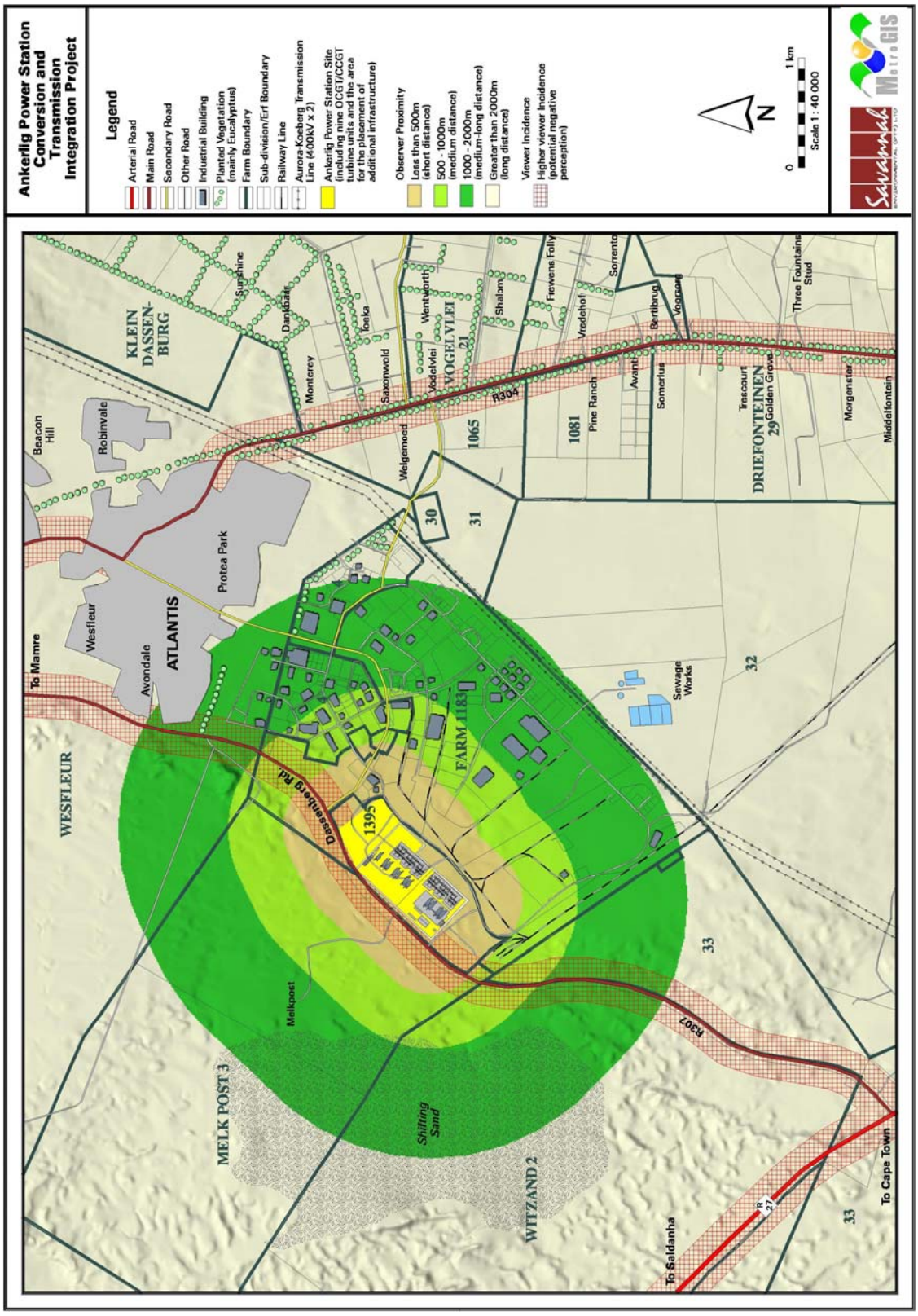

Figure 7: Observer proximity to the Ankerlig power station.

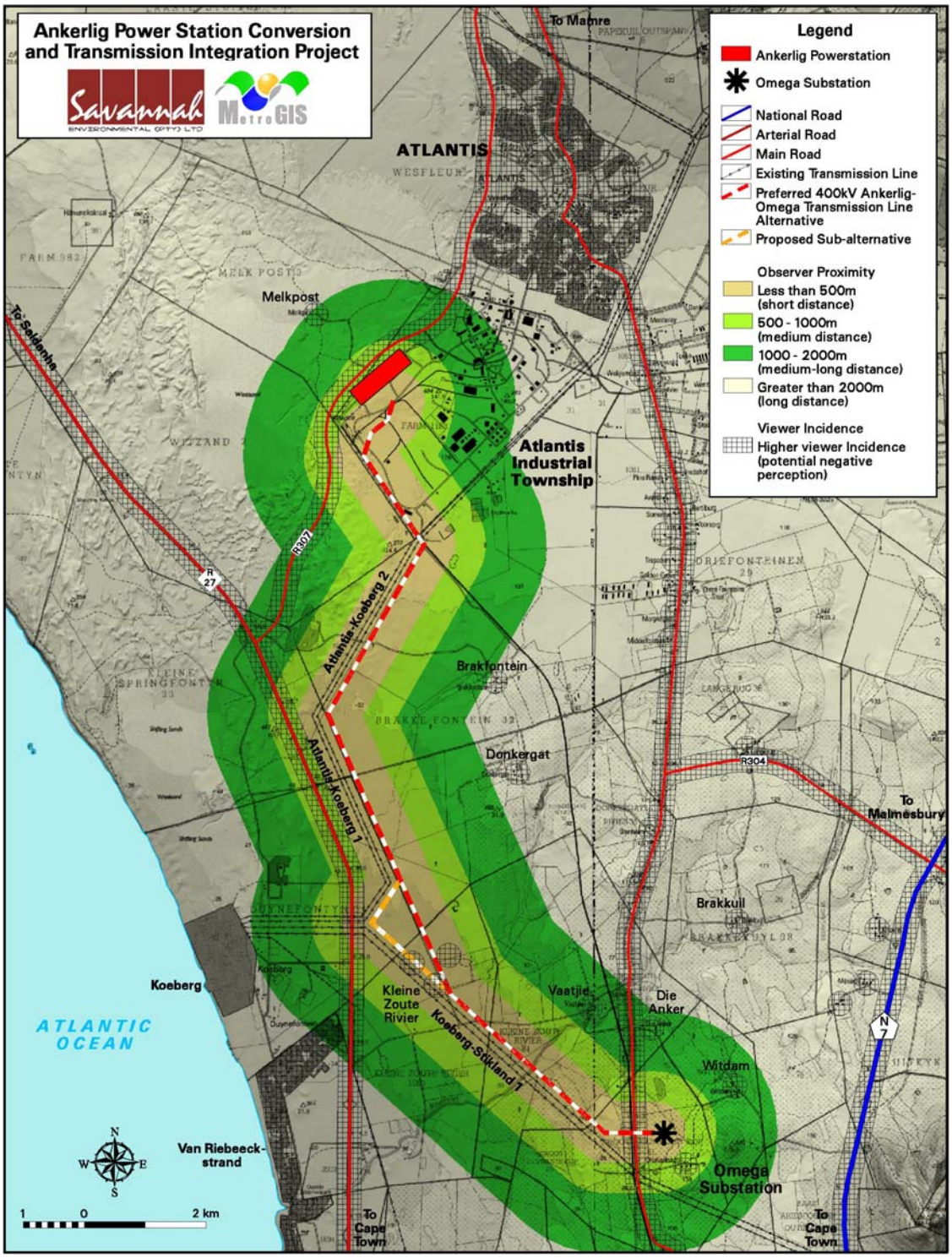

Figure 8: Observer proximity to the proposed Ankerlig - Omega transmission power line.

4.4. Viewer incidence and 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 proposed infrastructure. 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.) that would create a myriad of options.

For the purpose of the power station conversion, five areas were classified as having differing observer incidences and perceptions.

The **first area** of viewer incidence and perception is indicated as a 200m buffer zone around the major roads in the area (see Figure 7). The rationale is that this area is likely to contain the most observers, being the main roads between Cape Town and the West Coast National Park and Cape Town and Atlantis/Mamre. The purpose of observers travelling along the R27 would be predominantly tourism related, whilst observers using the R307 or R304 would more than likely be local residents commuting between Cape Town and Atlantis/Mamre. If the proposed converted power station and additional infrastructure were sighted from this area it would more than likely have a negative impact on the viewer.

The **second area** of high viewer incidence and negative viewer perception is the Atlantis residential area. This area has, through its relatively close proximity to the power station, and through its relatively high population density, the potential to be visually affected by the proposed OCGT to CCGT conversion. Please refer to Figure 2.

The less populated agricultural areas (agricultural holdings and small holdings west of the R304) to the east of the study area constitute the **third zone**. These areas are sparsely populated but would still evoke a predominantly negative viewer perception.

The **fourth zone** is the Atlantis industrial area itself. Employees of the various industries found within this area predominantly frequent this zone. It is assumed that their perception of the proposed CCGT plant would be neutral as they go about their daily business, or even positive for the employees of the facility.

The **fifth area** is the remainder of the study area (excluding the first four zones). This area is predominantly devoid of observers, as it covers great tracts of vacant farming land and unpopulated areas. This zone is seen as having a neutral viewer perception and therefore a low effect on the visual impact of the proposed facility.

The transmission power line alternatives largely traverse areas with land-uses as described above (**fifth area** of viewer incidence or viewer perception). They also share the characteristics of the **first area** as discussed above (i.e. a 200m buffer zone around the major roads) as well as the inclusion of additional sensitive visual receptors in the form of individual homesteads along the length of the alignments. These sensitive visual receptors include the farm settlements of Witdam, Vaatjie, Die Anker, Donkergat, Kleine Zoute Rivier and Brakfontein as indicated on Figure 8.

5. RESULTS

5.1. Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed infrastructure are displayed on Figures 9 (power station conversion) and Figure 10 (transmission power line). Here the weighted impact and the likely areas of impact are indicated as a visual impact index. Values were assigned for each potential visual impact per data category (as mentioned above) and merged in order to calculate the visual impact index. An area with short distance visual exposure of the project infrastructure, a high viewer incidence and a predominantly negative perception of the structures would therefore have a higher value (greater impact) on the index.

Ankerlig Power Station conversion

The proposed OCGT to CCGT conversion and additional infrastructure have the greatest potential to visually impact on road users travelling along the Dassenberg Road (R307). This is due to the observer's short distance (and high frequency) experience of the power station infrastructure. The facility is highly unlikely to be visible from the Atlantis residential area, but its residents travelling along the R307 would be able to view this infrastructure as they commute to and from Cape Town and other areas on a daily basis. Existing infrastructure, associated with the OCGT power station, is already visible from this road (mitigating the potential future visual impact to some degree) but is set back from the road at a distance of approximately 300m. The additional infrastructure will be placed adjacent to this road at distances closer than 150m from observers travelling along this road.

The other areas, further removed from the power station, that will experience a diminishing visual impact of the facility, are virtually all restricted to the industrial area itself or to predominantly vacant land north-west of the facility. Some of the smallholdings west of the R304 appear on the lower end of the index where these sightings will occur at an average distance of approximately 5km.

Transmission power line

The visual impact index for the transmission power line alternatives is shown on Figure 10. Here the area of potentially high visual impact is indicated within a 500m buffer zone from the transmission power line. This area (predominantly vacant farmland) is however greatly devoid of random observers upon whom the transmission power line could have a visual impact.

Other areas with a very high visual impact value occur along the R27, near Koeberg, and the R303 near the Omega substation. The sightings of the proposed Ankerlig - Omega transmission power line along the R27 will be influenced/obstructed by the existing transmission power line infrastructure (Atlantis-Koeberg 1 and 2, and Koeberg-Stikland 1), virtually negating the potential visual impact. This is also true for the proposed sub-alternative section near Koeberg where a great number of existing power lines exit the power station and cross over the R27. The section where the proposed transmission power line crosses the R303, approximately 500m from where the Koeberg-Stikland 1 lines cross the road, will experience the highest visual impact. The visual impact will be compounded by the additional line crossing over the road.

Most of the farm settlements (as identified from the 1:50 000 topo-cadastral maps) are not expected to experience high visual impacts. The sensitive visual receptor indicated as Vaatjie on the map, may experience a medium visual impact (from approximately 1.5km from the alignment) while most of the other identified farmsteads (Witdam, Die Anker, Donkergat and Brakfontein) are located beyond two kilometres from the proposed power line.

The Kleine Zoute Rivier settlement area is expected to experience the highest potential visual impact as the proposed transmission power line alternatives effectively traverse these properties. This is especially true for the proposed sub-alternative that will span **across** a number of residences and slightly less so for the preferred alternative that will cross **between** the residential dwellings. The proposed sub-alternative is not considered a viable option to the preferred alternative due to this potentially critical flaw.

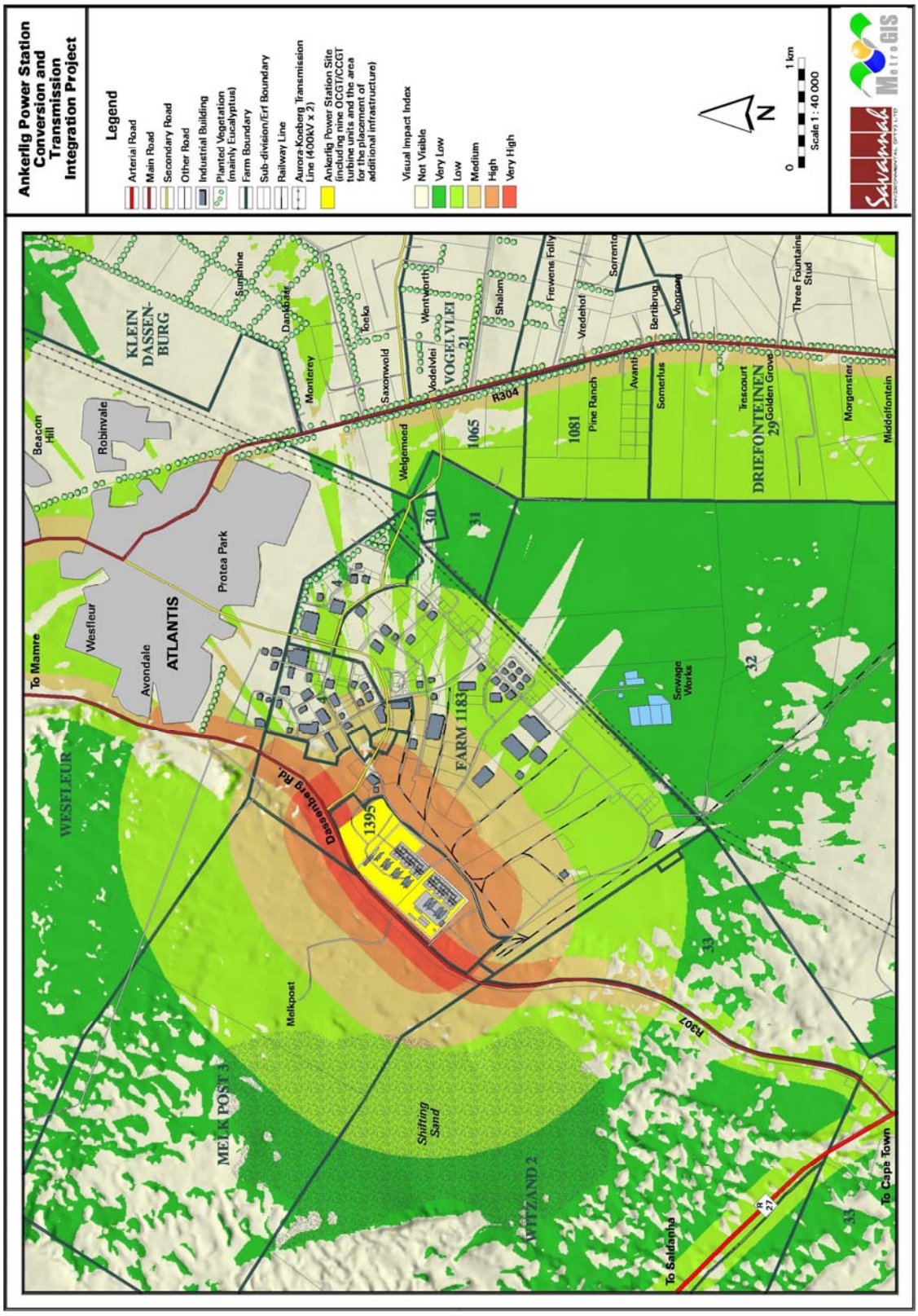

Figure 9: Visual impact index - Ankerlig power station conversion.

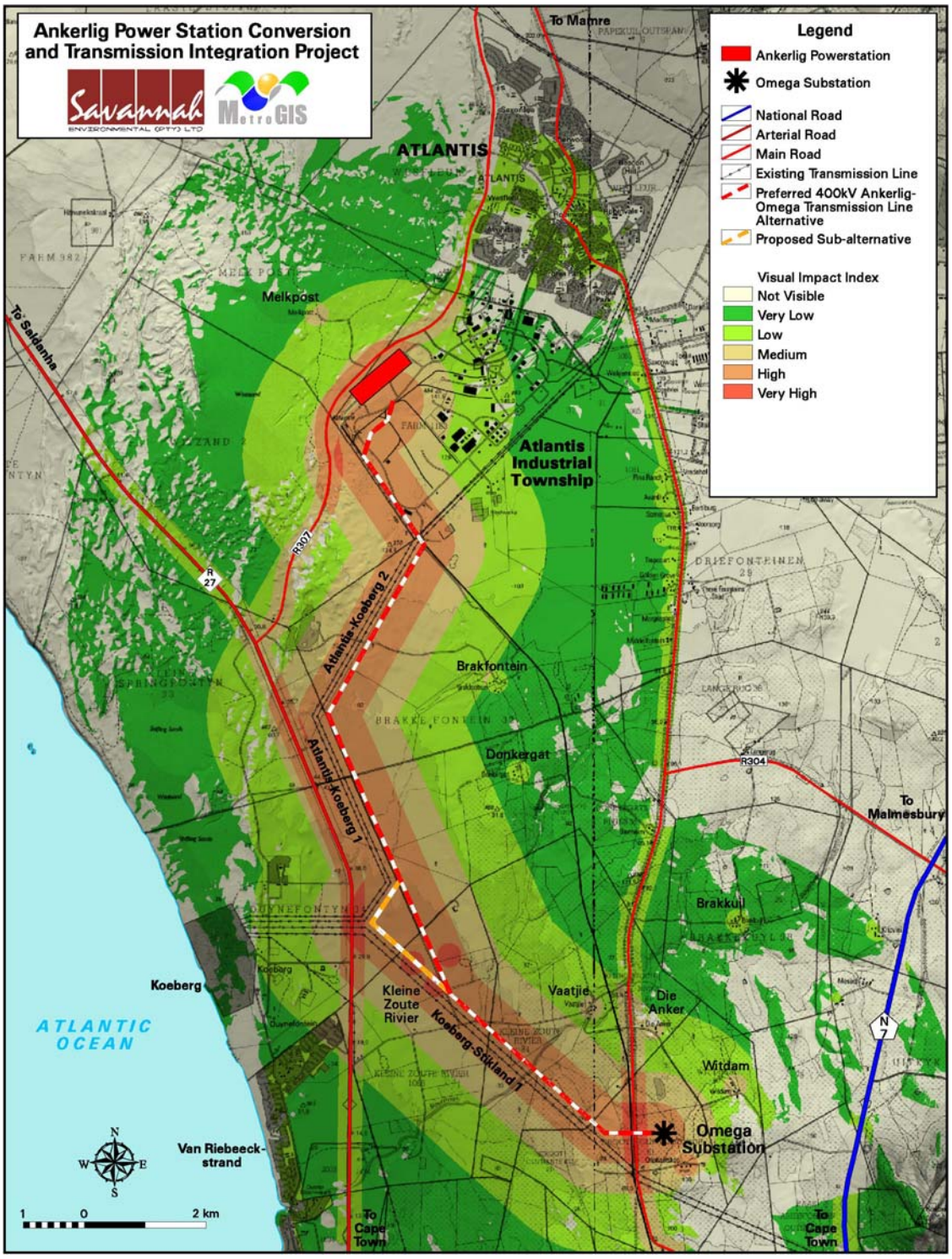

Figure 10: Visual impact index - transmission power line.

Figure 11: Koeberg-Stikland 1 transmission power lines crossing the R303 near the Omega substation. (The proposed Ankerlig - Omega transmission power line will cross approximately 500m from this point.)

5.2. Visual impact severity rating

The previous section of the report identified specific areas where likely visual impacts could occur. This section quantifies these potential visual impacts in their respective geographical locations and in terms of the identified issues related to visual impact.

The methodology for the assessment of potential visual impacts states the nature of the potential visual impact (e.g. the potential visual impact of the power station conversion on users of the Dassenberg Road) and includes a table quantifying the potential visual impact according to the following criteria:

- **Extent (E)** - local (high = 4), regional (medium = 3), national (low = 2) or international (very low = 1)
- **Duration (D)** - very short (0-1 yrs = 1), short (2-5 yrs = 2), medium (5-15 yrs = 3), long (>15 yrs = 4), and permanent (= 5)
- **Magnitude (M)** - low (= 0-4), medium/moderate (= 4-6), high (= 6-8) and very high (= 8-10)
- **Probability (P)** - very improbable (= 1), improbable (= 2), probable (= 3), highly probable (= 4) and definite (= 5)
- **Status** (positive, negative or neutral)
- **Significance (S)** - low, medium or high, where the significance is determined by combining the above criteria in the following formula: S = (E+D+M) P

The significance weighting for each potential visual impact (as calculated above) is as follows:

- <30 points: Low (where the impact would not have a direct influence on the decision to develop in the area)

- 31-60 points: Medium (where the impact could influence the decision to develop in the area)
- >60: High (where the impact must have an influence on the decision to develop in the area)

The potential visual impact of the power station conversion on users of Dassenberg Road

As indicated above, the primary area of potential visual impact would occur along this section of road within a 200m radius of the power station conversion and additionally constructed infrastructure. It must however be borne in mind that the visual impact associated with the power station conversion will be an additional impact and that the initial visual impact has already occurred during the construction of the original OCGT power plant and its associated infrastructure. This initial visual impact was further compounded by the capacity increase (i.e. the construction of additional OCGT units) as addressed by a previous visual impact assessment report (MetroGIS (Pty) Ltd, 2007).

The envisaged visual impact of the power station conversion and the construction of additional fuel storage tanks, as well as the proposed water reservoir are therefore not as significant as would be the case if this had been a "green fields" development site. The increase in power generating developments along the Dassenberg Road is however still expected to increase the cumulative visual impact on observers travelling past the facility, as more structures would be visible along a longer stretch of road due to the increased height of the structures (i.e. the 60 m high stacks associated with the CCGT units) and the additional fuel tanks.

The table below quantifies the potential visual impact of the proposed power station conversion and construction of ancillary infrastructure.

Table 1: Impact table summarising the significance of visual impacts - power station conversion.

Nature of Impact: Potential visual impact on users of Dassenberg road.		
	Without mitigation	**With mitigation**
Extent	Local **(4)**	Local **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(7)**	High **(6)**
Probability	Highly probable **(4)**	Highly probable **(4)**
Significance	High **(60)**	Medium **(56)**
Status (positive or negative)	Negative	Negative
Reversibility	None	None
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (partially)	NA
Mitigation: • Additional infrastructure (such as the water reservoir and fuel storage tanks) should be set back (further away) from the road as far as possible. • The viability of the construction of a five to ten metre tall vegetated screening berm between the Dassenberg Road and the power station site (as proposed in the OCGT capacity increase VIA report) should be investigated.		

Cumulative impacts: Each new development, expansion or increase in dimensions of the power station infrastructure attributes to the accumulation of the visual impact of the facility along the Dassenberg Road.
Residual impacts: N.A.

The potential visual impact of the transmission power line

The potential visual impact of the construction of the Ankerlig - Omega transmission power line is generally envisaged to be relatively low. This is due to the transmission alignment adjacent to the existing power lines within the study area. The already visible power lines (existing vertical disturbance) are expected to absorb the visual exposure of an additional power line to a large degree. To this end the proposed sub-alternative, near the Koeberg power station would have been preferred in order to confine the exposure of the transmission power line within an already disturbed development corridor. The originally preferred alternative would spread the visual exposure and would effectively sterilise (encapsulate) this triangular section created between the power lines from a visual point of view. The location of the Kleine Zoute Rivier settlement immediately in the path of this alignment however excludes the sub-alternative as a viable option.

The areas with the highest envisaged visual impact along the transmission line alignment are expected to occur near the Omega substation, where the power line would cross the R303, and at the Kleine Zoute Rivier settlement. Observers travelling north along the R303 will pass underneath existing transmission power lines (Koeberg-Stikland 1) and after approximately 500m will encounter the Ankerlig -Omega power line. The repetitive observation of power lines along this section of road is therefore spread out over a longer distance thereby increasing the visual impact. The proposed transmission power line should ideally have crossed the R303 adjacent to the existing power lines.

This realignment of the power line is virtually the only mitigation measure offered for the construction of the proposed Ankerlig - Omega transmission power line and is reflected in the table below under the "with mitigation" column.

Table 2: Impact table summarising the significance of visual impacts - Ankerlig - Omega transmission power line.

Nature of Impact: Potential visual impact on users of the R303		
	Without mitigation	**With mitigation**
Extent	Local **(4)**	Local **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(5)**	Moderate **(5)**
Probability	Highly probable **(4)**	Probable **(3)**
Significance	Medium **(52)**	Medium **(39)**
Status (positive or negative)	Negative	Negative
Reversibility	None	None
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (partially)	NA

Mitigation: The realignment of the preferred alignment to facilitate the crossing of the R303 adjacent to (in closer proximity to) the existing power lines, should this be technically feasible.
Cumulative impacts: The construction of each new power line across this road contributes to the potential cumulative visual impact experienced by road users. Setting the new power lines further apart spreads the visual impact over a larger distance.
Residual impacts: N.A.

Table 3: Impact table summarising the significance of visual impacts - Ankerlig - Omega transmission power line.

Nature of Impact: Potential visual impact on residents of the Kleine Zoute Rivier settlement associated with the preferred alternative.		
	Without mitigation	**With mitigation**
Extent	Local **(4)**	NA
Duration	Long term **(4)**	NA
Magnitude	Very high **(8)**	NA
Probability	Highly probable **(4)**	NA
Significance	High **(64)**	NA
Status (positive or negative)	Negative	NA
Reversibility	None	NA
Irreplaceable loss of resources?	No	NA
Can impacts be mitigated?	No	NA
Mitigation: None.		
Cumulative impacts: The construction of each new power line in close proximity of this settlement contributes to the potential cumulative visual impact experienced by its residents.		
Residual impacts: NA		

Table 4: Impact table summarising the significance of visual impacts - Ankerlig - Omega transmission power line.

Nature of Impact: Potential visual impact on residents of the Kleine Zoute Rivier settlement associated with the sub-alternative.		
	Without mitigation	**With mitigation**
Extent	Local **(4)**	NA
Duration	Long term **(4)**	NA
Magnitude	Very high **(10)**	NA
Probability	Definite **(5)**	NA
Significance	Very High **(90)**	NA
Status (positive or negative)	Negative	NA
Reversibility	None	NA
Irreplaceable loss of resources?	No	NA

Can impacts be mitigated?	No	NA
Mitigation: None.		
Cumulative impacts: The construction of each new power line in close proximity of this settlement contributes to the potential cumulative visual impact experienced by its residents.		
Residual impacts: NA		

5.3. Additional issues related to the visual impact

Landscape character / land use character

The proposed site for the power station conversion is located on the existing Ankerlig Power Station site within an established industrial area relatively far removed from residential developments or other conflicting land uses. The general land use is conducive to the conversion to, and operation of the CCGT plant and no significant impact on the general land use character of the greater area is envisaged.

The construction of the Ankerlig - Omega transmission power line adjacent to existing power lines (i.e. an existing vertically disturbed landscape) is similarly not in conflict with the landscape character.

Visually sensitive features (scenic features or attractions)

The area in close proximity of the proposed power station conversion project and the transmission power line does not contain any identified visually sensitive features or scenic attractions. Long distance views of Table Mountain may however be influenced by the project structures, depending on the location of the viewer in relation to the power station.

Potential impact of the project infrastructure on tourism and eco-tourism

The specific area surrounding Atlantis and the proposed project infrastructure is not currently viewed as a major tourist destination. Tourism predominantly consists of visitors travelling to the West Coast National Park and Saldanha Bay along the R27. This road passes south-west of the Atlantis industrial area at a distance of about 4km (at the closest) from the power station.

The conversion of the OCGT plant and the proposed transmission line are not expected to significantly influence the tourism potential within the region.

Visual absorption capacity (VAC) of the natural vegetation

The visual absorption capacity of the natural vegetation in this region is not considered as an element that could successfully negate or mitigate the visual impact of the proposed OCGT to CCGT conversion due to the relatively low growth form and the height of the proposed conversion infrastructure (i.e. 60m stacks).

Potential visual impact of lighting

The effects of lighting are especially problematic in rural or sparsely populated areas where there is an absence of the lighting generally present in urban areas. The increase in the number of operational and security lighting fixtures, associated with the power station conversion project (and the aircraft warning lights required by the Civil Aviation Authority on the 60m high smoke stacks) may potentially impact on adjacent landowners north of the Dassenberg Road (i.e. Melkpost). This area north of the power station site is however not densely populated, with the exception of Melkpost (which is situated almost 1.5km from the site) and is not expected to experience significant lighting impacts.

Glare from floodlights has the potential to visually impact, or at the very least irritate, observers travelling along Dassenberg Road at night if not fitted properly.

The impacts associated with light pollution can be lessened through the careful planning and sensitive placement of light fixtures and the fitment of covers and shields designed to contain, rather than spread the light. A qualified lighting engineer should be consulted during the design and construction phases of the OCGT to CCGT technology conversion, to plan and fit new lighting fixtures effectively from the outset.

Potential mitigation measures

The above recommendation (regarding lighting) is an example of a potential mitigation measure that could diminish the visual impact of the proposed OCGT to CCGT conversion.

Other potential mitigation measures for the proposed CCGT plant include the maintenance and general appearance of the facility. These measures focus on the fact that if/when the facility is seen by outsiders; the general impression should be favourable. Timely maintenance of the CCGT units, ancillary infrastructure and the general surrounds of the property (gardens, access roads, etc.) can prevent the visual impact of degradation and perceived poor management. The most notable aspect of maintenance on this type of structure is the painting of the CCGT units. In this regard and as a further mitigation to the visual impact, overtly contrasting and bright colours should be avoided. Natural hues that compliment the natural environment can soften the general appearance of the power plant. The colour schemes currently utilised for the OCGT units is deemed appropriate and should be continued for the CCGT units and associated infrastructure.

It was also previously noted that the ancillary project infrastructure (i.e. the water reservoir and fuel storage tanks) should be removed from the Dassenberg Road as far as possible. The technical feasibility of this suggestion should be investigated when the detailed site layout plans are compiled for the Ankerlig conversion project. This will assist in minimising the cumulative visual impact associated with the additional infrastructure proposed for the power station site.

Mention was also made of the vegetated screening berm that was proposed during the visual impact assessment for the Ankerlig capacity increase project. The effectiveness of this screening berm along the northern perimeter of the power station site was illustrated for the OCGT stacks at an offset of 30m above ground level. The increase in the stack heights to 60m above ground level will reduce the effectiveness of the berm to some extent in shielding observers travelling along

Dassenberg Road from viewing them. The proposed berm would however still be effective in hiding the ancillary infrastructure.

Mitigation measures for the proposed Ankerlig - Omega power line include avoiding the unnecessary removal of vegetation for the transmission power line servitude and limiting access to the servitude (during both construction and operational phases) along existing access roads.

6. CONCLUSION

In both the conversion of the power station and construction of the Ankerlig - Omega transmission power line, the visual impacts will be additional to existing visual impacts. The operation of the Ankerlig OCGT power station and the number of transmission power lines already present within the study area mitigates the visual impacts that would be associated with "green fields" projects. The establishment of the Atlantis industrial area in the mid-1970s and the presence of the Koeberg Nuclear Power Station have set the trend for industrial style developments within the region. It is unlikely that this trend would be reversed in the foreseeable future and it is envisaged that the region will come under increasing development pressure, further impacting on the visual quality of the area.

7. MANAGEMENT PLAN

The management plan tables aim to summarise the key findings of the visual impact report and to suggest possible management actions in order to mitigate the potential visual impacts.

Table 4: Management plan - Ankerlig power station conversion and associated infrastructure.

OBJECTIVE: The mitigation and possible negation of the potential visual impact of the OCGT to CCGT conversion of the Ankerlig power station and ancillary infrastructure with specific reference to the potential exposure of the project structures to the Dassenberg Road.

Project component/s	CCGT gas turbine units, water reservoir, fuel storage tanks and lighting structures.
Potential Impact	The potential exposure to and visual impact on observers travelling along the Dassenberg Road.
Activity/risk source	The viewing of the abovementioned project infrastructure from this road.
Mitigation: Target/Objective	The shielding of the project infrastructure by means of the creation of a 5-10m high vegetated berm and the sensitive placement of project infrastructure in order to not visually impose on road users.

Mitigation: Action/control	Responsibility	Timeframe
Undertake proper pre-construction planning, including a master plan indicating site layout, infrastructure placement (away from the Dassenberg Road) and the potential vegetated berm.	Eskom/landscape architect/engineer.	Pre-construction.
Ensure that proper planning is undertaken regarding the placement of lighting structures and that light fixtures only illuminate areas inside the power station	Eskom/lighting engineer.	Construction/Operation.

facility. Undertake regular maintenance of light fixtures. Maintain the general appearance of the facility in an aesthetically pleasing way.	Eskom	Operation.

Performance Indicator	The effective concealment of the majority of the project infrastructure from observers travelling along the Dassenberg Road.
Monitoring	The monitoring of the condition of the site and infrastructure during the operational phase of the project.

Table 5: Management plan - Ankerlig - Omega transmission power line.

OBJECTIVE: The mitigation of potential visual impacts caused by the unnecessary removal (clearing) of vegetation cover for the power line servitude or the creation of new access roads during the construction phase.

Project component/s	Transmission power line servitude.
Potential Impact	The potential scarring of the landscape due to the creation of cleared cut-lines and new roads/tracks.
Activity/risk source	The viewing of the abovementioned cutlines/roads by observers.
Mitigation: Target/Objective	Minimal disturbance to vegetation cover in close vicinity to the proposed transmission power line.

Mitigation: Action/control	Responsibility	Timeframe
Avoid the unnecessary removal of vegetation for the transmission power line servitude and limit access to the servitude (during both construction and operational phases) along existing access roads.	Eskom.	Construction/Operation.

Performance Indicator	Vegetation cover that remains intact with no visible cutlines, access roads or erosion scarring in and around the power line servitude.
Monitoring	The monitoring of vegetation clearing during the construction and operational phases of the project.

8. REFERENCES

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