

**MOKOPANE INTEGRATION PROJECT**  
**VISUAL IMPACT ASSESSMENT**  
**TRANSMISSION LINE AND SUBSTATION ALTERNATIVES**

Produced for:  
Eskom Holdings Limited



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Lourens du Plessis from MetroGIS (Pty) Ltd undertook the visual impact assessment in his capacity as a visual assessment and Geographic Information Systems specialist. 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 modelling and digital mapping, and applies this knowledge in various scientific fields and disciplines. His GIS expertise are often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

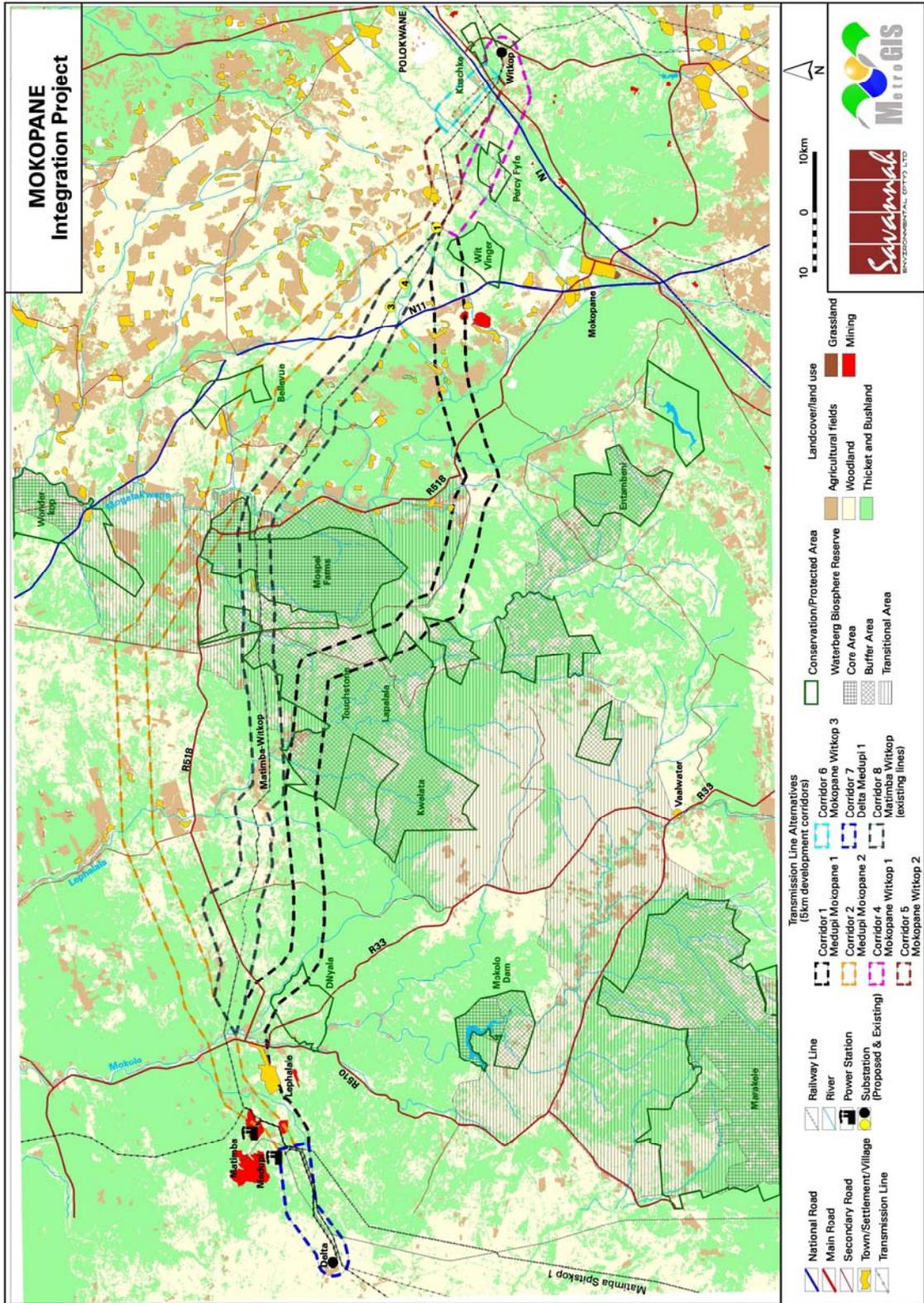
Savannah Environmental (Pty) Ltd appointed MetroGIS (Pty) Ltd as an independent specialist consultant for the visual impact assessment. Neither the author, nor MetroGIS will benefit from the outcome of the project decision-making.

## **1. INTRODUCTION AND BACKGROUND**

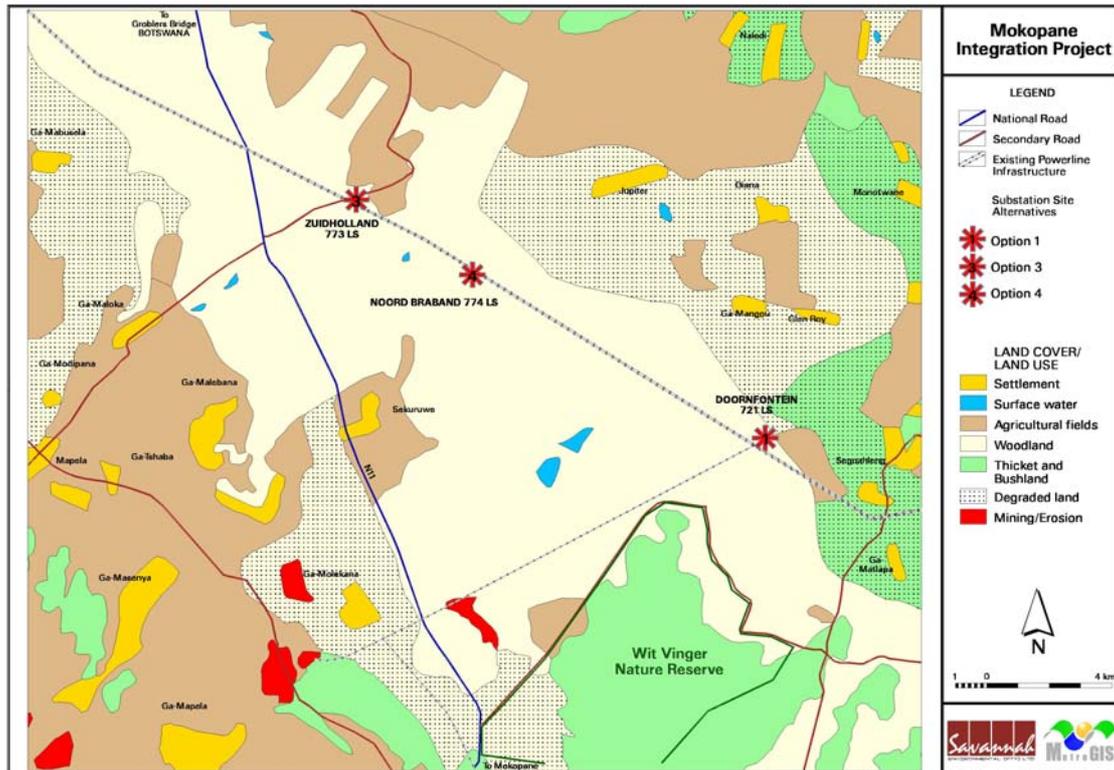
Eskom Holdings Limited is proposing to construct a new substation in the Mokopane area and to connect the proposed substation with the Delta substation, the Medupi Power Station (near Lephalale) and the Witkop substation (south of Polokwane) by means of the construction of two 400kV transmission power lines.

The transmission line alternatives (Corridors 1, 2, 4, 5, 6, 7 and 8) and the three substation options (Alternatives 1, 3 and 4) identified for investigation in the EIA phase of the project are indicated on Figure 1 below. The scoping study for this project originally examined four alternative substation sites (i.e. it included an Alternative 2) and eight alternative transmission line development corridors (i.e. including Alternative 3). Since the completion of the scoping report one substation alternative and one transmission line development corridor were withdrawn on the basis of technical feasibility.

This report sets out to identify and assess the possible visual impacts related to the proposed Mokopane Integration Project as mentioned above, as well as offer potential mitigation measures, where required.



**Figure 1:** Land use/land cover map indicating the proposed transmission line and substation alternatives.



**Figure 2:** Land use/land cover map indicating the proposed substation alternatives.

## 2. SCOPE OF WORK

The study area for the Mokopane Integration Project covers an area of approximately 25 000km<sup>2</sup> in the Limpopo Province from Lephalale in the west to Polokwane in the east. The (overlapping) study area for the proposed Mokopane substation covers an area of 700km<sup>2</sup> north of Mokopane with three potential site options identified along the existing Matimba-Witkop transmission lines, east of the N11 national road.

The scope of work includes the determination of the potential visual impacts in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed infrastructure. In this regard specific issues related to the visual impact were identified during a site visit to the affected environment. Issues related to the proposed Mokopane Integration Project include:

- Visual distance/observer proximity to the proposed infrastructure (apply the principle of reduced impact over distance)
- Viewer incidence/viewer perception (identify areas with high viewer incidence and negative viewer perception)
- Landscape character/land use character (identify conflict areas in terms of existing and proposed land use)
- Visually sensitive features (scenic features or attractions)
- General visual quality of the affected area
- Visual absorption capacity of the natural vegetation

- Potential visual impact of lighting (after hours operations and security) of the proposed substation
- Potential mitigation measures

### **3. METHODOLOGY**

#### **3.1. General**

The study was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed infrastructure. A detailed Digital Terrain Model (DTM) for the study area was created from 20m interval contours supplied by the Surveyor General.

Site visits were undertaken to source information regarding land use, vegetation cover, topography and general visual quality of the affected environment. It further served the purpose of verifying the results of the spatial analyses and to identify other possible mitigating/aggravating circumstances related to the potential visual impact.

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 upon which the proposed infrastructure could have a potential impact.
- The creation of viewshed analyses from the proposed development area 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.

#### **3.2. 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 the proposed infrastructure, or evidence thereof, weren't visible, no impact would occur.

Viewshed analyses of the proposed infrastructure, based on a 20m contour interval digital terrain model of the study area, indicate the potential visual exposure (i.e. areas from where the infrastructure could theoretically be visible). The visibility analyses were undertaken at an offset of 20m (for the substation alternatives) above average ground level and at 35m (for the transmission line alternatives) in order to simulate a worst-case scenario. The viewshed analyses do not include the visual absorption capacity of natural vegetation in the study area. The visual absorption capacity of the vegetation is however addressed as a separate issue within this report and does form part of the visual impact assessment criteria.

### Substation site alternatives

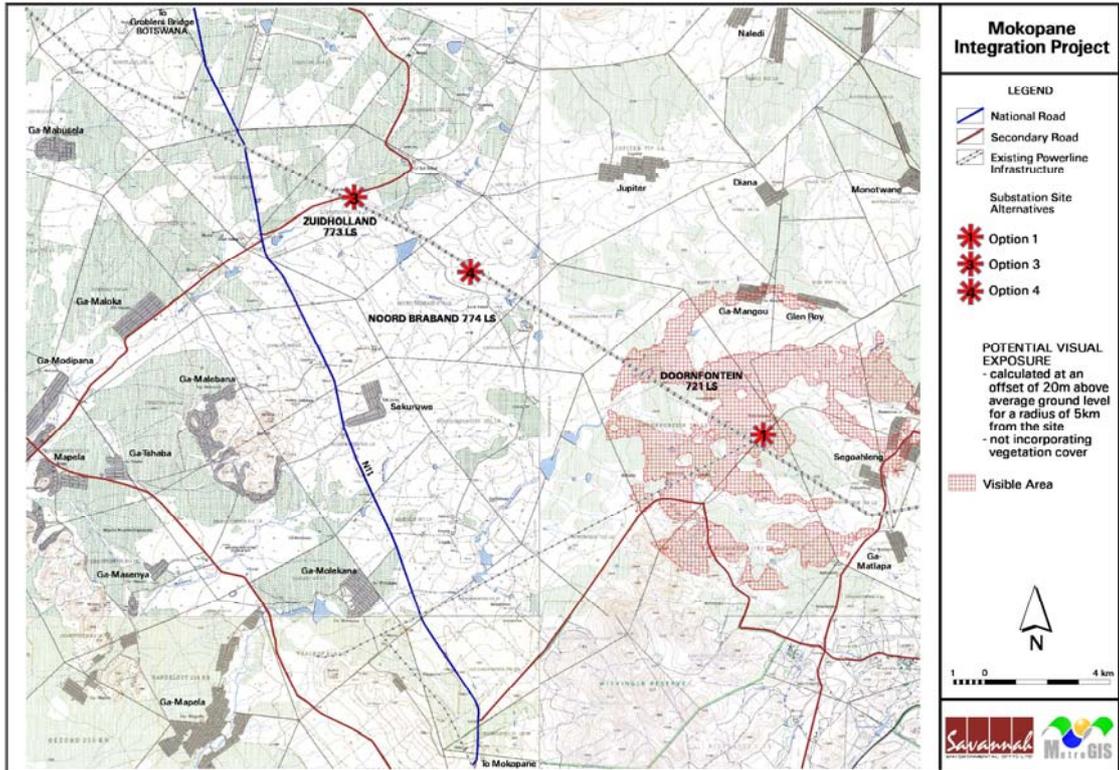
Three feasible alternative sites have been identified as potential locations for the construction of the Mokopane transmission substation and turn-in line infrastructure. The three options are situated north of Mokopane and include the farms Doornfontein 721 LS (Option 1), Zuidholland 773 LS (Option 3) and Noord Braband 774 LS (Option 4). The proposed sites are all located in close proximity to the Matimba-Witkop 400kV transmission lines in order to allow for turn-in line infrastructure from one of these lines to the substation.

**Option 1** is located north of the Wit Vinger Nature Reserve approximately 3.3km (line of sight) west of the Segoahteng settlement.



**Figure 3:** General environment near Option 1 (Note: Wit Vinger Nature Reserve and hills south of the proposed site).

**Option 1** has a relatively scattered pattern of visual exposure due to the undulating nature of the topography and will potentially be visible from Segoahteng, Ga-Mangou and Glen Roy.



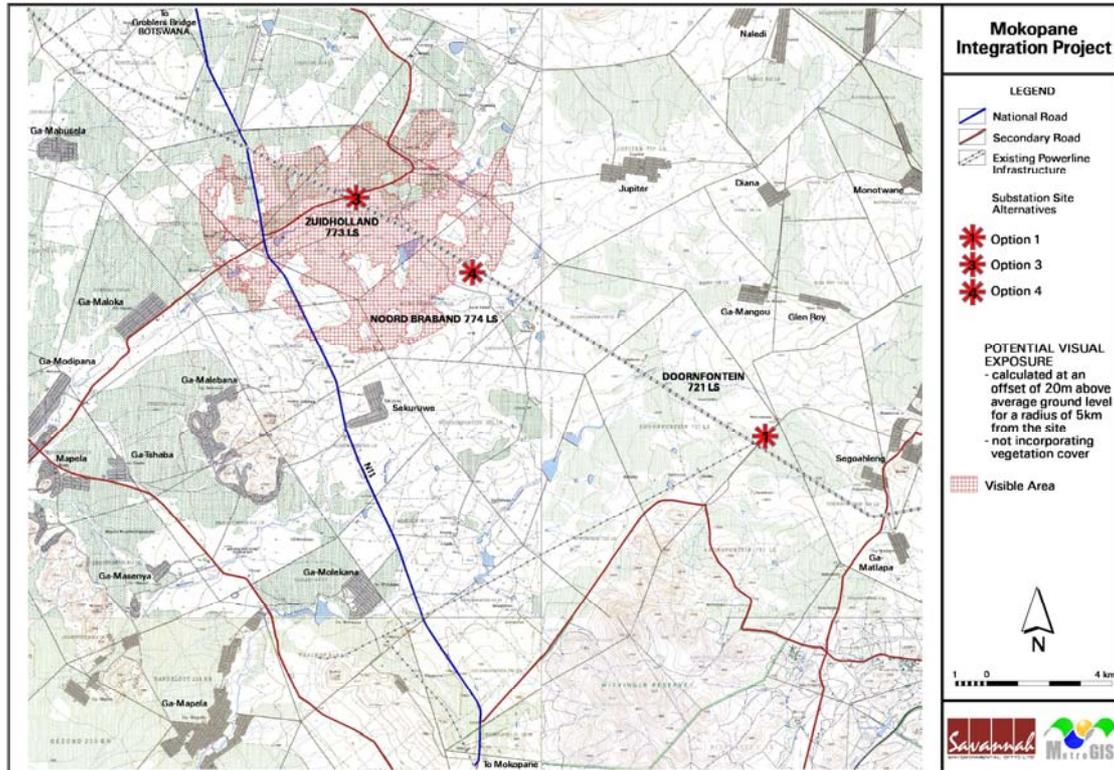
**Figure 4:** Potential visual exposure - substation Option 1.

**Option 3** is located along the Matimba-Witkop 400kV transmission lines at a distance of approximately 3km from the N11 national road.



**Figure 5:** General environment near Options 3 (Note: The proposed substation site is located on the right-hand side of the road).

The core area of visual exposure for Site **Option 3** is indicated on Figure 6. This option is not expected to be visible from any major villages or settlements but it will potentially be visible from the N11 national road at a distance of 3km at the closest.



**Figure 6:** Potential visual exposure - substation Option 3.

**Option 4** is located 4.4km south-east of Option 3. It is 5.7km from the N11 and the closest major settlement, Sekuruwe, is about 5km south-west of the proposed site.

**Option 4** is not expected to be visible, or have a significant visual influence on observers travelling along the N11 (located beyond 5km from the proposed site). It is also not in close proximity to any major settlements within the core area of visual exposure.