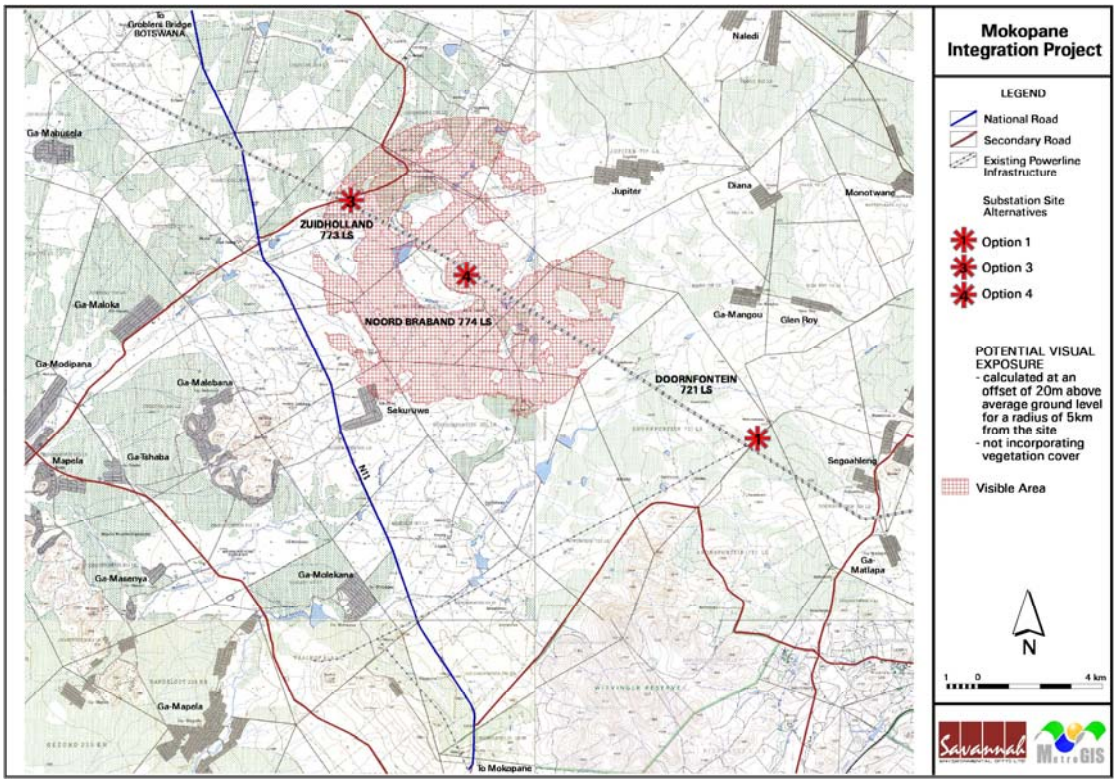

Figure 7: Potential visual exposure - substation Option 4.

Transmission line alternatives

Seven feasible transmission line development corridors were identified in order to link the Delta substation with the Medupi Power Station and the Witkop substation. Three of these alternatives (Corridors 1, 2 and 8) function as a link between the Medupi Power Station and the proposed Mokopane substation, and three alternatives (Corridors 4, 5 and 6) function as a link between the proposed substation and the Witkop substation. Only one transmission line development corridor (Corridor 7) is proposed for the Delta-Medupi section of the Mokopane Integration Project.

The first corridor (**Corridor 1**) leaves the Medupi Power station in an easterly direction south of Lephalale before traversing north of the D'Nyala Nature Reserve. It crosses the Waterberg plateau, Waterberg Biosphere Reserve buffer zone (Touchstone Nature Reserve) before spanning across the escarpment and dropping down towards the R518. It steers east for another 50km before joining the Matimba-Witkop transmission lines. The length of the first corridor is 172km.

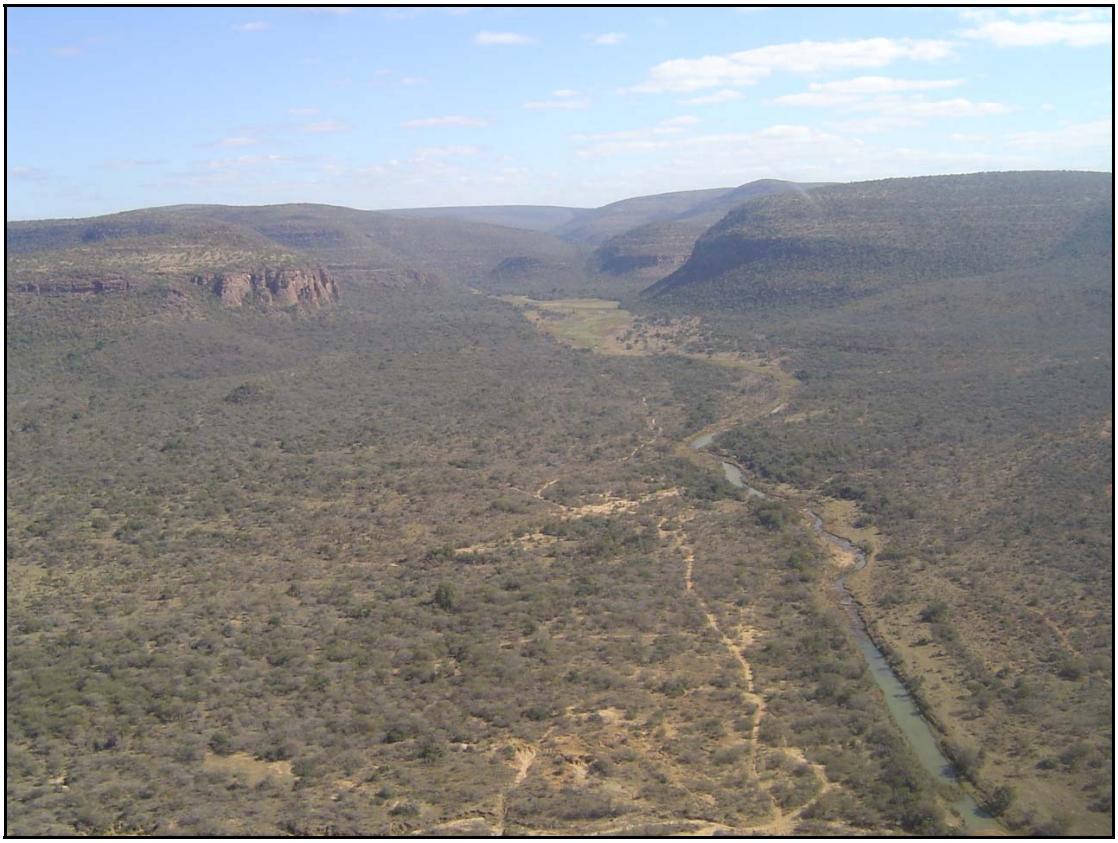

Figure 8: The Waterberg Mountains eastern escarpment.

Corridor 2 originates at the Medupi Power Station and proceeds in a north-easterly direction for approximately 30km before veering east for 85km. It traverses the Waterberg Biosphere Reserve's transitional zone before it turns south-east, crossing the southern section of the Bellevue Nature Reserve. It continues for roughly 40km before joining the Matimba-Witkop power lines near the proposed Mokopane substation site. The total length of the transmission line corridor is 180km.

Figure 9: Settlements along the eastern section of Corridor 2 (Note: the absence of natural woodland, thicket and bushland).

Corridor 8 (the existing Matimba-Witkop transmission line corridor) originates at the Matimba Power Station and travels east for approximately 29km before reaching the R518. The lines split at this point and the northern section traverses adjacent to this road for almost 9km while the southern section crosses between two hills. The two lines meet up shortly thereafter and continue eastward for 30km before entering the Waterberg Biosphere Reserve's transitional, buffer (Touchstone) and core areas (Moepel Farms). After 32km it crosses the escarpment and continues another 58km to the proposed Mokopane substation site. The Matimba-Witkop transmission line covers a distance of over 182km from Matimba to the proposed substation site.

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 where 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.

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.

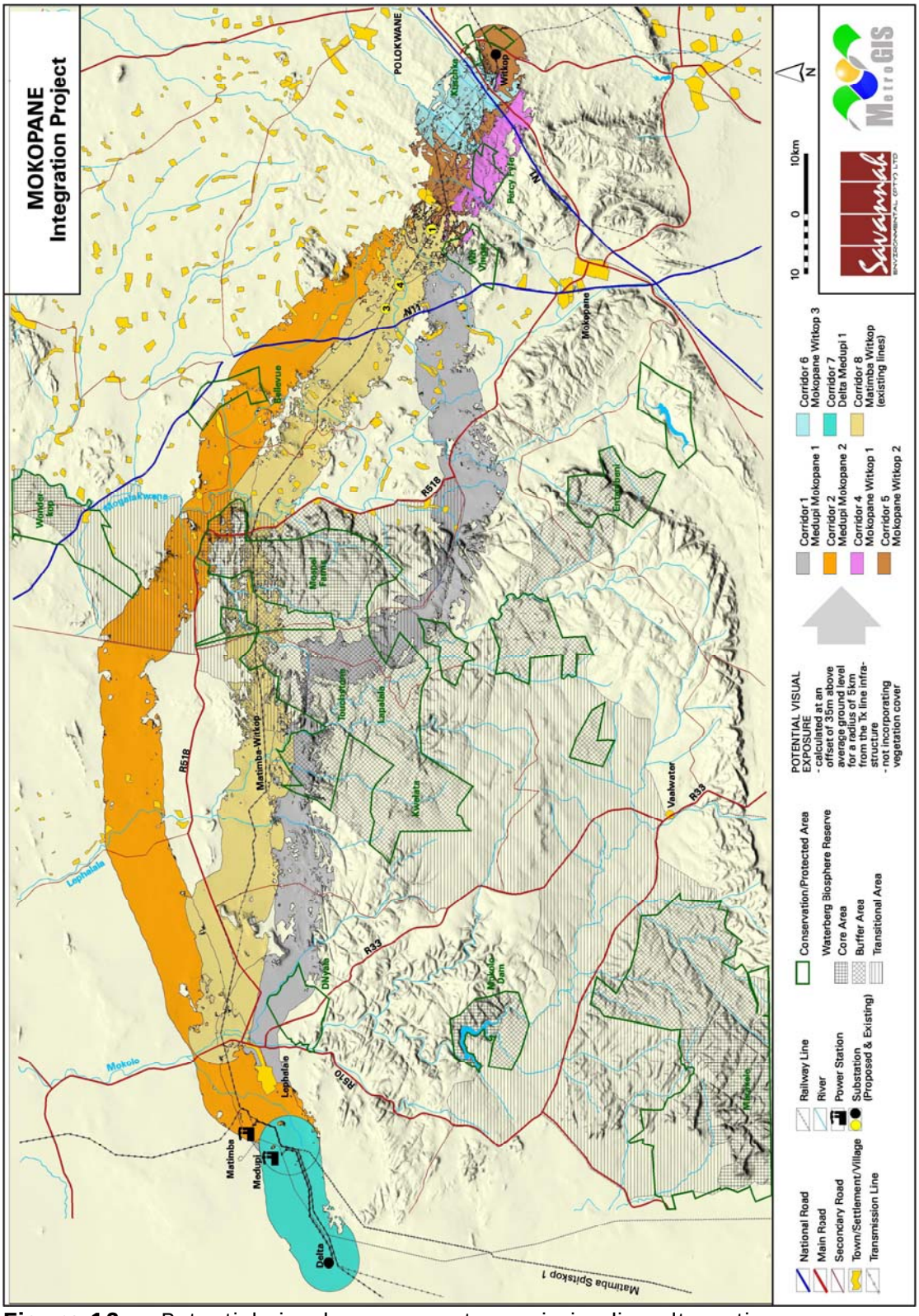

Figure 13: Potential visual exposure - transmission line alternatives.

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 thought 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.

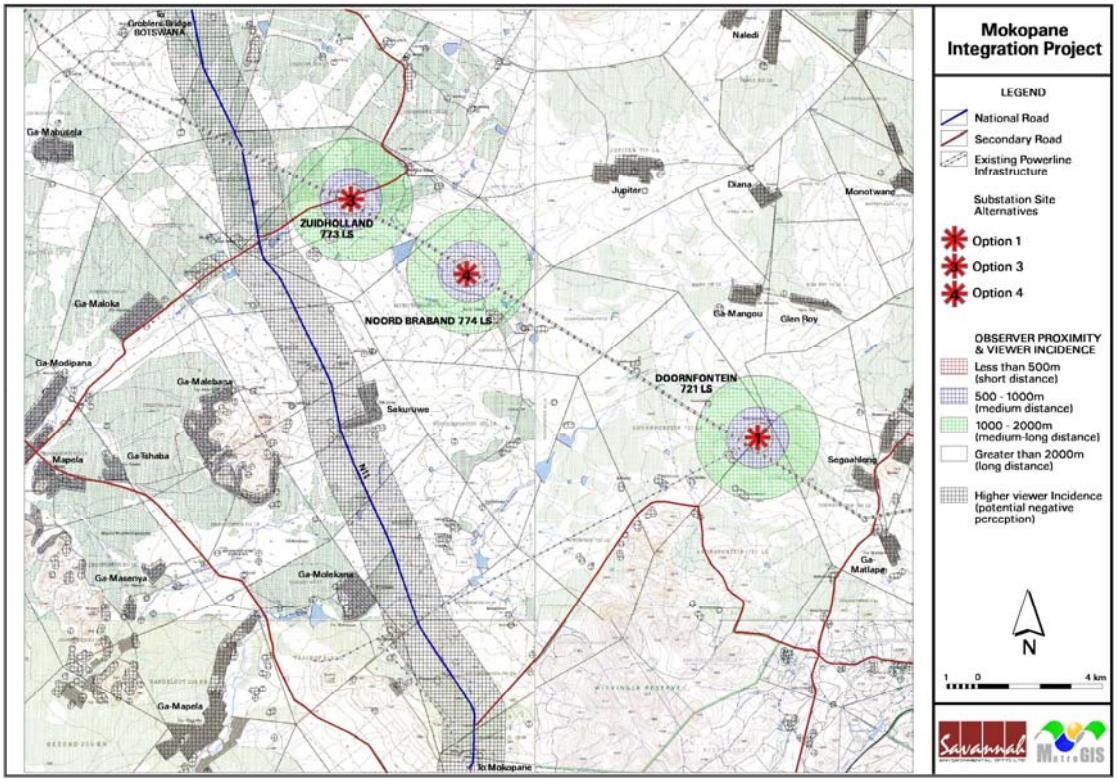

Figure 14: Observer proximity and viewer incidence - substation alternatives.

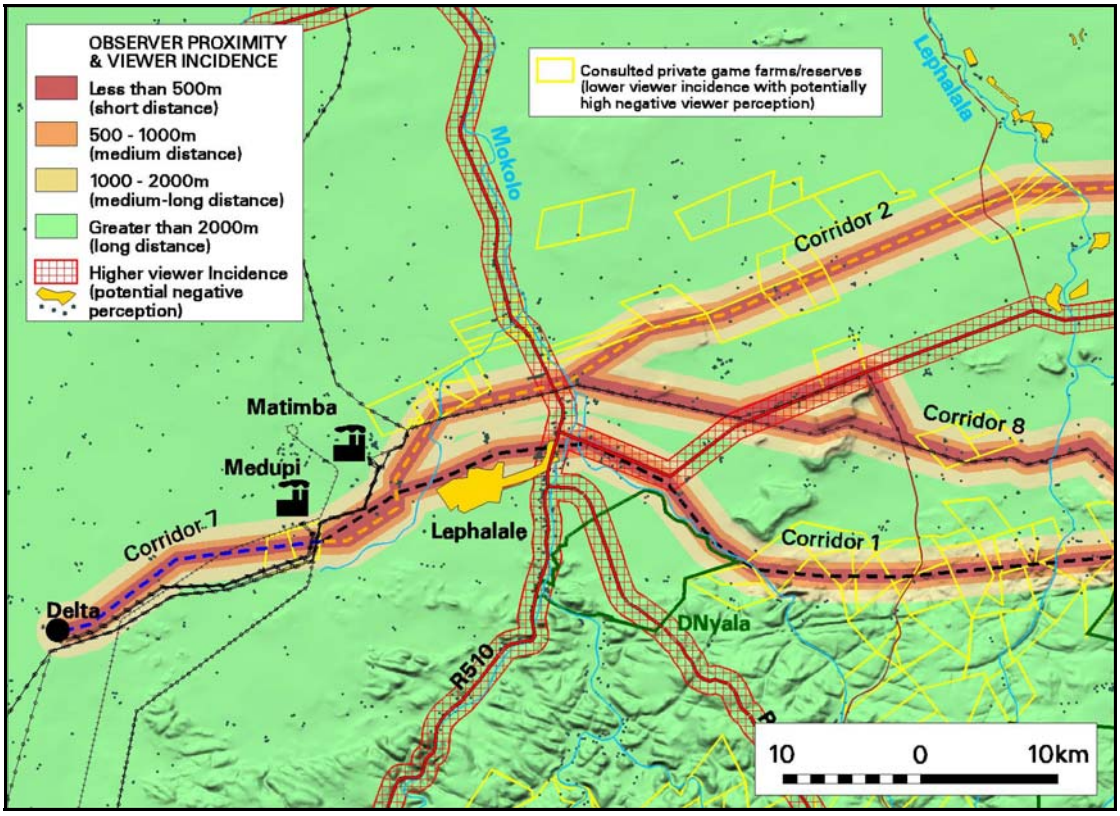

Figure 15: Observer proximity and viewer incidence - transmission line alternatives (western section).

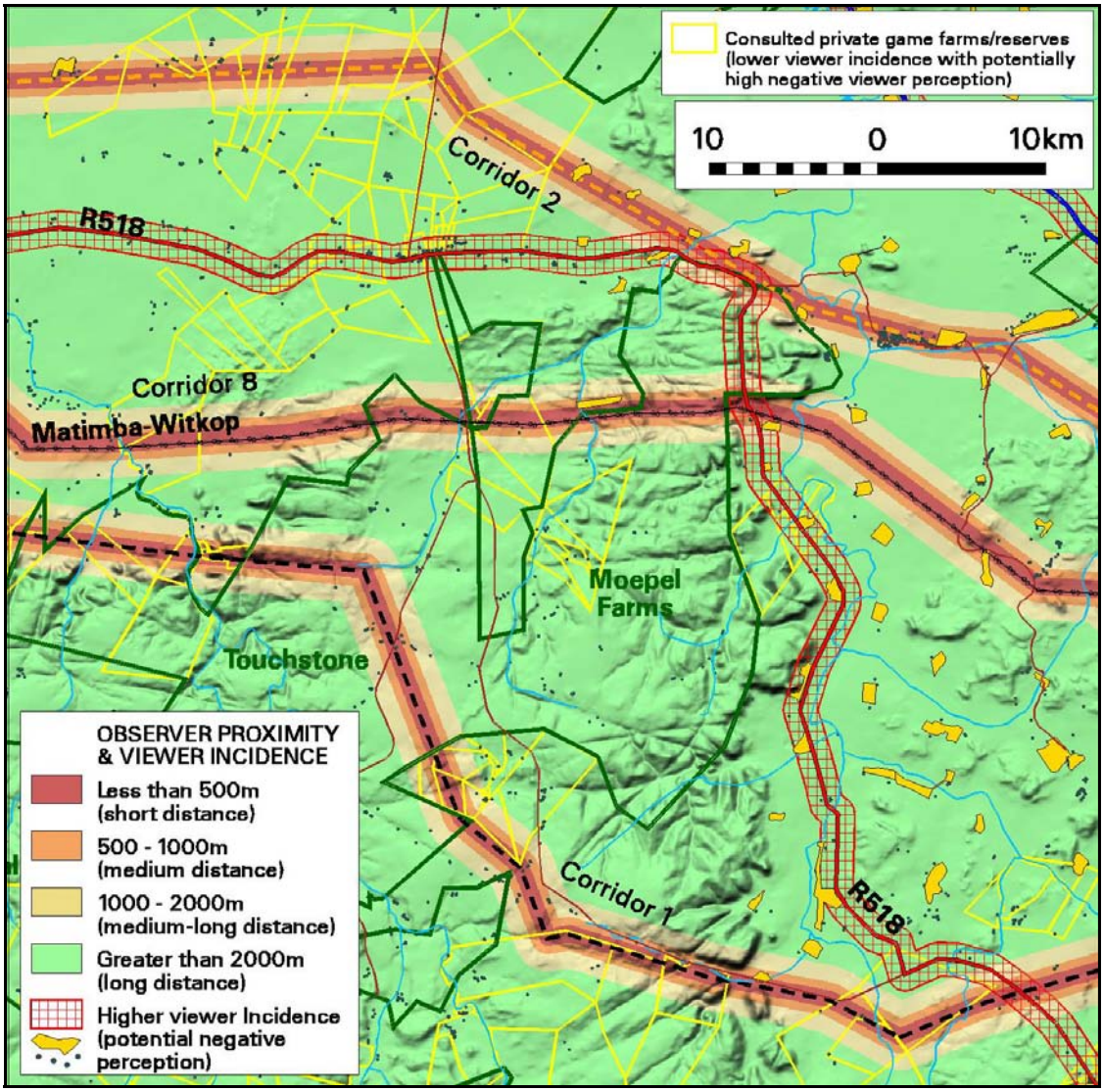

Figure 16: Observer proximity and viewer incidence - transmission line alternatives (central section).

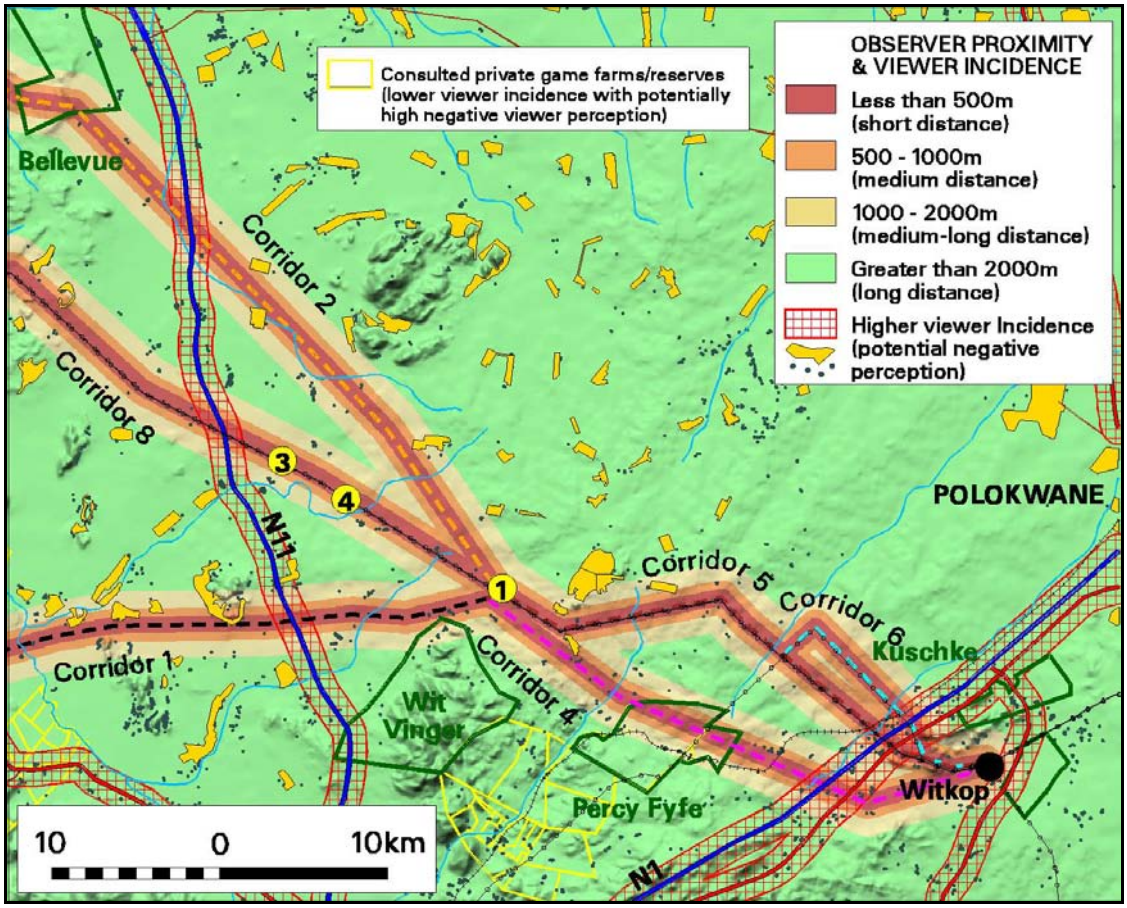

Figure 17: Observer proximity and viewer incidence - transmission line alternatives (eastern section).

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
Villa Nora 428 LR	Gouda 453 LR	Zwellendam 548 L	Rhynosterfontein 538 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
Deugdzaamheid 197 LR	Windsor-Castle 493 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

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
Ga-Nkidiktitlana	Buffelshoek	Pudiyakgopa	Ga-Mashashane