



**Figure 10:** Existing Matimba-Witkop 400kV transmission lines (Note: The vegetation cover is removed underneath the power lines).

**Corridor 4**, from the proposed substation site to the Witkop substation, travels in a south-easterly direction for 11km before traversing the Percy Fyfe Nature Reserve. After 6km it leaves the nature reserve and continues for 16km across predominantly thicket and bushland before entering the Witkop substation. The total length of the fourth corridor is 33km.



**Figure 11:** Aerial view of the Witkop substation.

**Corridors 5** and **6** follow the existing Matimba-Witkop 400kV power lines from the proposed substation site to the Witkop substation. Corridor 5 (34.5km total length) follows these power lines for the entire length of its alignment, while Corridor 6 veers off after 19km to follow the Warmbad-Witkop 275kV line for 17km. The total length of Corridor 6 (including the joint section with Corridor 5) is 37km.



**Figure 12:** Power line infrastructure on the hill west of the Witkop substation.

The Delta-Medupi transmission line corridor (**Corridor 7**) originates at the Delta substation and travels in a north-easterly direction towards the Medupi Power Station. The alignment occurs north of the Matimba-Marang/Pluto/Midas transmission power lines at distances varying between 1.7km at the closest to 3km at the furthest. The total length of the alignment is 20.7km.

Viewshed analyses for the transmission line alternatives are shown in Figure 13. The visibility of the transmission towers were calculated at a maximum offset of 35m above ground level for a radius of 5km (i.e. the expected sphere of visual influence of the transmission line infrastructure) from the centerline. The viewshed analyses do not include the potential visual absorption effect of the natural vegetation or other structures and therefore signify a worst-case scenario in terms of visibility.

It is clear that the proposed transmission line infrastructure have the potential to be visually exposed to large areas within their respective 5km buffer zones. This is due mainly to the relatively tall (35m) transmission line towers associated with 400kV power lines. The proposed corridors display a more even potential exposure pattern where they traverse flat terrain and more scattered patterns where they encounter elevated topography. Corridor 2, which does not traverse the Waterberg Mountains and escarpment, is seen as having a larger area of potential visual exposure than Corridors 1 or 8. The latter of these alternatives (the existing Matimba-Witkop power lines) traverse both flat terrain and the Waterberg escarpment and therefore have a combined pattern of visual exposure. The Corridor 8 deviation encounters some undulating terrain where it leaves the existing Matimba-Witkop alignment as well as at the eastern leg before it joins these lines again. The visual exposure is relatively scattered within these areas.

Corridors 4, 5 and 6 have very similar patterns of potential visual exposure due to their close proximity to each other and the relatively homogenous terrain they traverse.

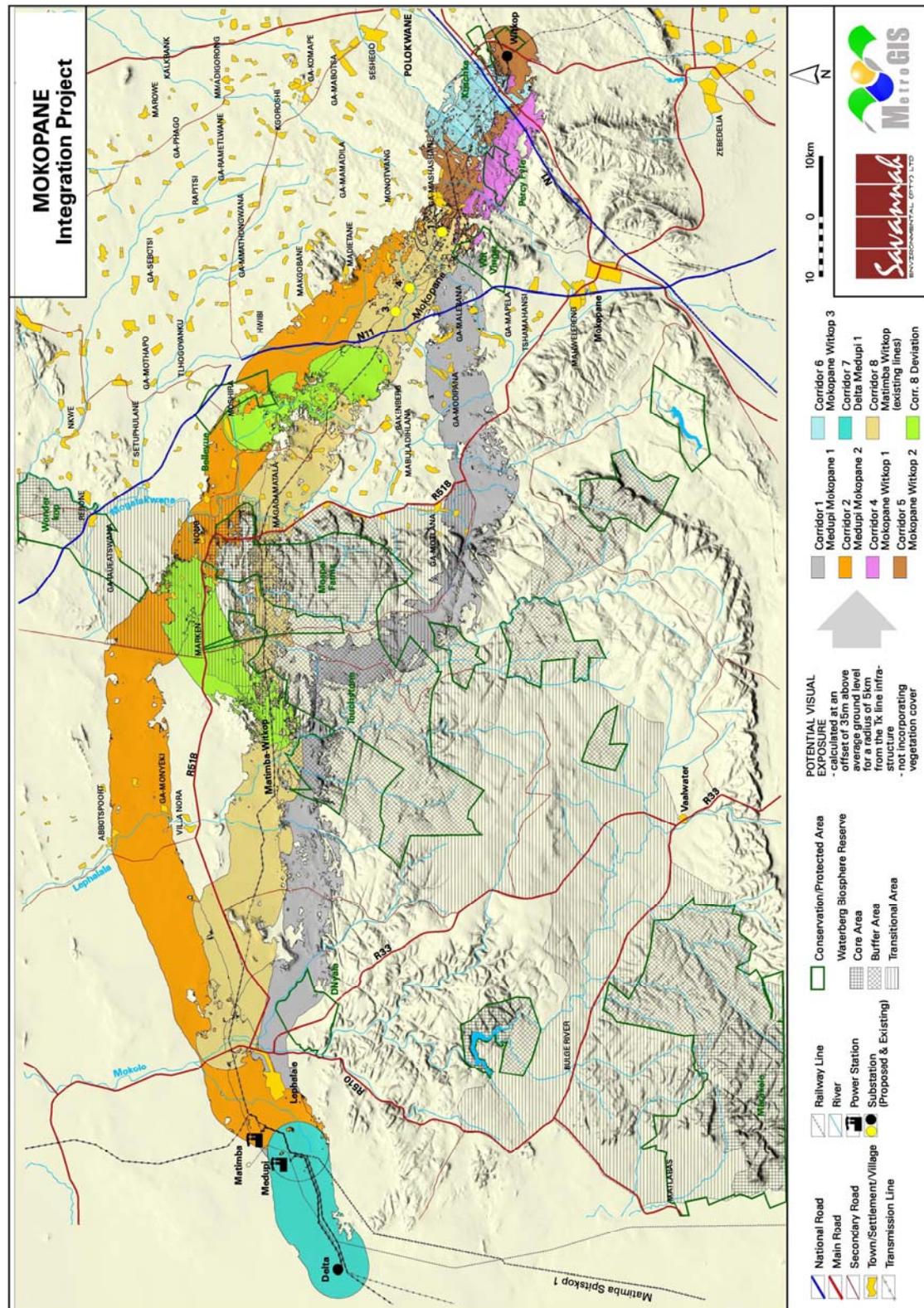


Figure 13: Potential visual exposure - transmission line alternatives.

### 3.3. Visual distance/observer proximity to the project infrastructure

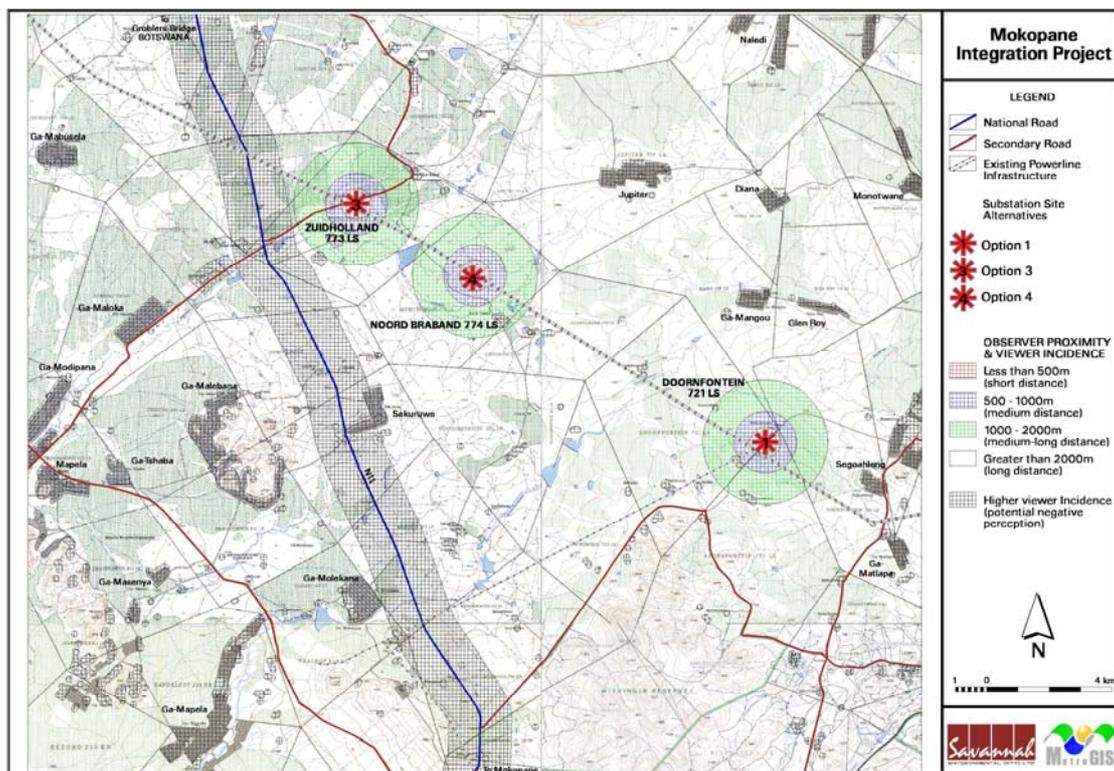
The principle of reduced impact over distance is applied in order to determine the core area of visual influence for these types of structures. It is envisaged that the type of structures (transmission lines and a substation) and the predominantly undeveloped nature of the receiving environment could create a significant contrast.

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

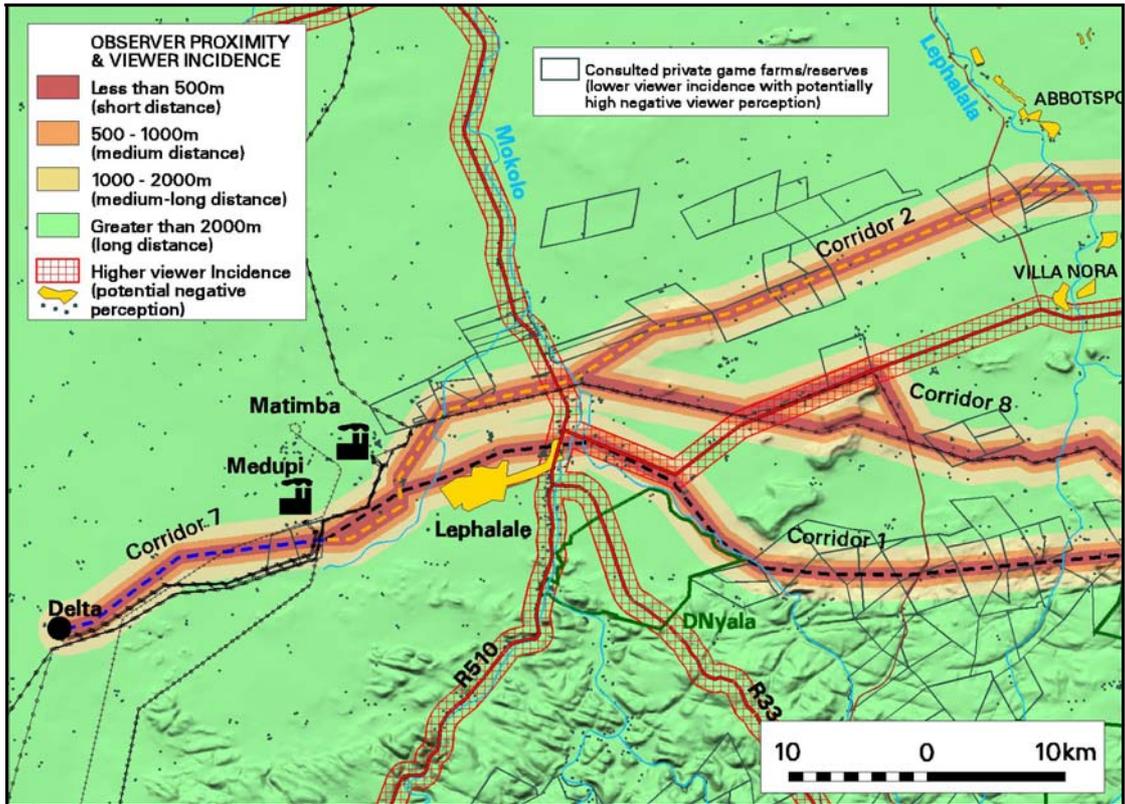
The proximity radii chosen, based on the dimensions (size) of the proposed project infrastructure, are:

- 0 - 500m. Short distance view where the project infrastructure would dominate the frame of vision and constitute a very high visual prominence.
- 500 - 1000m. Medium distance view where the structures would be easily and comfortable visible and constitute a high visual prominence.
- 1000 - 2000m. Medium to longer distance view where the structures would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence.
- Greater than 2000m. Long distance view of the project infrastructure where the structures could potentially still be visible though not as easily recognisable. This zone constitutes a medium to low visual prominence.

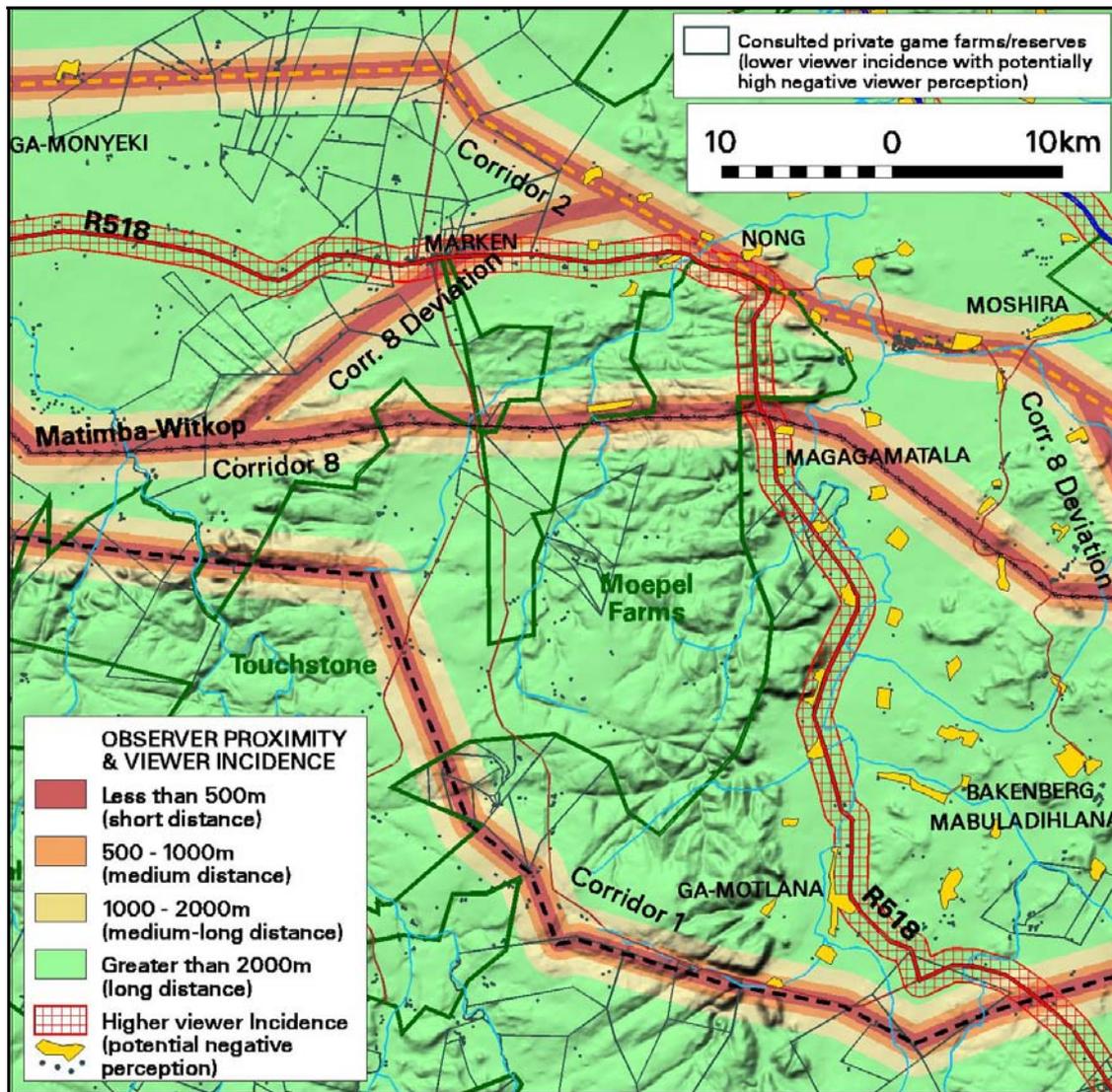
Figures 14 to 17 indicate the observer's proximity to the proposed substation alternatives and the proposed transmission line development corridors.



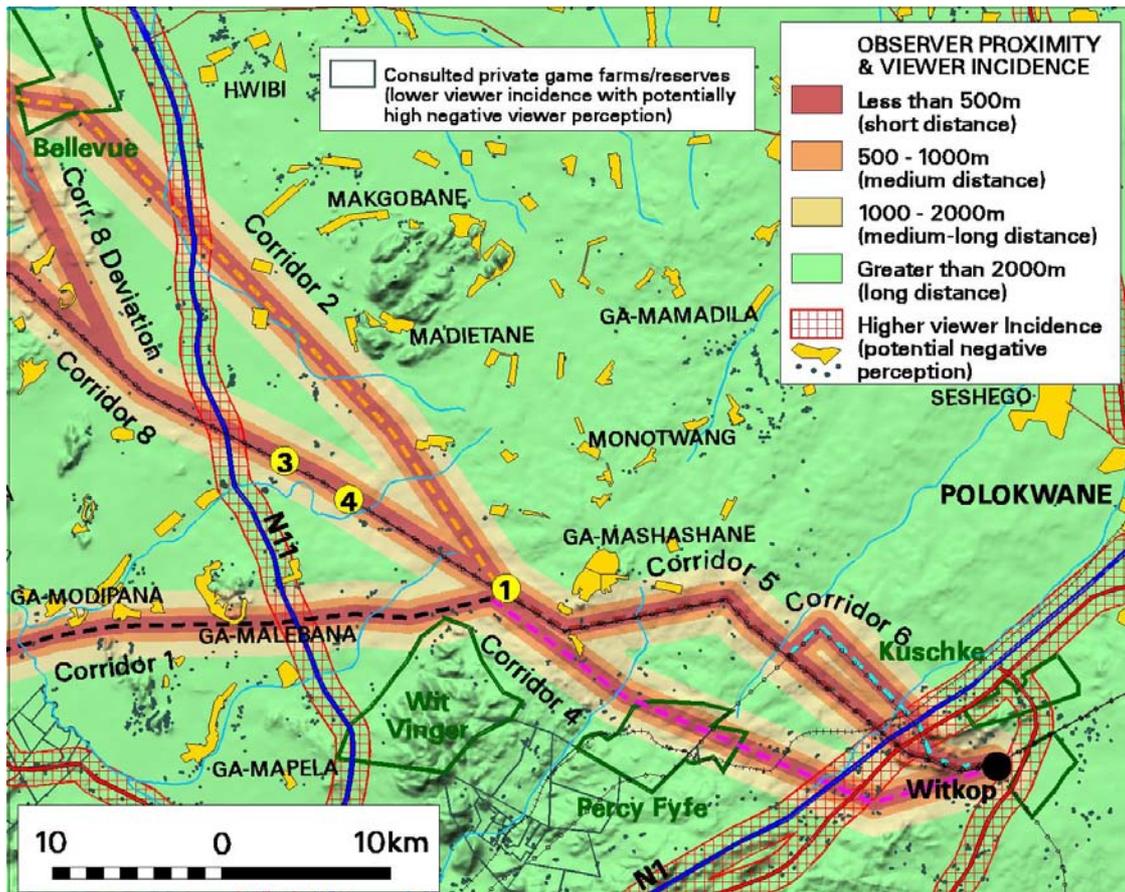
**Figure 14:** Observer proximity and viewer incidence - substation alternatives.



**Figure 15:** Observer proximity and viewer incidence - transmission line alternatives (western section).



**Figure 16:** Observer proximity and viewer incidence - transmission line alternatives (central section).



**Figure 17:** Observer proximity and viewer incidence - transmission line alternatives (eastern section).

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

### 3.4. Viewer incidence/viewer perception

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the infrastructure associated with the proposed Mokopane Integration Project. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; i.e. regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

Four areas of higher viewer incidence and/or potentially negative viewer perception of the proposed project infrastructure were identified for the study area. The **first area** includes towns (Lephalale and Mokopane), residential areas (Onverwacht), villages and settlements (predominantly to the north and east of the study area), individual homesteads/farm residences (scattered throughout the study area) and private game reserves/farms (with tourist lodges). The last category (indicated on Figures 15 to 17) includes the farm boundaries of

consulted landowners who indicated that their farms are utilised for game viewing, hunting, photographic safaris and/or informal conservation areas. The farms are not expected to contain a high viewer density, but observers (tourists/visitors) are expected to have a potentially high negative viewer perception of the project infrastructure due to the nature-based activities within these areas.

Farms in close proximity of the proposed project infrastructure within **area one** include:

|                        |                        |                     |                         |
|------------------------|------------------------|---------------------|-------------------------|
| Kuipersbult 511 LQ     | Early Morn 215 LR      | Spider 535 LQ       | Duna 554 LR             |
| Zongezien 467 LQ       | Witpan 447 LR          | Durban 522 LR       | Sterkwater 560 L        |
| Kalkfontein 468 LQ     | Pieterman 445 LR       | Wynberg 521 LR      | Groot Denteren 5        |
| Vucht 436 LQ           | Rooibokpan 216 LR      | Weltevreden 508 LR  | Grafton 565 LQ          |
| Wellington 432 LQ      | Duikerrivier 568       | Groetfontein 494 LR | Adelaide 557 LR         |
| Garibaldi 480 LQ       | Schoonhoven 448 LR     | Spektakel 526 LR    | Duikerrivier 568        |
| Weltevreden 482 LQ     | Fairfield 219 LR       | Drakensberg 549     | Sterkwater 560 L        |
| Grootgenoeg 426 LQ     | Leerdam 443 LR         | New Belgium 608     | Broederschap 581        |
| Samaria 207 LR         | Scheveningen 444 LR    | Hanover 555 LR      | Laussonie 561 LR        |
| Goa 427 LR             | Welgevonden 449 LR     | Rivierplaats 541    | Daggakraal 591 LR       |
|                        |                        |                     | Rhynosterfontein 538 LR |
| Villa Nora 428 LR      | Gouda 453 LR           | Zwellendam 548 L    | LR                      |
| Killarney 210 LR       | Johannisberg 509 LR    | Poeskopdrift 545    | Slangfontein 655 LR     |
| Goedgelegen 194 LR     | Kirstenbos 497 LR      | De Koop 525 LR      | Lola Montez 796 LR      |
| Buffelsfontein 220 LR  | Klip Bank 713 LR       | Colesberg 556 LR    | St. Etienne 798 LR      |
| Deugdzaamheid 197 LR   | Schrikfontein 715 LR   | Uitvlugt 567 LQ     | Wydenhoek 216 KR        |
| Stinkkraal 195 LR      | Hookdoorn Draai 711 LR | Duikerfontein 53    | Appingendam 805 LR      |
|                        | Windsor-Castle 493 LQ  |                     |                         |
| Deugdzaamheid 197 LR   | LQ                     | Norfolk 559 LR      | Kranskloof 218 KR       |
| Turflaagte 214 LR      | Toulon 495 LQ          | Rivierplaats 541    | Smithsfield 536 LQ      |
| Tiel 218 LR            | Cradock 534 LQ         | Eyzerbeen 553 LR    | Fairfield 219 LR        |
| Grobbelaarshoek 462 LR | Diepspruit 463 LR      | Sterkfontein 459 LR | Republiek 456 LR        |

*Please consult the Public Participation Process (PPP) report for a comprehensive database of the consulted landowners.*

The high-density residential areas are expected to have a high visual absorption capacity and will not suffer as severe a potential visual impact as the rural settlements due to the occurrence of less visual clutter. Residents along the perimeter of high-density residential areas could however still be exposed to the project infrastructure necessitating the inclusion of these neighbourhoods into the first zone. Residents of this zone are seen as potential sensitive visual receptors upon which the construction of the substation or transmission lines could have a negative visual impact.

Villages and rural settlements (in close proximity of the proposed project infrastructure) within **area one** include:

|               |              |               |              |
|---------------|--------------|---------------|--------------|
| Neckar        | Ga-Lebelo    | Phofu         | Ngope        |
| Ga-Maeteletsa | Mosuka       | Madietane     | Ga-Mosoge    |
| Abbottspoort  | Mphello      | Nokayamatlala | Sekuruwe     |
| Bangalong     | Uitspanning  | Goedehoop     | Ga-Malebana  |
| Ga-Monyeki    | Diretsaneng  | Phetole       | Morwasethula |
| Ga-Musi       | Magagamatala | Ga-Masipa     | Phatsane     |