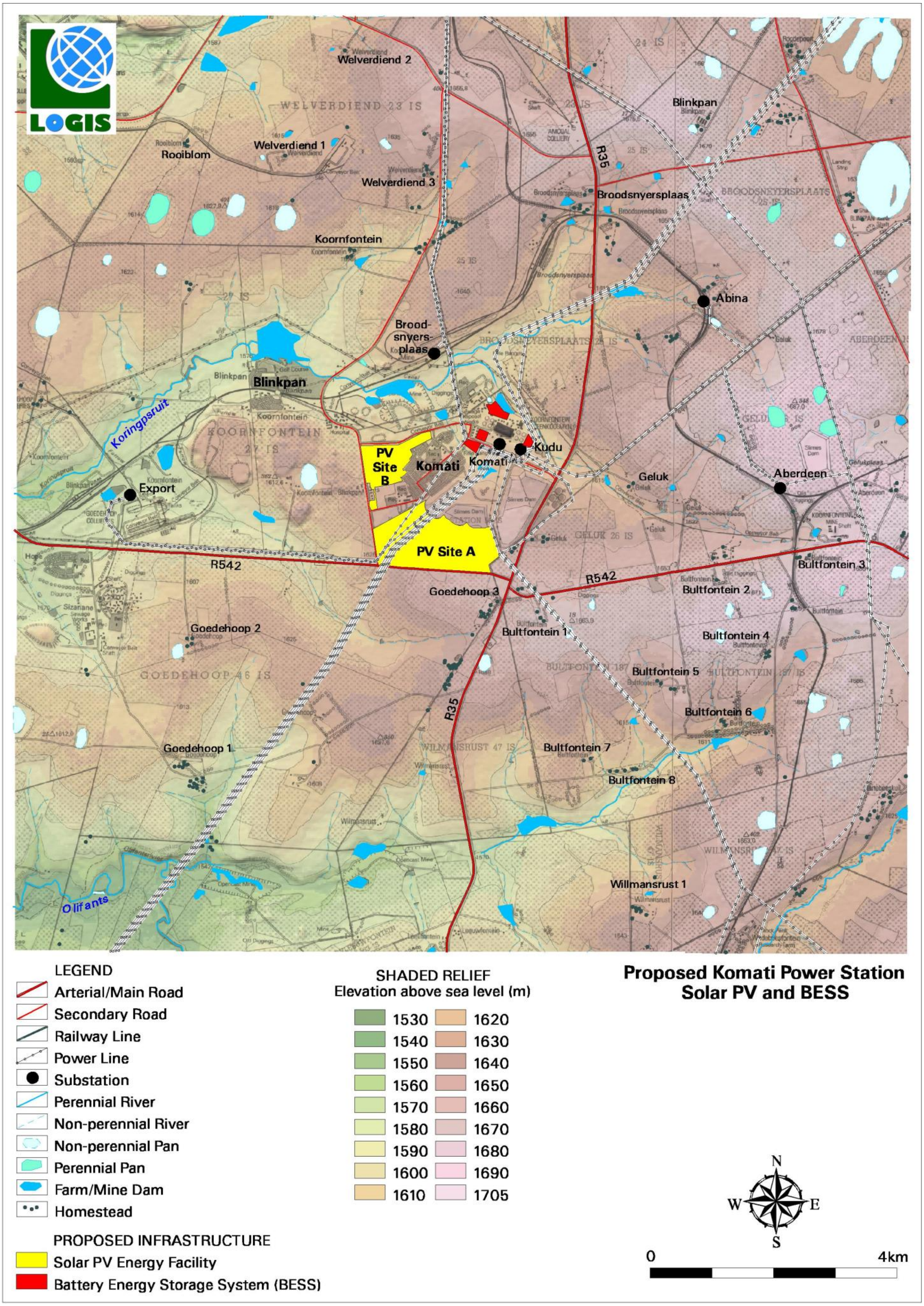
Figure 8: View of the PV Site B from the west.

Figure 9: Typical coal mining activity within the study area.

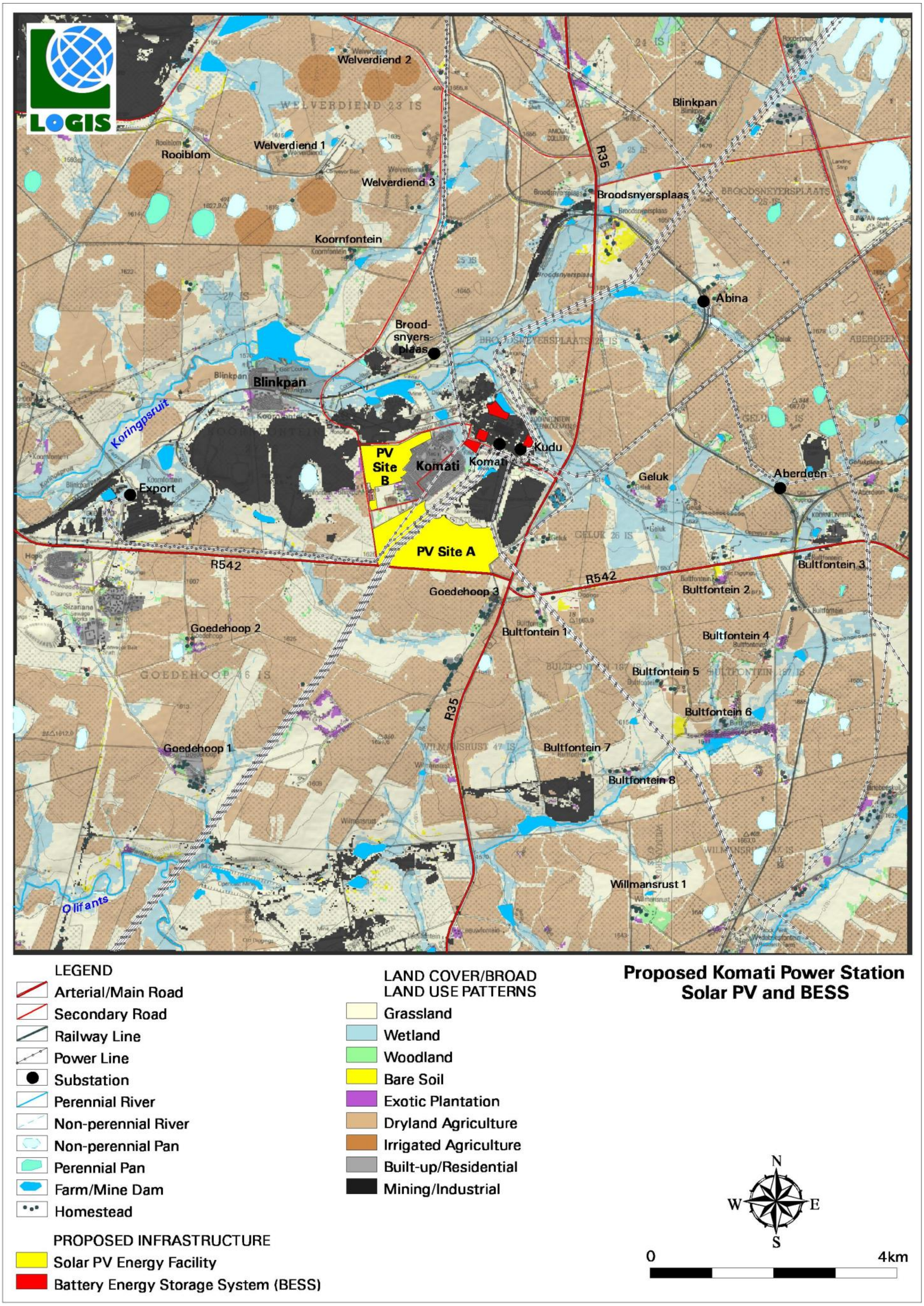
Figure 10: General environment within the study area.

Figure 11: Power lines near the R542 arterial road.

Figure 12: The Komati coal-fired power station and associated infrastructure.



Map 1: Shaded relief map of the Study Area.



Map 2: Land cover and broad land use patterns.

5. VISUAL EXPOSURE/VISIBILITY

The result of the viewshed analysis for the proposed Solar PV Energy Facility is shown on the map below (**Map 3**). The viewshed analysis was undertaken from a representative number of vantage points within the Site A and B development footprints at an offset of 5m above ground level (as a worst-case-scenario). This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels, inverters, BESS, etc.) associated with the proposed project. The visual exposure of the BESS is show on **Map 4**.

It should be noted that the viewshed analysis is based on both the Site A and B project boundaries (in their entirety) as provided and that the results may differ once a final layout, structure positions and dimensions are provided during the EIA phase of the project.

The viewshed analysis will be further refined once a preliminary and/or final layout is completed and will be regenerated for the actual position of the infrastructure on the site and actual proposed infrastructure during the EIA phase of the proposed project.

Map 3 also indicates proximity radii from the development footprints in order to show the viewing distance (scale of observation) of the facilities in relation to their surrounds.

Results – PV facility

The PV facility (both sites) is expected to be visible for up to 6km from the development sites. The visual exposure is relatively scattered due to the undulating nature of the topography, with lower-lying land (e.g. along the Koringspruit and Olifants Rivers) shielded from the infrastructure, and only higher-lying terrain being exposed. It should be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing mining, power line and power station infrastructure in closer proximity to the sites.

The following is evident from the viewshed analyses:

0 – 1km

The PV facility may be highly visible within a 1 km radius. This zone includes the town of Komati where visual exposure is expected from the outlying edges of the built-up areas. The R542 arterial road will be highly exposed to PV Site A where it traverses south of the site. The R35 could similarly be exposed to PV Site A, but from a slightly longer distance. There are a number of homesteads located within a 1km radius of PV Site A, namely the Goedehoop 3 residence and a number of unnamed houses east of the site.

1 – 3km

This zone predominantly falls within mining land, vacant farmland an open space, but does contain sections of the abovementioned roads, some houses further south along the R35, and the Geluk homestead east of the power station and the development sites.

3 - 6km

Within a 3 – 6km radius, the visual exposure will be significantly reduced, especially to the south-east. Exposed residences may include the Bultfontein 2 and 3 homesteads (to the east) and the Broodsnyersplaas and Welverdiend 3 residences to the north.

> 6km

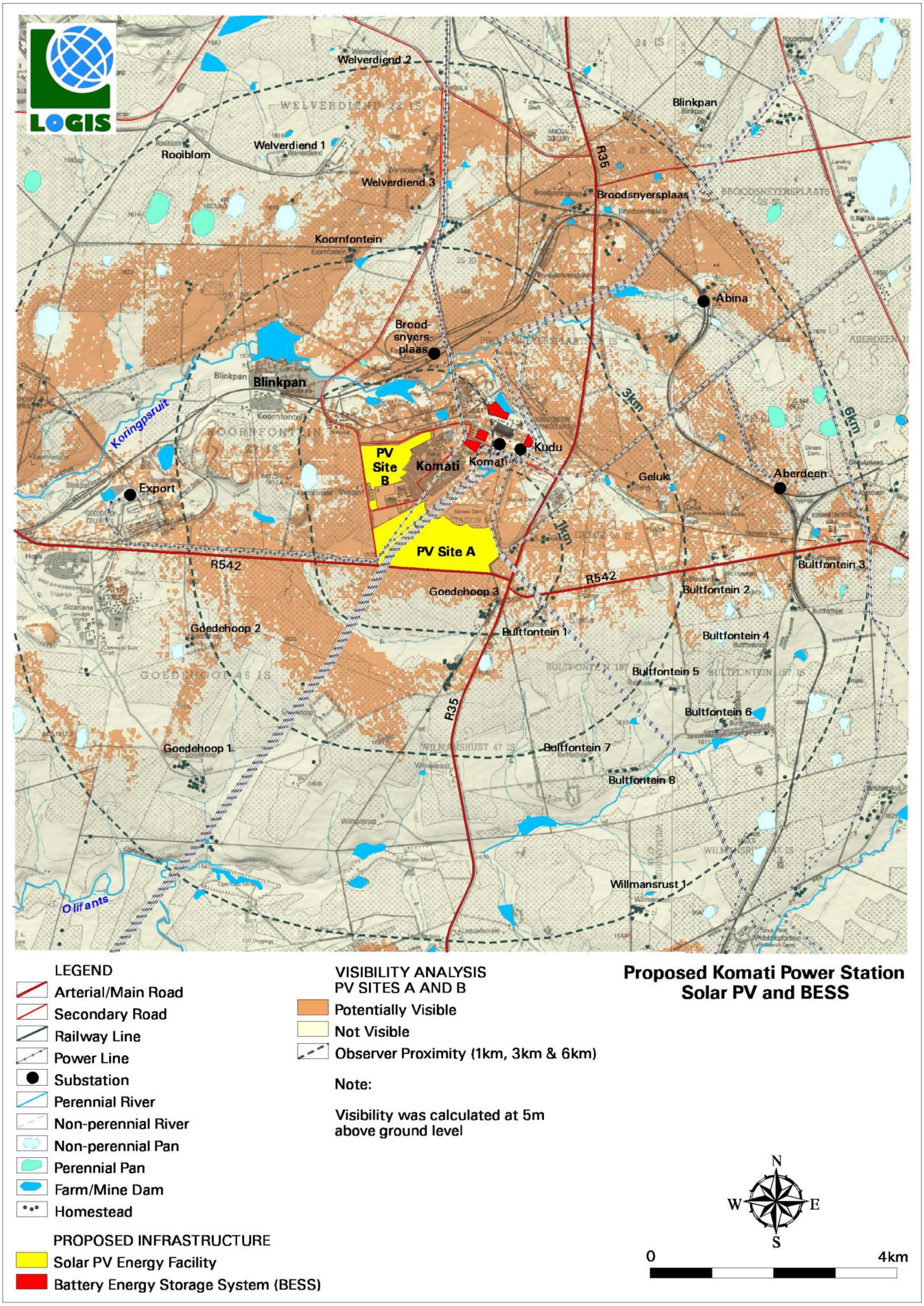
At distances exceeding 6km, the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (Solar PV Energy Facility) and the observer, and the developed and industrial nature in closer proximity to the proposed infrastructure.

Conclusion

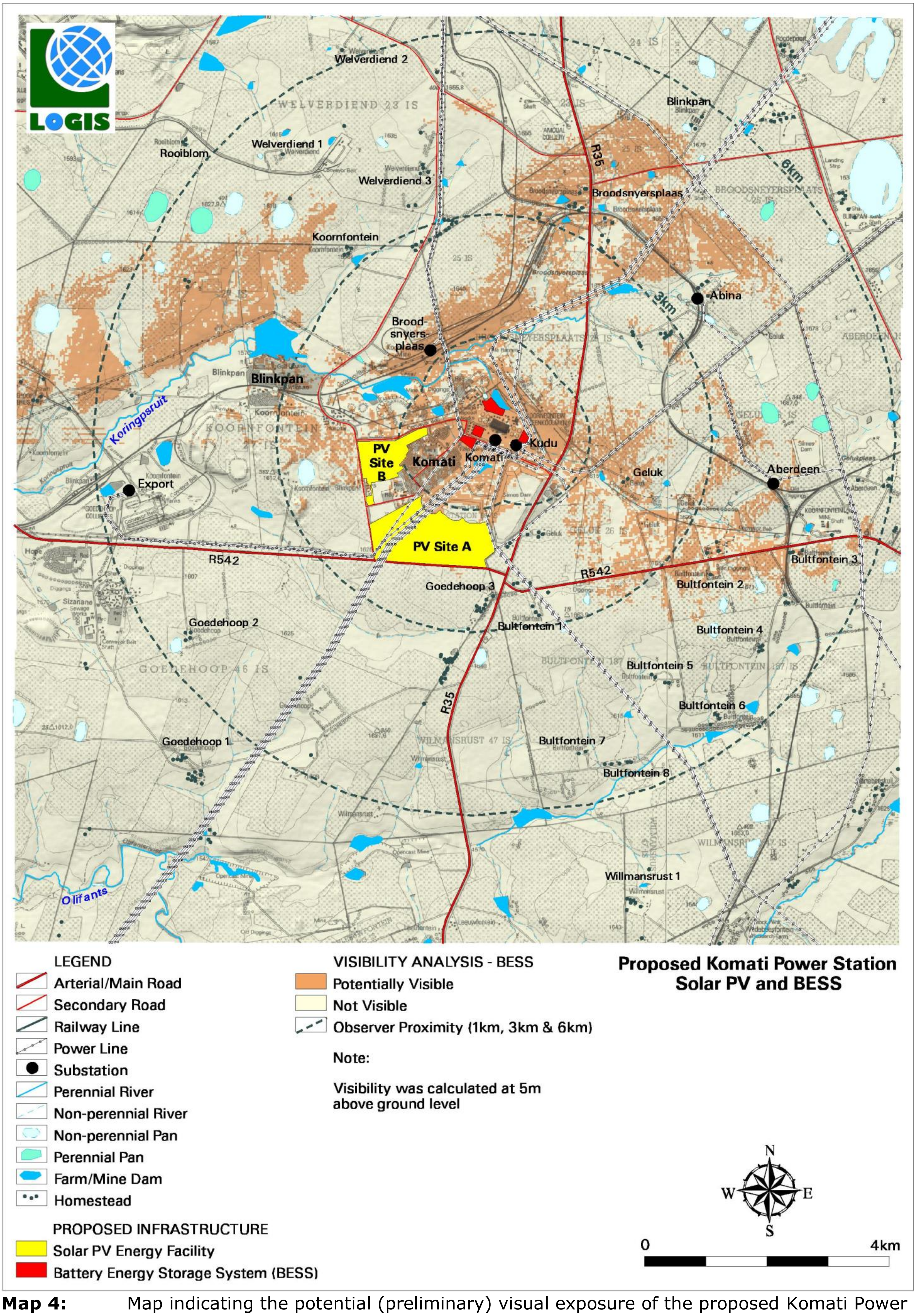
In general terms, it is envisaged that the structures, where visible from shorter distances (e.g. less than 1km and potentially up to 3km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. This may include observers travelling along the R542 and R35 arterial roads, residents along the outskirts of the Komati residential area, and the farm residences mentioned above. It should once again be stressed that the visual exposure of the PV facility structures will be in conjunction with the existing visual clutter (power lines, power station and mining infrastructure) within the region.

Results – BESS

The visual exposure of the BESS infrastructure is expected to be very limited, mainly within a 1km radius of the BESS structures. The only potentially affected receptor site within this zone may be a short section of the R35 arterial road where it traverses east of the power station. The location of the BESS structures immediately adjacent to the power station further reduces the potential visual exposure, and ultimately the potential visual impact, due to the fact that the visual amenity has already been compromised at this location.



Map 3: Map indicating the potential (preliminary) visual exposure of the proposed Komati Power Station Solar PV Energy Facility.



Map 4: Map indicating the potential (preliminary) visual exposure of the proposed Komati Power Station BESS.

6. ANTICIPATED ISSUES RELATED TO THE VISUAL IMPACT

Anticipated issues related to the potential visual impact of the proposed Solar PV Energy Facility include the following:

- The visibility of the Solar PV Energy Facility to, and potential visual impact on, observers travelling along the R542 and R35 arterial roads in closer proximity to the proposed infrastructure.
- The visibility of the Solar PV Energy Facility to, and potential visual impact on residents of dwellings within the study area, with specific reference to residents of the Komati residential area and the farm residences in closer proximity to the proposed development.
- The potential visual impact of the Solar PV Energy Facility on the visual character or sense of place of the region.
- The potential visual impact of the Solar PV Energy Facility on tourist routes or tourist destinations/facilities (if present).
- The potential visual impact of the construction of ancillary infrastructure (i.e. internal access roads, buildings, power line, etc.) on observers in close proximity to the facility.
- The visual absorption capacity of the natural vegetation or built structures/mining infrastructure (if applicable).
- Potential cumulative visual impacts (or consolidation of visual impacts), with specific reference to the placement of the Solar PV Energy Facility within a predominantly mining and industrial area.
- The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the Solar PV Energy Facility.
- Potential visual impact of solar glint and glare as a visual distraction and possible air/road travel hazard (if required).
- Potential visual impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity to the Solar PV Energy Facility (if required).
- Potential visual impacts associated with the construction phase.
- The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may potentially constitute a visual impact at a local and/or regional scale. These need to be assessed in greater detail during the EIA phase of the proposed project.

Table 1: Impact table summarising the potential primary visual impacts associated with the proposed Solar PV Energy Facility.

Impact Visual impact of the facility on observers in close proximity to the proposed Solar PV Energy Facility infrastructure and activities. Potential sensitive visual receptors

<table>
<tr><td colspan="4">include:

• Residents of Komati and farm dwellings (if present in closer proximity to the facility)
• Observers travelling along the R542 and R35 arterial roads</td></tr>
<tr><td>Issue</td><td>Nature of Impact</td><td>Extent of Impact</td><td>No-Go Areas</td></tr>
<tr><td>The viewing of the PV facility infrastructure and activities</td><td>The potential negative experience of viewing the infrastructure and activities</td><td>Primarily observers situated within a 1km (and potentially up to 3km) radius of the facility</td><td>N.A.</td></tr>
<tr><td colspan="4">Description of expected significance of impact

Extent: Local
Duration: Long term
Magnitude: Moderate
Probability: Probable
Significance: Moderate
Status (positive, neutral or negative): Negative
Reversibility: Recoverable
Irreplaceable loss of resources: No
Can impacts be mitigated: Yes</td></tr>
<tr><td colspan="4">Gaps in knowledge & recommendations for further study

A preliminary and/or final layout of the Solar PV Energy Facility and ancillary infrastructure is required for further analysis. This includes the provision of the dimensions of the proposed structures and ancillary equipment.

Additional spatial analyses are required in order to create a visual impact index that will include the following criteria:

• Visual exposure
• Visual distance/observer proximity to the structures/activities
• Viewer incidence/viewer perception (sensitive visual receptors)
• Visual absorption capacity of the environment surrounding the infrastructure and activities

Additional activities:

• Identify potential cumulative visual impacts
• Undertake a site visit
• Recommend mitigation measures and/or infrastructure placement alternatives

Refer to the Plan of Study for the EIA phase of the project below.</td></tr>
</table>

7. CONCLUSION AND RECOMMENDATIONS

The fact that some components of the proposed Komati Power Station Solar PV Energy Facility and associated infrastructure may be visible does not necessarily imply a high visual impact. Sensitive visual receptors within (but not restricted to) a 3km buffer zone from the facility need to be identified and the severity of the visual impact assessed within the EIA phase of the proposed project.

It is recommended that additional spatial analyses be undertaken in order to create a visual impact index that will further aid in determining potential areas of visual impact. This exercise should be undertaken for the core PV infrastructure (solar field) as well as for the ancillary infrastructure, as these structures (e.g. the BESS structures and power line) are envisaged to have varying levels of visual impact at a more localised scale. The site-specific issues (as mentioned earlier in the report) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact.

This recommended work must be undertaken during the EIA Phase of reporting for this proposed project. In this respect, the Plan of Study for the EIA is as follows:

Visual Impact Assessment (VIA)

The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability and significance of the potential visual impacts, and will propose management actions and/or monitoring programs and may include recommendations related to the solar energy facility layout.

The visual impact is determined for the highest impact-operating scenario (worst-case scenario) and varying climatic conditions (i.e. different seasons, weather conditions, etc.) are not considered.

The VIA considers potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region.

The following VIA-specific tasks must be undertaken:

- **Determine potential visual exposure**

The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if (or where) the proposed project and associated infrastructure were not visible, no impact would occur.

The viewshed analyses of the proposed project and the related infrastructure are based on a detailed digital terrain model of the study area.

The first step in determining the visual impact of the proposed project is to identify the areas from which the structures would be visible. The type of structures, the dimensions, the extent of operations and their support infrastructure are taken into account.

- **Determine visual distance/observer proximity to the proposed Project**

In order to refine the visual exposure of the proposed project on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for this type of structure.

Proximity radii for the proposed infrastructure are created in order to indicate the scale and viewing distance of the proposed project and to determine the prominence of the structures in relation to their environment.

The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly (anticipated) negative visual perception of the proposed facility.

- **Determine viewer incidence/viewer perception (sensitive visual receptors)**

The next layer of information is the identification of areas of high viewer incidence (i.e. main roads, residential areas, settlements, etc.) that may be exposed to the Project infrastructure.

This is done in order to focus attention on areas where the perceived visual impact of the proposed project will be the highest and where the perception of affected observers will be negative.

Related to this data set, is a land use character map, that further aids in identifying sensitive areas and possible critical features (i.e. tourist facilities, protected areas, etc.), that should be addressed.

- **Determine the visual absorption capacity (VAC) of the landscape**

This is the capacity of the receiving environment to absorb the potential visual impact of the proposed project. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing, sparse and patchy vegetation will have a low VAC.

The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low.

The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

- **Calculate the visual impact index**

The results of the above analyses are merged in order to determine the areas of likely visual impact and where the viewer perception would be negative. An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This focusses the attention to the critical areas of potential impact and determines the potential **magnitude** of the visual impact.

Geographical Information Systems (GIS) software is used to perform all the analyses and to overlay relevant geographical data sets in order to generate a visual impact index.

- **Determine impact significance**

The potential visual impacts are quantified in their respective geographical locations in order to determine the significance of the anticipated impact on identified receptors. Significance is determined as a function of extent, duration, magnitude (derived from the visual impact index) and probability. Potential cumulative and residual visual impacts are also addressed. The results of this section are displayed in impact tables and summarised in an impact statement.

- **Propose mitigation measures**

The preferred alternative (or a possible permutation of the alternatives) will be based on its potential to reduce the visual impact. Additional general or site-specific mitigation measures will be proposed in terms of the planning, construction, operation and decommissioning phases of the proposed Project.

- **Reporting and map display**

All the data categories, used to calculate the visual impact index, and the results of the analyses will be displayed as maps in the accompanying report. The methodology of the analyses, the results of the visual impact assessment and the conclusion of the assessment will be addressed in the VIA report.

- **Site visit**

Undertake a site visit in order to collect a photographic record of the affected environment, to verify the results of the spatial analyses and to identify any additional site-specific issues that may need to be addressed in the VIA report.

8. REFERENCES/DATA SOURCES

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