ANKERLIG POWER STATION CONVERSION AND TRANSMISSION INTEGRATION PROJECT

VISUAL ASSESSMENT - INPUT FOR SCOPING REPORT AND TRANSMISSION POWER LINE ALTERNATIVE SELECTION

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- January 2008 -

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Lourens du Plessis from MetroGIS (Pty) Ltd. undertook the visual 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.

Lourens 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 utilise the principles and recommendations stated therein to successfully undertake visual impact assessments.

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

1. INTRODUCTION AND BACKGROUND

The proposed Ankerlig power station (previously known as the Atlantis OCGT power station) conversion site is situated approximately 40km north of Cape Town and about 3km (at the closest) from the Atlantis residential area. It is located within the western corner of the Atlantis Industrial Township and is surrounded by predominantly open space and vacant land to the north, west and south. The sparsely occupied, mixed industrial area borders the proposed site to the east. The industrial area stretches eastward for about 2 - 3 km towards the Aurora-Koeberg transmission lines that form the eastern boundary of the industrial township.

The site is relatively remote and far removed from major centres, tourist attractions and major roads. It is located next to the R307 (Dassenberg Road) that functions as the primary access route to Atlantis and Mamre (north of Atlantis) from Cape Town. The closest major road is the R27 (about 5 km from the site). The R27 functions as the primary connector between Cape Town, Saldanha and the West Coast National Park.

The Ankerlig power station conversion project can be seen as a third phase of the original Atlantis OCGT power station project. The current OCGT units in operation (four units), as shown in the photograph below, are the first phase of the project. The second phase of the project (currently under construction) includes the expansion (capacity increase) of the power station by adding another five OCGT units, four fuel tanks and a switchyard to the power station. The latest phase that will be addressed by this document is the proposed conversion of the OCGT (Open Cycle Gas Turbine) units to CCGT (Combined Cycle Gas Turbine) units.

Figure 1: Ankerlig OCGT power station (four OCGT units and two fuel tanks are shown)

The conversion of the power station from OCGT to CCGT technology, as a visual concern, primarily entails the increase of the dimensions of the gas turbine units. The tallest of the new components (such as the smokestacks) will be 60 m tall whereas the existing tallest structures (exhaust stacks) are 30 m tall. Additional infrastructure associated with the conversion project includes the construction of a small water reservoir (2 million litres) and eight fuel tanks (with a total capacity of approximately 43 million litres) east of the OCGT capacity increase area. Please refer to Figure 2 for the layout of the OCGT power station, the capacity increase area and the area identified for the additional fuel storage tanks and off-loading and other related infrastructure.

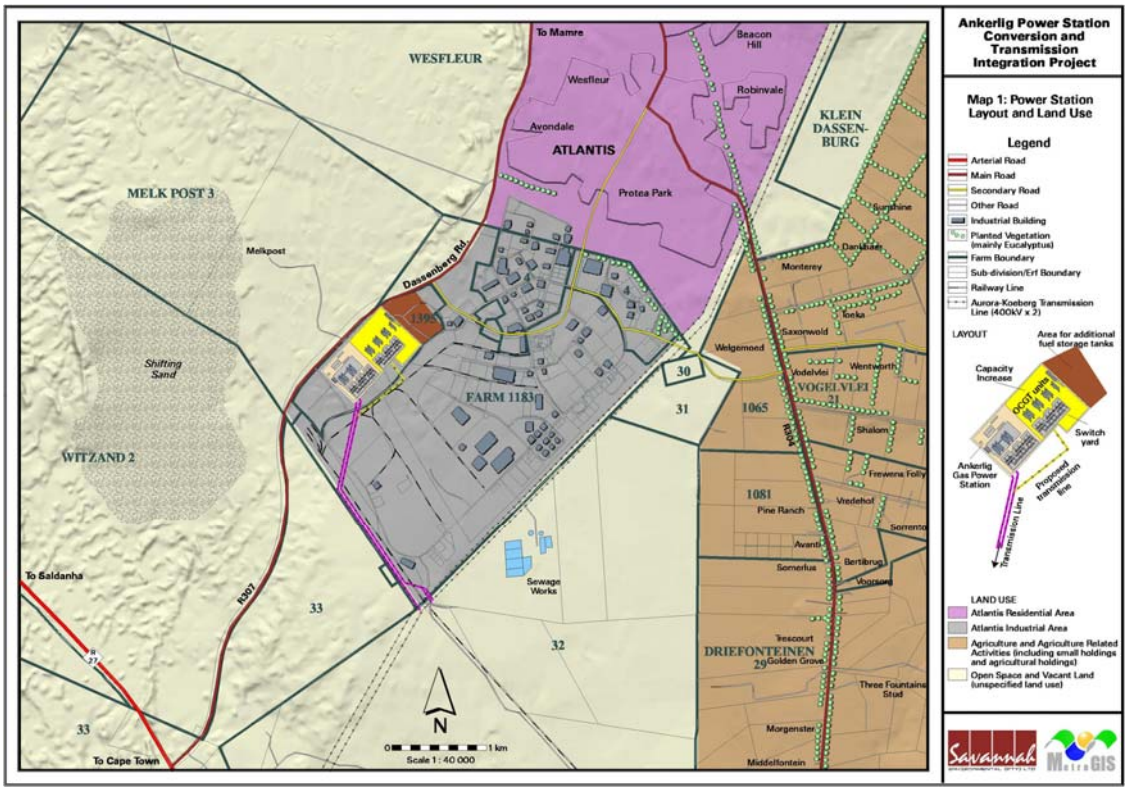

Figure 2: Ankerlig power station layout and broad land use

The Ankerlig project further includes the integration of the Ankerlig power station with the already authorised Omega substation situated approximately 13km south-east of the Atlantis industrial area on the farm Groot Oliphantskop 81 through the construction of a 400 kV transmission power line between these two points. Three alternative transmission power alignments are proposed for investigation and are described in Chapter 3 (Transmission Power Line Alternatives).

2. ISSUES RELATED TO THE VISUAL IMPACT ASSESSMENT

An initial viewshed analysis of the proposed Ankerlig conversion project, based on a 5m contour interval digital terrain model of the study area, indicates the visibility of the OCGT plant at full capacity (i.e. nine turbine units) and the potential future visual exposure after the conversion. The object offset for the current power station was taken at a maximum 30m above ground level (i.e. the height of the OCGT smoke stacks) and the proposed converted power station was taken at 60m offset above ground level. See Figure 3 below.

(Note: This viewshed analysis is based on the OCGT/CCGT plant alone and does not include the proposed Ankerlig to Omega transmission power line integration. Separate viewshed analyses were done for the three transmission power line alternatives).

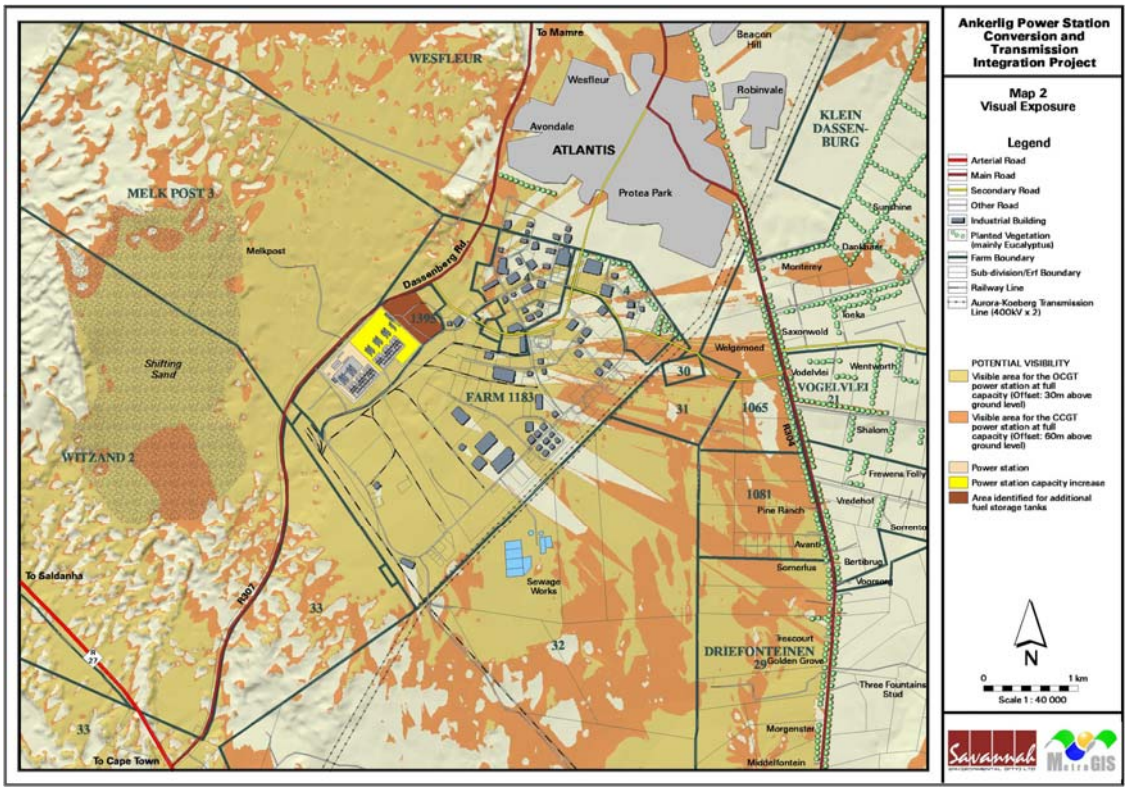

Figure 3: Potential visual exposure of the Ankerlig power station

It becomes apparent that the facility would be relatively exposed due to the predominantly flat topography of the region. The general trend of the visual exposure (for the OCGT power station) shows a larger area with a short to medium distance exposure, and a smaller, scattered area with medium to long distance exposure. The areas shown in red indicate the additionally exposed land after the conversion to a CCGT power station. The increase in dimensions of the power station, following the conversion process, clearly increases the medium to long distance exposure of the power station significantly, especially to the south-east of the industrial area.

The fact that these additional areas are exposed does not imply that it constitutes a significant visual impact, at least not for all of the exposed areas. Further investigation is necessary in order to determine the specific visual impact within these exposed areas (i.e. the potential occurrence of sensitive visual receptors).

The visual impact assessment within the EIA will address these and other crucial issues related to the visibility of the proposed OCGT to CCGT conversion project and the preferred transmission power line alternative. These issues or criteria will aim to quantify the actual visual impact and to identify areas of perceived visual impact.

Other issues/criteria to be addressed by the visual impact assessment:

- Visual distance/observer proximity to the facility (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
- Potential impact of the power station conversion on the tourism and eco-tourism (Cape West Coast Biosphere Reserve) potential of the area
- Visual absorption capacity of the natural vegetation
- The effect of existing man-made structures on the visual exposure
- Potential visual impact of lighting (after hours operations and security)
- Potential mitigation measures

An initial scanning level assessment of the above issues did not reveal any fatal flaws to be associated with the proposed power station conversion project. These issues should however still be investigated in greater detail in order to scientifically motivate and/or identify any other mitigating/aggravating circumstances. The potential cumulative visual impact of the power station conversion project should also be addressed as a site-specific issue. This is due to the increase of development adjacent to the R307 (Dassenberg Road) brought about by the both the proposed conversion project and the proposed placement of additional fuel tanks and off-loading and other related infrastructure east of the power station. Fuel tank placement alternatives within the identified area should be investigated and recommendations should be made in order to facilitate the mitigation of potential visual impacts.

3. TRANSMISSION POWER LINE ALTERNATIVES

Three transmission power line alternatives (Options A, B and C) were identified for the integration of the Ankerlig power station with the Omega substation. All the alternatives will be 400kV transmission power lines utilising standard towers. Option A follows existing transmission power lines (Koeberg-Stikland 1, Atlantis-Koeberg 1 and Atlantis-Koeberg 2) for virtually the entire length of the alignment, while Option B follows Option A for about 2.5km before veering northwards across open farmland (for about 9km) towards the Ankerlig power station. Option C follows a seemingly deserted railway line servitude for approximately 9km before entering the Atlantis industrial area. All the alternatives cross the R303 near the Omega substation and will traverse the Atlantis industrial area, adjacent to the existing Ankerlig transmission power lines, for a distance of about 3km before linking with the Ankerlig power station.

Figure 4: Koeberg-Stikland 1 transmission power lines crossing the R303 near the Omega substation

Figure 5: The railway line servitude near the Atlantis industrial area (Note: service road adjacent to the railway line)

An initial viewshed analysis within the study area from each of the transmission power line alternatives is shown in Figures 6 to 8 below. The visibility of the transmission power line towers where calculated at a maximum offset of 50m above ground level within a 5 km radius (regarded as being the reasonable limit of visibility of a power line).

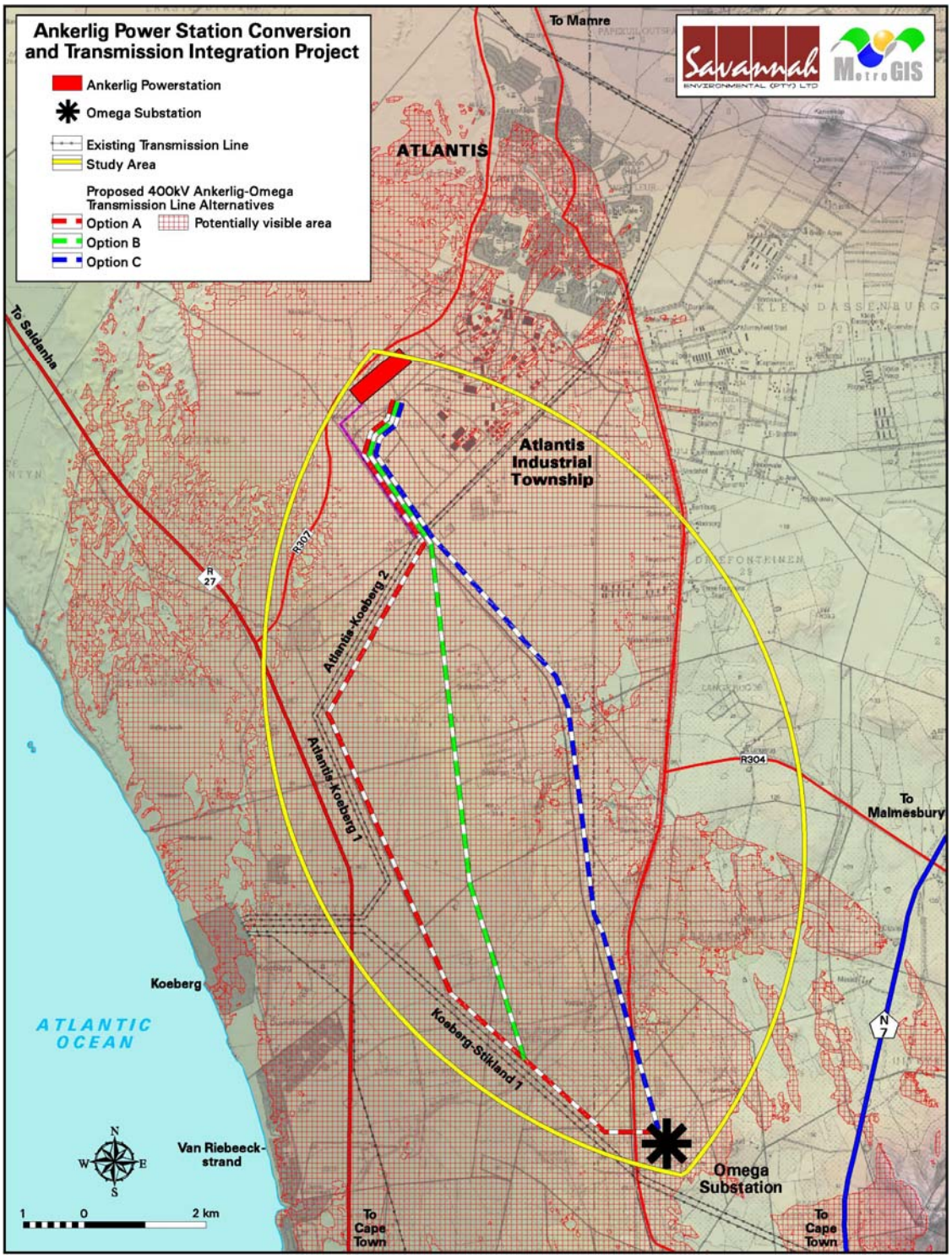

Figure 6: Potential visual exposure of transmission power line Option A

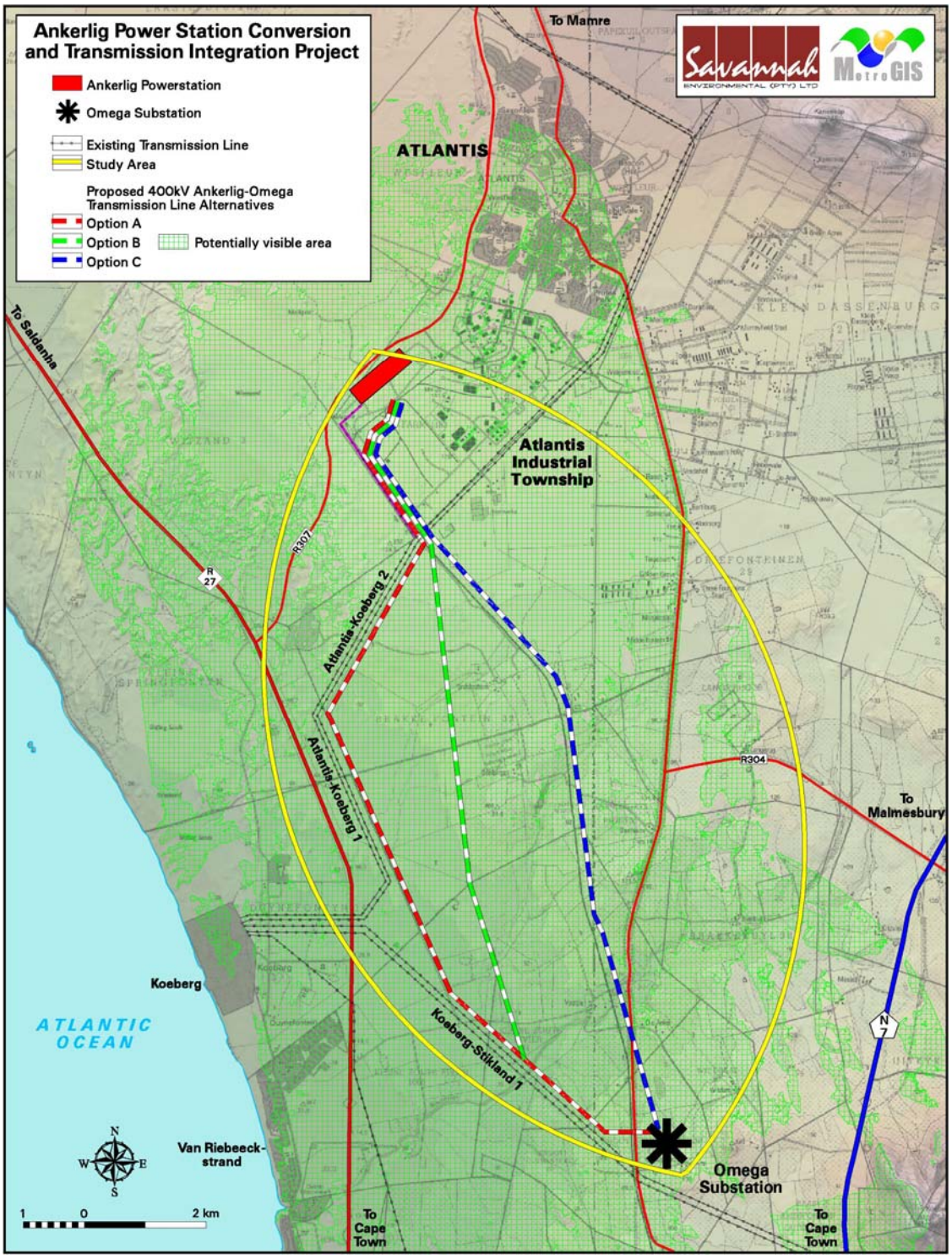

Figure 7: Potential visual exposure of transmission power line Option B

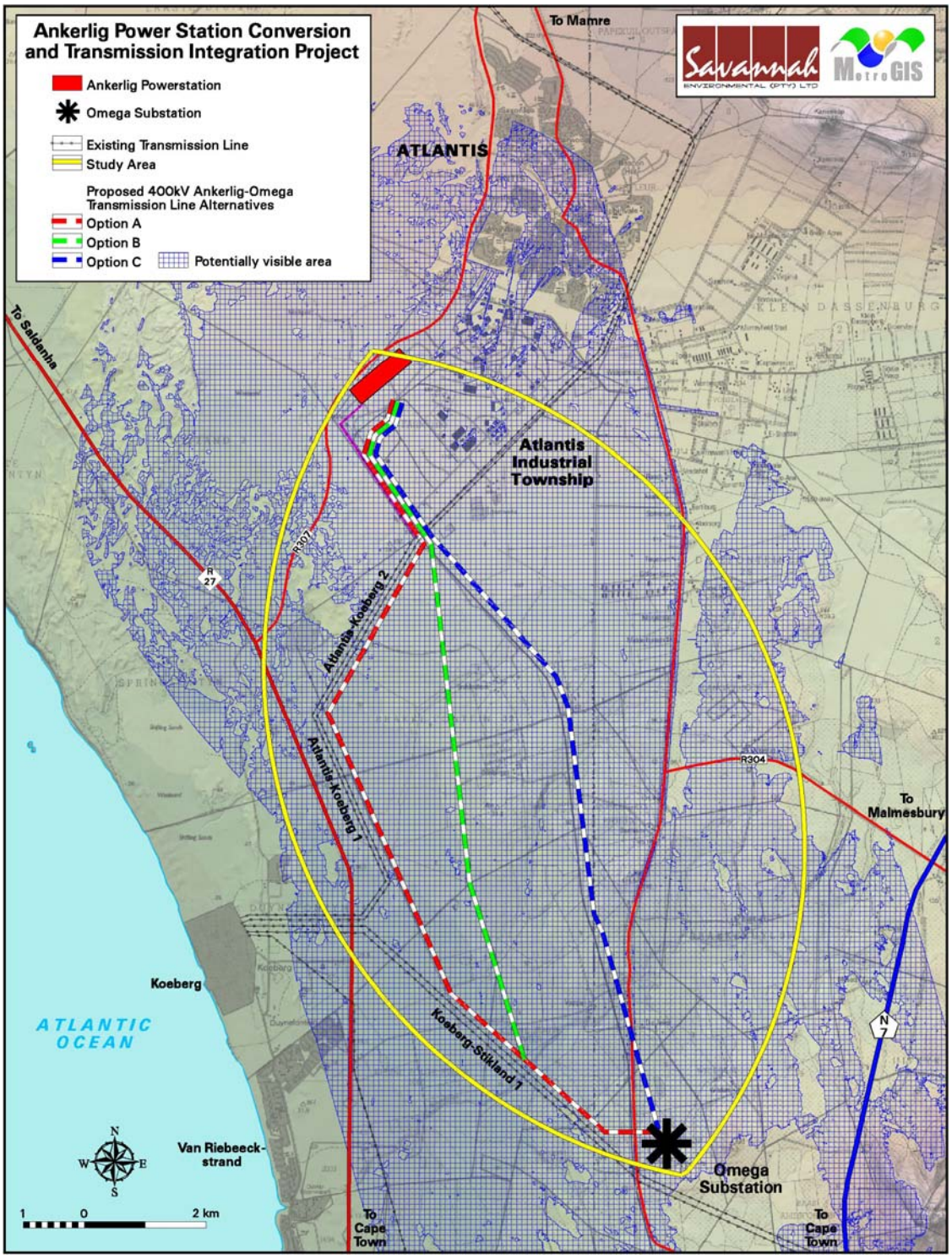

Figure 8: Potential visual exposure of transmission power line Option C

It is clear from the initial viewshed analyses that there is only a slight difference in the theoretical visibility between the three alternatives. This is due mainly to the flat topography and the relatively low growth form of the natural vegetation within the

study area. Another set of criteria was used to allow for the comparison between the three transmission power line alternatives.

The criteria used for the comparison includes:

- The potential area of visual exposure within the study area
- The length of the alignment
- The proximity and exposure to major roads (based on the number of road crossings)
- The proximity (less than 1km) and exposure to farmsteads along the alignment (as identified from the 1:50 000 topo-cadastral maps)
- The potential consolidation of existing linear infrastructure (existing power line servitudes, access roads, railway lines, etc.)

A comparative table indicates a summary of the above criteria. Positive values were awarded for opportunities and negatives where constraints were identified.

Table 1: Comparative table of the proposed transmission power line alternatives

Alter-native	**Length (Total)**	**Visible area**	**Proximity to major roads**	**Proximity to farmsteads**	**Consolidation of existing infrastructure**	**Total value**
A	15.3km **(-1)**	74km^2 **(+1)**	1 crossing **(-1)**	Remote **(+1)**	High potential (up to 13.3km along existing Tx lines) **(+2)**	**(2)** Pre-ferred
B	14km **(0)**	77km^2 **(0)**	1 crossing **(-1)**	Close proximity to Brakfontein and Donkergat, **(-2)**	Low potential (less than 5km) **(-1)**	**(-4)** Not pre-ferred
C	13.3km **(+1)**	81km^2 **(-1)**	1 crossing **(-1)**	Close proximity to Brakfontein, Donkergat, Blenheim, Vaatjie and Die Anker **(-5)**	Average potential (12.5km along railway line) **(+1)**	**(-5)** Not pre-ferred

The preferred alternative, based on the above criteria is Option A. It has the smallest area of potential visual exposure even though it is the longest alignment; it is relatively far removed from settlements and has the best ability to consolidate the linear infrastructure (existing vertically disturbed landscapes) within this region. This is due to the alignment running parallel to the existing transmission power lines.

Options B and C did not fare very well due to Option C's close proximity to a number of settlements (sensitive visual receptors) and Option B's nearly 9km of "green fields" alignment, effectively removing it from existing access roads and servitudes. These two alternatives are not preferred, though not fatally flawed, as proposed transmission power line alternatives from a visual impact point of view. The visual impacts envisaged for Options B and C would far exceed the potential visual impacts associated with Option A.

4. CONCLUSION

It is recommended that the potential visual impact of the proposed Ankerlig power station conversion be assessed according to the issues/criteria mentioned earlier in this report. Specific areas of focus for the visual impact assessment of the power station conversion should include the additionally exposed areas and the potential cumulative visual impact of increased development adjacent to the R307 (Dassenberg Road). This road has the highest frequency of observers with a potentially negative visual perception of the power station.

The nominated preferred transmission power line alternative should similarly be assessed in order to determine its potential visual impacts. This is especially relevant for Options B and C where the potential visual impact is expected to be considerably higher than for Option A.

5. REFERENCES

Chief Director of Surveys and Mapping, varying dates. *1:50 000 Topo-cadastral Maps*

City of Cape Town, varying dates. *5 m interval contours*

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