Appendix F: Impacts Assessment Methodology

A number of potential impacts (ecological, avifauna, soils, heritage, and Social and Visual) were assessed through the basic assessment process for the proposed deviation of the existing northern section of the 132kV Dassenberg Koeberg power line that runs from the Ankerlig Power Station to Koeberg Power Station in Western Cape Province. These impacts were identified through specialist reports, and are included in **Appendix D** of the Basic Assessment Report. All the specialists followed the methods outlined below to completely evaluate and assess the environmental impacts associated with the development.

Potential impacts associated with the construction and operation of the proposed 132kV power line deviation and associated infrastructure are discussed below. All impacts are assessed according to the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or;
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);

- Assigned a score of 4 is highly probable (most likely); and
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
» The **status**, which is described as positive, negative or neutral.
» The degree to which the impact can be reversed.
» The degree to which the impact may cause irreplaceable loss of resources.
» The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S= (E+D+M) P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance** weightings for each potential impact are as follows:

» < **30 points**: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» **30-60 points**: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
> 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Impact Assessment

IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN PHASE
Alternative (preferred alternative)

No impacts are anticipated that may result from the planning and design phase of the proposed development.

IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION AND OPERATIONAL PHASES

1. Potential impacts on Ecology (Flora & Fauna)

The realignment of the Koeberg-Ankerlig 132kV line is likely to result in a number of different impacts on fauna and flora during the construction and operation phase which are summarized below.

Construction Phase

Impacts on vegetation and listed or protected plant species

Some loss of vegetation is an inevitable consequence of the power line construction and some individuals of protected or red-data listed species are also likely to be impacted. Although it may be possible in some instances to translocate affected individuals, this only partially mitigates the impact, as not all individuals may survive and some habitat is no longer available for use as a result of transformation or the presence of permanent infrastructure.

Direct and Indirect Faunal impacts

The construction of the overhead power line will result in some habitat loss for resident fauna, while increased levels of noise, pollution, disturbance and human presence during construction will be detrimental to fauna, especially in those parts of the route which are not currently near to human activity. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species (such as mole rats or blind snakes) would not be able to avoid the construction activities and might be killed. During the operational phase, interactions between the infrastructure considered here and fauna is likely to be very low and therefore this impact is assessed only for the construction phase.

Operational Phase

Negative ecological impacts associated with power line servitude maintenance activities

Maintenance activities such as vegetation clearing or alien plant control beneath the power line may be detrimental to indigenous flora if conducted in an inappropriate manner. In some areas the vegetation beneath the power lines is mowed or brush cut to less than 30cm tall. This has a large detrimental impact on many species which are not able to resprout and result in the loss of the species in the affected area as a result. In addition, this kind of disturbance encourages the proliferation of alien species which often come to dominate in these areas. However in the current context, the majority of vegetation is of a low stature and it is only the alien Acacia which is too tall and needs to be cleared. Alien clearing should be target specific and should utilise the recommended approaches as detailed by DAFF for a particular species.

Cumulative Impacts

Although the extent of transformation and habitat loss resulting from the new power line section is likely to be relatively low, this must be considered in light of the high conservation value of the affected area which falls within listed ecosystems as well as priority 'Critical Biodiversity Areas' defined by the City of Cape Town Biodiversity Network. In addition, the actual amount of habitat loss resulting from the development could vary significantly depending on the management of the vegetation beneath the power line which could vary from a positive outcome to a large negative outcome.

Listed Plant Species

More than 600 species are known from the quarter degree square which includes the site. Although this is in itself a high number which illustrates the high diversity of the area, the fact that this includes 98 species of high conservation concern is at once more impressive and concerning. Given the above results, it is highly likely that some listed species occur along the power line route and may be impacted by the development. However, as a large proportion of the route is heavily invaded by alien acacia, this also presents the opportunity to clear these areas and improve the habitat for such species. Generating a positive outcome however, depends very heavily on the manner in which the vegetation under the power line is managed and inappropriate clearing techniques will definitely not improve the habitat for most species.

Table 1: Summary of listed plant species known from the quarter degree square 3318CB according to the SANBI SIBIS database.

IUCN Status	Count
Critically Endangered	15
Endangered	35
Threatened	1
Vulnerable	47
Near Threatened	20
Declining	4
Least Concern	528
Grand Total	**661**

Critical Biodiversity Areas & Broad-Scale Processes

The site lies within the planning domain of the Cape Town City Biodiversity Network which was developed by the City of Cape Town and is updated on a regular basis. The relevant portion of the map is illustrated below in Figure 1. The whole power line route except for the section over the Dassenberg Road lies within various protected areas or Category 1 CBAs, indicating that these areas have high conservation value and impact to these areas is undesirable. A mitigating circumstance for the section of power line through the Witzands Nature Reserve is that the affected area is heavily invaded and it is also along the margin of the area in proximity to the other power lines and the urban fringe of Atlantis.

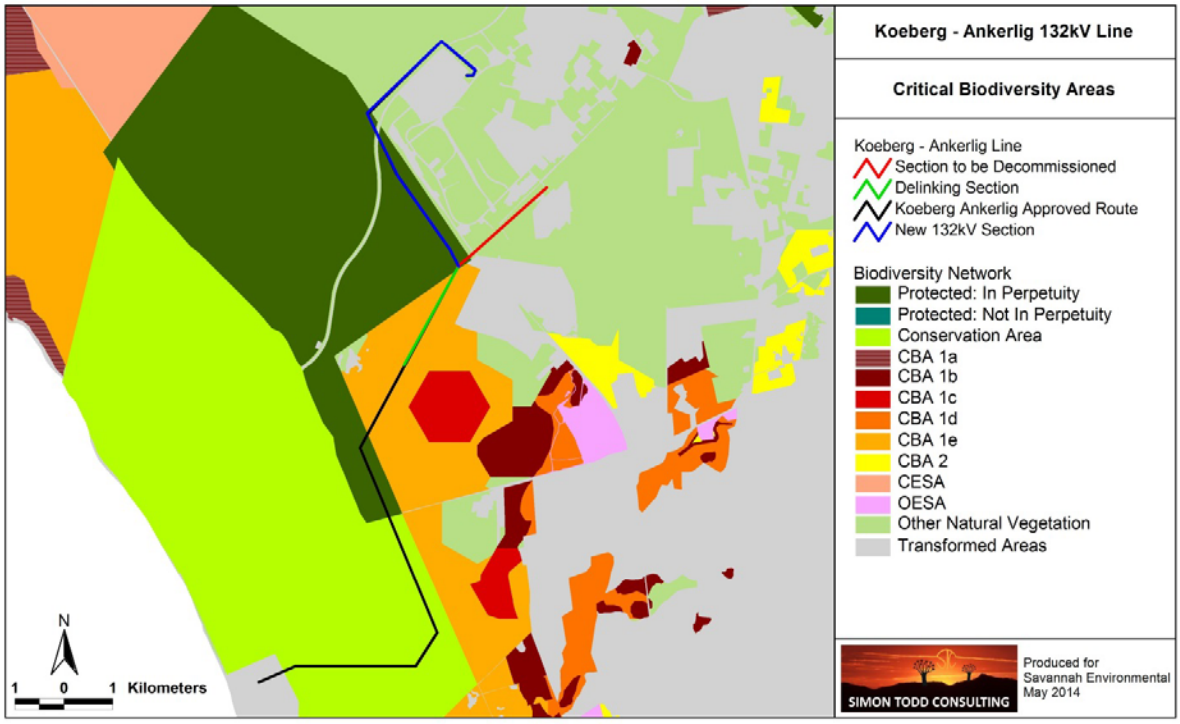

Figure 1. City of Cape Town Biodiversity Network map for the study area, indicating protected areas and Critical Biodiversity Areas.

Faunal Communities

Mammals

The site is likely to have relatively low mammalian species richness. The site falls within or near the edge of the distribution range of 42 terrestrial mammals and nine bats. Species which were observed during the site visits include Steenbok *Raphicerus campestris*, Common Duiker *Sulvicapra grimmia*, Yellow Mongoose *Cynictis penicillata*, Cape Gerbil *Tatera afra*, Striped Mouse *Rhabdomys pumilio*, Karoo Bush Rat *Otomys unisulcatus*, Porcupine *Hystrix africaeaustralis*, Cape Molerat *Georychus capensis* and Cape Hare *Lepus capensis*. Two listed terrestrial mammal species may occur at the site, the Honey Badger *Mellivora capensis* and the White-tailed Mouse *Mystromys albicaudatus* (Endangered). It must be noted that whilst the Honey Badger may be present in the area, it is unlikely that the power line would generate significant habitat loss for this wide-ranging species.

Reptiles

According to the SARCA database 31 reptiles have been recorded from the area. This includes three listed species, the Bloubergstrand Dwarf Burrowing Skink *Scelotes montispectus*, Cape Dwarf Chameleon *Bradypodion pumilum* and Cape Sand Snake *Psammophis leightoni*. It is possible that all three species may occur within the affected area as the habitat is suitable for each of them. The Bloubergstrand Dwarf Burrowing Skink (described in 2002) is however only known from near the coast and it has not been recorded so far inland, but given that it is associated with sandy dune vegetation, it is plausible that it occurs at the site as well as little is known about this species. In terms of the likely impacts of the development on reptiles, habitat loss is not likely to be highly significant as the power line is not likely to create a large loss of habitat. Although the construction phase will generate some disturbance which may negatively impact reptiles, this would be temporary and in the long-term impacts on reptiles are likely to be low.

Amphibians

The diversity of amphibians within the affected area is likely to be relatively low as there are no wetlands or significant drainage features within the power line route. Species present are likely to be those which are not dependent on water and associated with sandy soils such as the Sand Toad *Vandijkophrynus angusticeps*, Sand Rain Frog *Breviceps rosei* and Cape Sand Frog *Tomopterna delalandii*. Given the low diversity of frogs in the footprint area and the low likely terrestrial footprint of the power line, impacts on amphibians are likely to be low and concentrated in the construction phase.

Site Sensitivity Assessment

The sensitivity map for the affected sections of the power line is depicted below in Figure 2. The section where the decoupling will take place is considered the most sensitive section and the line should not be deviated from the current alignment in this section as this would generate additional disturbance in this sensitive area. The decoupling should take place as close to Ankerlig as possible. The section on the other side of the Dassenberg Road in the dunes is considered medium sensitivity and the power line should be routed as close to the Dassenberg road as possible to coincide the disturbance with the existing disturbance associated with the road. The major impacts associate with the development would be disturbance during construction and vegetation clearing underneath the power line during construction and operation of the line. There is a lot of variation in the condition of the vegetation underneath Eskom power lines in the area. This is related to the manner in which vegetation underneath the power line has been managed. Areas that have been unselectively mowed to keep the vegetation cover and height under control have become dominated by weedy species and retain low biodiversity and ecological function. In contrast, areas where the indigenous vegetation has not been tampered with and the alien woody vegetation selectively

removed show a significant improvement over adjacent uncleared areas. Where such appropriate management allows for indigenous vegetation of at least 1m tall, the power line corridors appear to provide a net positive outcome for indigenous species and a number of listed species have been observed by the consultant in the power line corridors in the area. It is clear therefore that the mitigation and long-term management for the development should focus on selective alien clearing and allowing the persistence of the indigenous vegetation as much as possible. Since the vegetation along the majority of the route is naturally fairly short, there do not appear to be any major constraints in this regard.

Figure 2: The sensitivity map for the affected sections of the power line

Assessment of Impacts

The major impacts identified above are assessed below, during the construction and operational phase of the power line as well as before and after mitigation.

Construction Phase

Construction Impact 1: Impacts on listed vegetation types and plant species of conservation concern.

Impact Nature: Impacts on vegetation and listed or protected plant species would occur due to the construction activities.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Medium-term (2)
Magnitude	Medium (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (44)**	**Low (21)**
Status	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes, to a large extent	

Mitigation

» Vegetation clearing to be kept to a minimum. Blanket vegetation clearing or brush cutting should not take place, the footprint areas for the pylons can be cleared to facilitate construction but the servitude itself should only be cleared of alien species and any individuals of indigenous trees or shrubs that are particularly tall and may pose a hazard.
» A formal road should not be constructed under the power lines, a simple track should be sufficient.
» The final development area should be surveyed for the presence of listed and protected species and the pylons positions adjusted accordingly if necessary. If such species cannot be avoided, they should be marked and translocated prior to the commencement of construction as part of the search and rescue operation for the development.

Cumulative Impacts

Cumulative impacts on vegetation are likely to be relatively low given the low expected footprint of the power line.

Residual Impacts

With appropriate avoidance and mitigation residual impacts will be very low.

Construction Impact 2. Faunal Impacts.

Impact Nature: Construction activities such as the operation of heavy machinery and the presence of construction personnel at the site will result in direct and indirect impacts on terrestrial fauna at the site.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (1)	Short-term (1)
Magnitude	Medium (5)	Low (3)
Probability	Highly Probable (4)	Probable (3)
Significance	**Low (28)**	**Low (15)**
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Noise and disturbance during the construction phase cannot be avoided but would be transient in nature and with appropriate mitigation, no long-term impacts from the construction phase can be expected.	

Mitigation

» Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
» Construction staff should undergo an environmental induction at the start of the project to ensure that they are aware of the appropriate response to the presence of fauna at the site and do not kill or harm fauna such as snakes or other reptiles which are often feared.
» All hazardous materials used during construction should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
» All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.

Cumulative Impacts

The construction of the infrastructure would contribute to cumulative disturbance and habitat loss for fauna, but the contribution would be very small and is not considered significant.

Residual Impacts

Residual impacts would be very low.

Operational Phase

Negative ecological impacts associated with power line servitude maintenance activities.

Impact Nature: Maintenance activities may negatively affect vegetation if not conducted in the appropriate manner.		
	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Medium-High (7)	Low (1)
Probability	Highly Probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (10)**
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes.	

Mitigation

» Alien vegetation clearing should take place on at least an annual basis along the power line corridor. All alien species present should be cleared in the appropriate manner in accordance with the DAFF alien plant control guidelines.

» Vegetation clearing beneath the power line should be target specific and only alien species should be removed on a regular basis. If the indigenous vegetation becomes too tall and compromises safety, the tall elements may be specifically cut. General vegetation clearing or brush cutting should not take place.

» If the average height of the vegetation exceeds the safety standard, then the vegetation can be brush cut but not to a height lower than 40cm and preferably not more often than once every 10 years.

Cumulative Impacts

Cumulative impacts on vegetation are likely to be relatively low given the low expected footprint of the power line.

Residual Impacts

With appropriate avoidance and mitigation residual impacts will be very low.

Cumulative Impacts

Cumulative impact on listed ecosystems and Critical Biodiversity Areas.

Impact Nature: The power line may generate cumulative impact on listed ecosystems and CBAs.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (5)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (33)**	**Low (14)**
Status	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation » Regular targeted alien plant clearing within the power line servitude. » No wholesale vegetation clearing or brush cutting of indigenous species.		
Cumulative Impacts Given that the affected vegetation types are listed ecosystems any loss of these vegetation types is potentially significant. However as these areas are invaded by aliens which compromises the biodiversity of these areas, alien plant clearing within the power line servitude will improve the habitat and counter the loss from the development footprint.		
Residual Impacts Residual impacts will be very low.		

Implications for Project Implementation

- » Loss of indigenous vegetation along the power line corridor and introduction of alien vegetation.
- » Development of access roads and tracks under the power line of the deviated portion.
- » Increased risk to sensitive areas if deviation towards the Dassenberg Road is not made close to Ankerlig. This is probable if the power line traverses the tract of sensitive vegetation to the south of the road to the military base.

2. Potential Impacts on Agriculture

Terrain and soils

The proposed power line is located entirely on a level coastal plain with some relief. Dune formations are responsible for most of the topography. Slopes are mostly ≤2% but in places go up to 5%. The geology of the study area is mainly Quaternary quartz sand of the Springfontein Formation as well as calcareous coastal dune sand of the Witzand Formation.

The land type classification is a nation-wide survey that groups areas of similar soil, terrain and climate conditions into different land types. The proposed power line is predominantly located on one land type, Ha9, but also crosses two other very similar land types, Ha10 and Ga17 (as in figure below). Soils of these land types are almost entirely deep, unconsolidated grey to yellow sands predominantly of the Namib and Fernwood soil forms. These soils would fall into the Cumulic group, according to the classification of Fey (2010), which are described as young soils in unconsolidated sediments. The field investigation of soils confirmed the occurrence of deep, grey unconsolidated sands across the entire corridor area.

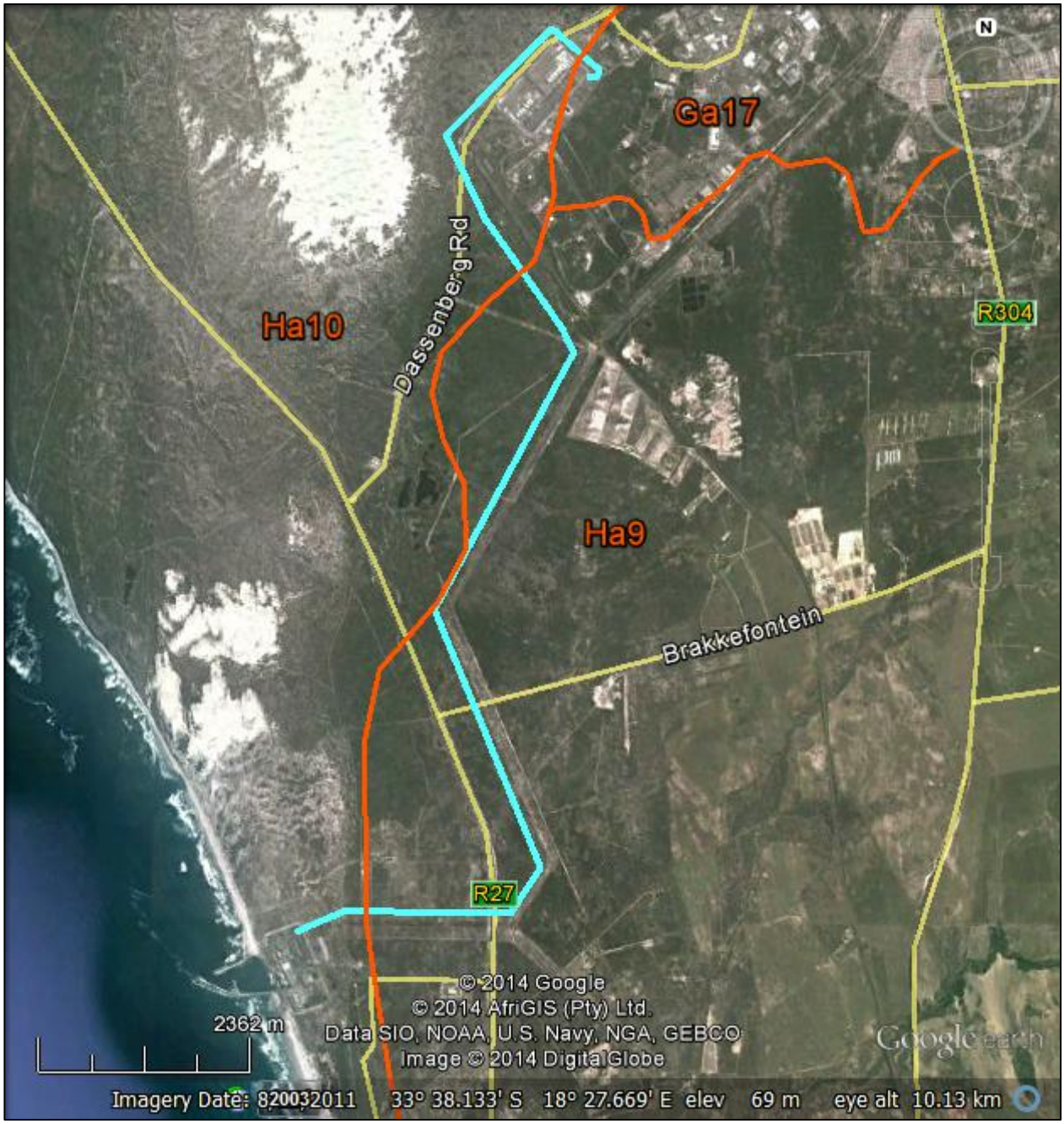

Figure 3: Satellite image of proposed power line corridor, shown in blue. Land type boundaries and labels are shown in orange.

Agricultural capability

Land capability is the combination of soil suitability and climate factors and is an indication of agricultural potential. Land capability is classified into 8 categories across South Africa. The proposed power line route is on land that is classified on the South African Agricultural Geo-referenced Information System (AGIS) as class 3 - moderate potential arable lands. However, in the field, this land has a far lower agricultural capability because of its extremely sandy texture (low clay content) which severely limits the water and nutrient holding capacity of the soil. As a result the land is not suitable for dryland cropping.

Another indication of agricultural capability is the potential wheat yield which is given on AGIS as 0.6 to 1.4 tons per hectare, and is therefore below economic viability. Grazing capacity is given as fairly high between 11 and 13 hectares per animal unit over most of the corridor and between 8 and 10 in some places.

The majority of the corridor is severely invaded by Australian wattle, which lowers the agricultural usability and grazing capacity of the land.

Land use and development at the site

The site falls within a grain producing agricultural region however, is not suitable for dry land cultivation. There is no cultivation or agricultural development along the corridor. At most the land is used for grazing, but due to the wattle invasion is of poor quality. The proposed power line runs adjacent to existing power lines for 65% of its route.

Identification and assessment of impacts on agriculture

The components of the project that can impact on agricultural resources and productivity are:

- Occupation of the land by the footprint of the development, which includes pylon bases, access roads, and during the construction phase, construction and storage camps.
- Construction activities that disturb the soil profile and vegetation, for example for excavations, levelling, bush clearing, etc.
- Height restrictions below the cables.

The following are identified as potential impacts of the development on agricultural resources and productivity, and assessed in the table formats below. There are three factors that influence the significance of all agricultural impacts. The first is that the actual footprint of

disturbance of the power line is very small in relation to available, surrounding land. The second is that agricultural potential and activity on the site is very limited. The third is that the proposed power line largely runs adjacent to existing power lines, and so does not introduce a new disturbance to the land.

Impacts associated with all phases of the development

Agricultural impact 1: loss of agricultural land.

Nature: Loss of agricultural land use due to direct occupation of land by footprint of power line infrastructure, and having the effect of taking affected portions of land out of agricultural production.		
	Without mitigation	**With mitigation**
Extent	Low (1) - Site	N/A
Duration	Long term (4)	N/A
Magnitude	Small (0)	N/A
Probability	Definite (5)	N/A
Significance	**Low (25)**	**N/A**
Status	Negative	N/A
Reversibility	Low	N/A
Irreplaceable loss of resources?	Low	N/A
Can impacts be mitigated?	No	
Cumulative impacts: The overall loss of agricultural land in the region due to other developments. The significance is low due to the limited agricultural potential of the land in the area, and due to the small footprint of impact associated with this development.		
Residual impacts: No mitigation possible or necessary so same as impacts without mitigation.		

Agricultural impact 2: Impacts on soil erosion.

Nature: Soil erosion due to alteration of surface characteristics due to vegetation removal; surface disturbance and having the effect of loss and deterioration of soil resources. There is a low risk of water erosion due to the very gentle slopes and high permeability of the soil. There is some risk of wind erosion, but due to deep sands the risk has low consequence.		
	Without mitigation	**With mitigation**
Extent	Low (1) - Site	Low (1) - Site
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Small (1)
Probability	Probable (3)	Improbable (2)

Significance	**Low (21)**	**Low (12)**
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
Mitigation: Limit the surface area that is cleared of vegetation at any one time (particularly during construction) to reduce wind erosion.		
Cumulative impacts: None		
Residual impacts: None		

Agricultural impact 3: Loss of topsoil.

Nature: Loss of topsoil due to poor topsoil management (burial, erosion, etc.) during construction related soil profile disturbance (levelling, excavations, disposal of spoils from excavations etc.) and having the effect of loss of soil fertility on disturbed areas after rehabilitation. Because of the deep, sandy nature of the soil and the dune-like environment, the loss of topsoil is much less critical than in other environments.		
	Without mitigation	**With mitigation**
Extent	Low (1) - Site	Low (1) - Site
Duration	Long term (4)	Long term (4)
Magnitude	Small (1)	Small (0)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (12)**	**Low (10)**
Status	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
Mitigation: » Strip and stockpile topsoil from all areas where soil will be disturbed. » After cessation of disturbance, re-spread topsoil over the surface. » Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land, or where they can be effectively covered with topsoil.		
Cumulative impacts: None		
Residual impacts: None		

Implications for Project Implementation

» Increased susceptibility of the power line corridor to invasive species as it is severely invaded by Australian wattle, which lowers the agricultural usability and grazing capacity of the land.
» Loss of agricultural land use caused by direct occupation of land by the footprint of the power line infrastructure.
» Increased soil Erosion caused by alteration of surface characteristics due to vegetation removal and surface disturbance.
» Loss of topsoil in disturbed areas, causing a decline in soil fertility.

3. Potential impacts on Avifauna

Vegetation of the study area

The region occurs in the western part of the Fynbos Biome (Mucina and Rutherford 2006) and the line crosses dry Sand Plain Fynbos (Mucina & Rutherford 2006) for the majority of its route south. Near Atlantis, the line passes through alien vegetation supporting Australian *Acacias* (Port Jackson and Rooikrans). The area experiences winter rainfall with an average of 326 mm. Relatively cool temperatures average just 16.6 – 16.9^{o}C. Coastal fog is common adding soil moisture levels (Mucina & Rutherford 2006). There is high plant species diversity particularly in the Koeberg Nature Reserve.

Avian microhabitats

Bird habitats along the line options occurred in similar sand plain Fynbos, but some areas (closer to Atlantis) were choked with alien acacias. These offer very limited bird habitat and are depauperate in birds.

The most important bird habitat is the wetland near the Water Treatment works ("Pond 6") just off the main Atlantis Road. These always contain (fresh) water and islands where wetland birds can roost. In the central sections, the line runs parallel with the R27 but also through alien vegetation – again bird-poor habitat. Some raptors are likely to use the existing lines for perching and hunting, and Steppe Buzzards often hunt the road verge for mice. In the southern sections, the proposed line runs through pristine fynbos vegetation within the Koeberg Nature reserve, constituting only 2 km of the total 7 km line. This area, however, supports indigenous bird species such as Prinias, Sunbirds, Sugarbirds, Robins and Black Harriers (which breed

here: RE Simmons unpubl data). Other raptors are likely to occur here and indeed were recorded in our site visit. The most up-to-date information available from the SABAP2 bird atlas scheme was used: 75 atlas cards were available along the 7 km length of line, submitted from 2007-2014.

A total of 171 bird species were recorded in the area through which the line passes (including the coast where this line does not pass). Of these, 18 were collision prone species as ranked by the BAWESG (2011), and 13 of these were red-listed. Excluding the coastal waterbirds (Cormorants, Penguins and Oystercatcher), that will not be impacted by this line, 9 red-listed species are likely to occur near the power line option.

Likelihood of occurrence of collision-prone and red-listed birds in the study area

Below is a comparison of the likelihood of occurrence of the collision-prone and red-listed species using the reporting rate from SABAP2 atlas data.

Table 2. The likelihood of occurrence of Red-listed (**in red**) followed by other collision-prone species that occur along the entire route of the new line option, drawn from SABAP2 atlas cards for 2 pentads. These are based on 75 atlas cards submitted to the SABAP2 project from 2007 to 2014. Reporting rates **in bold** denote relatively common species.

				Susceptible to:	
Common name (collision ranking)	**Scientific name**	**Red-list status**	**Reporting Rate* %**	**Electrocution**	**Disturb**
Great White Pelican (11)	*Pelecanus onocrotalus*	Near-threatened	**25.3**	-	
Greater Flamingo (19)	*Phoenicopterus ruber*	Near-threatened	5.3	-	High
Secretary bird (9)	*Sagittarius serpentarius*	Near-threatened	2.7	-	
Peregrine (24)	*Falco peregrines*	Near-threatened	9.3	-	
Lanner Falcon (30)	*Falco biarmicus*	Near-threatened	1.3	-	
Black Harrier (6)	*Circus maurus*	Vulnerable	**21.3**	-	Moderate
Africa Marsh Harrier (15)	*Circus ranivorus*	Vulnerable	**10.7**	Moderate	High
Blue Crane (7)	*Anthropoides paradiseus*	Vulnerable	**24.0**	-	Moderate
Caspian Tern (60)	*Sterna caspia*	Near-threatened	2.7	-	High
Black-shouldered Kite (96)	*Elanus caeruleus*	-	**49.3**		
Booted Eagle (56)	*Aquila pennatus*	-	4.0		
African Fish Eagle (23)	*Haliaetus vocifer*	-	**12.0**		
Jackal Buzzard (44)	*Buteo rufofuscus*	-	**21.3**	Moderate	Moderate
Steppe Buzzard (65)	*Buteo vulpinus*	-	**28.0**		
Black Sparrowhawk (102)	*Accipiter melanoleucus*	-	1.3		

				Susceptible to:	
Common name (collision ranking)	**Scientific name**	**Red-list status**	**Reporting Rate* %**	**Electrocution**	**Disturb**
Grey-winged Francolin (76)	*Scleroptila africanus*	-	4.0		
TOTALS:	**Of 9 Red data species: 4 species relatively common**				
Of 7 (other) collision-prone species: 4 species relatively common					
All red data and collision-prone species: 8 species relatively common					

*Reporting rate is a measure of the likelihood of occurrence,

** Collision rank derived from the BAWSESG guidelines. Smaller numbers denote more collision-prone.

The likelihood of occurrence of red-listed species in the new line option is shown in Table 2. Of the nine red-listed species, 4 species had a reporting rate above 10%, suggesting they are relatively common in the study area (Pelican, Black Harrier, Marsh Harrier, and Blue Crane). If we include the other 7 collision-prone species (Table 2) we see that four further species occurred above 10% - thus also relatively commonly (Kite, Fish Eagle, Jackal Buzzard, and Steppe Buzzard).

Actual numbers of collision-prone red data species

While the reporting rates (Table 2) indicate the likelihood of occurrence, it does not reveal numbers of birds. A 1-day site visit and sampling at the two sensitive areas was undertaken namely: (i) the open-water dams near the Atlantis Water treatment works and (ii) the 2 km length that falls within the Koeberg Nature Reserve. 4.25 hours was spent at the wetland, 3.5 hours in the Koeberg Nature Reserve and a 1 km transect was walked to record the smaller species.

At the water treatment wetland "pond 6" 136 birds of 23 species where counted in 4 h 15 mins: these comprised wetland birds and raptors including two red-listed species: White Pelican and African Marsh Harrier.

Table 3. Wetland and raptorial birds recorded in wetland near the Water Treatment Works, 6 March 2014.

SPECIES	Pond 1	Pond 2	Pond 3
Little Grebe	2	7	
White Pelican	**6**		
White-b Cormorant	6	11	
Reed Cormorant	1	1	

SPECIES	Pond 1	Pond 2	Pond 3
African Darter	3	2	
Purple Heron	1		
Black-headed Heron	2		
Grey Heron	1		
Black-crowned Night Heron	9		
Great White Egret	5		1
Glossy Ibis	1	1	
African Spoonbill		2	
Egyptian Goose		9	2
Sacred Ibis		2	
Yellow-billed Duck	3	4	
Red-billed Teal		2	
Duck spp		32	
Blacksmith Plover	5		
Black-winged Stilt	2		
Hartlaub's Gull	3	4	
African Marsh Harrier	**1**		
Fish Eagle	**2**		
African Goshawk	1		
Black shouldered Kite		**1**	**1**
TOTALS:	**45**	**87**	**4**
Species: 23 **Red-listed spp: 2**		**Birds: 136**	

Numbers of smaller bird species recorded in the Koeberg Nature Reserve 1 km transect were typical of a Fynbos habitat – 59 birds of 12 species were recorded including Sunbirds, Crows, Bulbuls and Prinias (Table 4). Two of these species were collision-prone species: Jackal Buzzards (2 adults and a juvenile), mobbed by a Black-shouldered Kite. While not present in summer, Black Harriers forage through this area in the late winter through to December (RE Simmons pers obs) but generally occur at low level, foraging 1-5 m above the vegetation.

Table 4. Small Fynbos birds recorded in a 1 km transect under the proposed power line in the Koeberg Nature Reserve.

Species	No	Perpd distance to observer	Date	Habitat
Fiscal Shrike	1	60	6/3/2014	Fynbos-type, wild dagga, sandy
Jackal Buzzard	1	0	6/3/2014	Fynbos-type, wild dagga, sandy
Karoo Prinia	1	30	6/3/2014	Fynbos-type, wild dagga, sandy
Cape Spurfowl	1	10	6/3/2014	Fynbos-type, wild dagga, sandy
Cape Bulbul	2	5	6/3/2014	Fynbos-type, wild dagga, sandy
Jackal Buzzard	1	100	6/3/2014	Fynbos-type, wild dagga, sandy
Kelp Gull	1	75	6/3/2014	Fynbos-type, wild dagga, sandy
Pied Crow	2	60	6/3/2014	Fynbos-type, wild dagga, sandy
Southern Double-Collared Sunbird	1	55	6/3/2014	Fynbos-type, wild dagga, sandy
Jackal Buzzard (Juv)	1	75	6/3/2014	Fynbos-type, wild dagga, sandy
Malachite Sunbird	2	10	6/3/2014	Fynbos-type, wild dagga, sandy
Grey-Backed Cisticola	1	20	6/3/2014	Fynbos-type, wild dagga, sandy
Karoo Prinia	1	60	6/3/2014	Fynbos-type, wild dagga, sandy
Fiscal Shrike	1	5	6/3/2014	Fynbos-type, wild dagga, sandy
Pied Starling	2	100	6/3/2014	Fynbos-type, wild dagga, sandy
Common Starling	40	75	6/3/2014	Fynbos-type, wild dagga, sandy
12 species	**59**	**birds**		**Collision-prone species = 1** **Red-data species in this transect= 0**

If we include the BAWESG sensitivity map in the assessment (Figure 4) we see that the line passes through 2 medium risk squares.

Figure 4: Numbers and locations of all wetland species recorded on the pans Water Treatment works

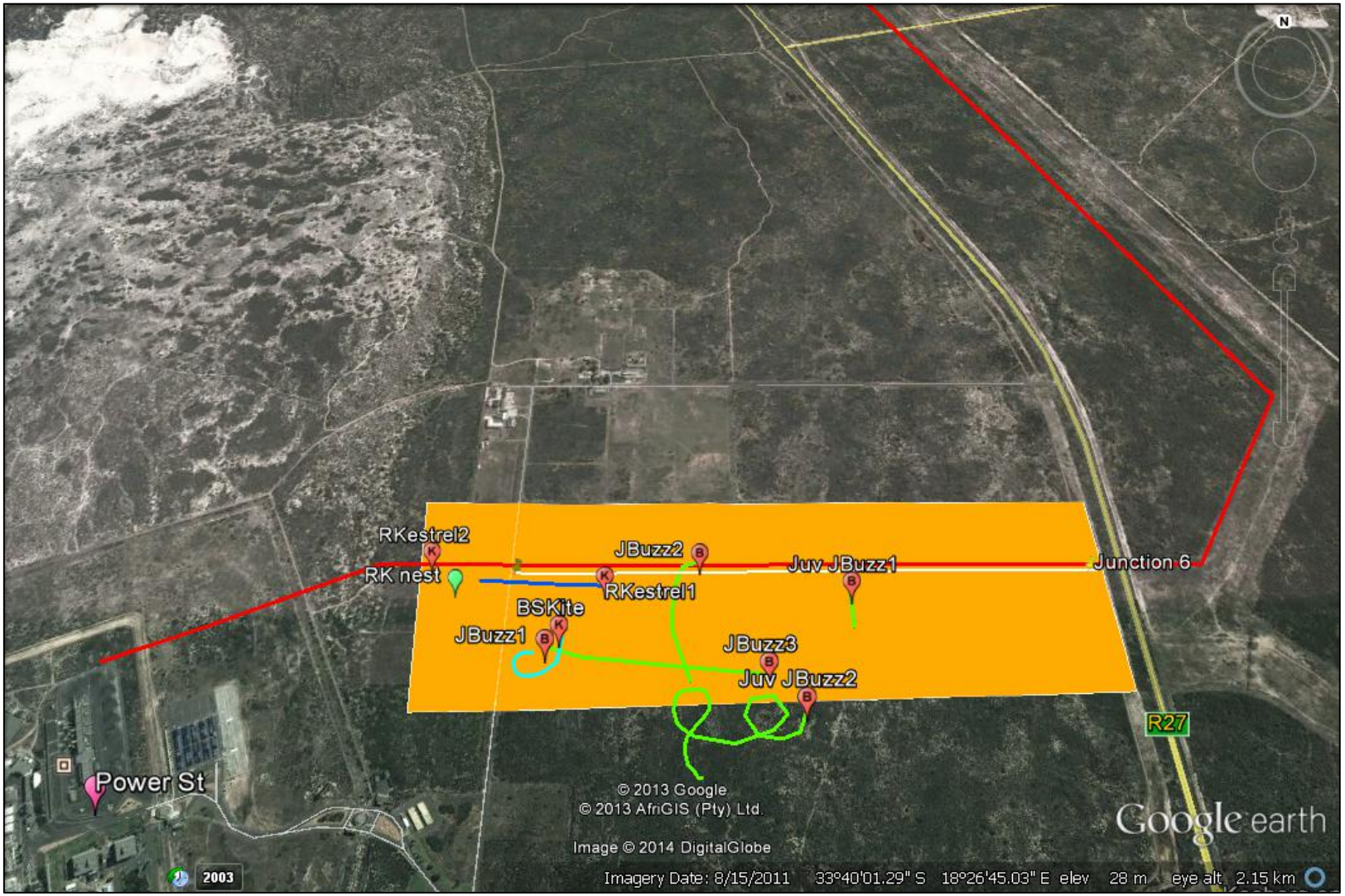

Figure 5: In the southern section of the line options near the Koeberg power station; Jackal Buzzards, Rock Kestrels (breeding) and Black Shouldered Kites were all recorded with some flight paths (shown). More importantly previous research has shown that the fynbos here is the main summer foraging area of Black Harriers which breed in the reserve.

Summary of impacts and mitigation

Avifaunal Impact 1: Power line impact on birds.

Impact Nature: Power lines generally have a negative influence on birds in the landscape and often kill large unmanouverable species such as bustards, cranes, and vultures through direct impact or (less often) electrocution. They also provide nesting sites for Pied Crows in tree-less environments and these species often interact negatively with small passerines and larger raptors. Power lines can have a positive influence where they provide nesting sites for large threatened raptors (Martials and Vultures) in otherwise open habitats. This is a much rarer occurrence.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Low (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate-High (7)	Medium-Low (5)
Probability	Probable (4)	Probable (3)
Significance	**Moderate (56)**	**Moderate-Low (33)**
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	They are two main methods of mitigating impacts of power lines (i) Moving the line farther from the potential source of conflict (ii) Affixing bird diverters (bird flappers) which alert birds to a danger ahead of them. Both could be employed in the placement of the line from Ankerlig to Koeberg	
Mitigation » For the **High Risk area** the best mitigation is to move the line to the **south of the exisiting line** and thus further from the source of the large numbers of birds (132 birds, 23 species in our survey). This means the line would be at least 700 m from the wetlands which are the focus of the birds in the area. The second, less effective option is to affix bird diverters to the lines in this area. » For the **medium risk areas** in the Koeberg Nature reserve, the line could not be moved and bird diverters are the best way to reduce bird impacts. Black Harriers breed in this reserve (to the north-west of the power station (R.E. Simmons unpubl), and they forage under these lines. Sometimes they perform aerial displays which bring them close these lines. Bird diverters would help reduce impacts by this Endangered species. To prevent		

crows breeding on the lines all pylon platforms should be fixed with "spikes" similar to those presently in use along these lines.
Cumulative Impacts Every new line that is erected therefore should have as much mitigation (position, diverters, size, length and design for safety as possible). Without mitigation, some species (such as the bustards) are in danger of suffering such large population losses that their populations will decline in certain areas where power lines occur in highest densities
Residual Impacts After mitigation there may still exist impacts to birds. For example, by moving the line away from the settling ponds at Atlantis there is no guarantee that birds will not still impact the line. The ideal way to avoid further impacts is for longer-term studies in the areas around the ponds at Atlantis and the line through the Koeberg NATURE RESERVE to determine flight paths of collision-prone species. Many wetlands are approached from certain directions depending on the wind direction and openness of the surrounding vegetation (wetland birds have high wing-loading i.e. they are heavy fliers) and land and take off into the wind.

By **summarizing** the different risk assessments we see that the proposed line option has:

- 9 red-listed species that occur along the proposed path;
- 4 of 9 red-listed species are relatively common (two Harriers, Pelican and Blue Crane) and collision-prone Black Harriers forage through the Koeberg section.
- The wetland area near the Water Treatment Works is a High risk area, because of the large number of wetland birds (136) and species (23) recorded there.
- The Koeberg Nature Reserve is a medium risk area because of the collision-prone raptors present – Black Harriers, Jackal Buzzards, and Black-shouldered Kites. These species however, are unlikely to be affected since there are 7 existing lines occurring in the area and these three species (the Buzzard, the Kite and Rock Kestrels) use the pylons to perch and breed. However, it is noted that **no bird deflectors** were present in either area, adding to the danger of the area for birds.
- The semi-quantitative summary indicates that the significance of the impacts is likely **medium (score 56)** before mitigation for the entire line and **low-medium (score 33)** after mitigation.

Implications for Project Implementation

The avifauna study has identified that the proposed line option has one high risk (Water Treatment wetland) and one medium risk area (Koeberg Nature Reserve) for birds. The study identified several areas that require further assessment and monitoring for e.g. the above wetland where large numbers of wetland species occur throughout the year. The area holds over 100 birds in summer and few of the existing lines have adequate forms of bird mitigation. The implication of implementing the project will result increased risk to sensitive areas if the power line is not constructed near the south-east side of the present line – taking it further way (approximately 760 m) from the wetland and the birds high risk areas.

4. Potential impacts on Heritage Sites

The study area consists of a corridor of land situated between the R27 (west) and the N7 (east). The northern extant is the industrial township of Atlantis and towards the south, the Melkbos area. Within this envelope lies a variety of landscapes – farm lands, brickfields, the Western Province Shooting Range as well as tracts of sandveld which have been infested with alien vegetation. Apart from the Blaauberg Hills to the south, the terrain is largely flat, punctuated by occasional dune fields. Where agriculture is not taking place, alien plant species are prolific.

Much of the proposed route lies immediately adjacent to a large existing servitude for series of 400kV lines that connect Ankerlig power station with the Omega substation. These have already been comprehensively surveyed.

The existing servitude already contains two 400 kV transmission lines and towers. Further lines will be an addition to a scenario where electrical infrastructure is a locally accepted feature of the landscape. This is not expected to detract from the scenic and qualities of the area as this has already been impacted by the existing servitude.

Cultural landscape

Since the Eskom servitude is already established and now a recognised element of the landscape, the addition of further transmission lines is not expected to

constitute a significant impact. Re-use of the existing alignment and consolidation of the electrical infrastructure is far more preferable than creating a completely new route which will subject the area to a new visual intrusion. Mitigation action (if needed) lies within the domain of visual impact assessment.

Nature Of Impact: Impacts to cultural landscape (historical pattern of settlement). The possible impact would be visible physical disruption of the historical pattern of land- use.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Maginitude	Small (1)	Small (1)
Probability	Unlikely (2)	Unlikely (2)
Significance	**Low (12)**	**Low (12)**
Status	Neutral – negative	Neutral – negative
Reversibility	reversible	reversible
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Mitigation not required	
Mitigation: No mitigation required		
Cumulative Impacts: N/a		
Residual Impacts: N/a		

Archaeological sites

Nature of impact: Impacts to pre-colonial archaeology caused by destruction and displacement of archaeological material but excavation of bases for towers.		
	Without mitigation	**With mitigation**
Extent	Local (1)	N/a
Duration	Permanent (5)	N/a
Maginitude	Small (1)	N/a
Probability	Unlikely (2)	N/a
Significance	**Low (12)**	N/a
Status	Neutral – negative	N/a
Reversibility	irreversible	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	Mitigation not required	

Mitigation: No mitigation required. Site environmental officer is requested to report any unexpected finds of archaeological material, fossil bone or human remains to relevant authority.
Cumulative Impacts: N/a
Residual Impacts: N/a

Implications for Project Implementation

They are no project implications as the proposed activity is considered acceptable in heritage terms.

5. Potential Visual Impacts

Potential visual exposure

The result of the viewshed analysis for the proposed Koeberg-Ankerlig power line is shown on **Figure 6**. The visibility analysis was undertaken along the alignment at an offset of 30m above average ground level (i.e. the maximum height of the power line structures.

The viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed power line, therefore signifying a worst-case scenario.

General

The power line has the potential to be (theoretically) visually exposed over a fairly large area due to the fact that it traverses mainly flat terrain, with very limited topographical features to shield observers from the proposed structures. Exceptions occur to the north-west where the undulating nature of the terrain interrupts visibility, and to the south-east where a weak ridge disrupts the viewshed pattern. It should be noted that the proposed 132kV power line would hardly ever be viewed in isolation, but rather against the backdrop of, from the west, or located behind (from the east) the much taller and bulkier 400kV power lines. It is only at the Atlantis industrial area where the alignment departs from the *Ankerlig-Koeberg 1 and 2 400kV* power line servitude.

0 – 500m

The visible area within a 500m radius of the proposed power line is generally devoid of sensitive visual receptors as it falls mainly within vacant natural land or adjacent to the existing power Koeberg-Ankerlig power lines. It is only where the alignment crosses over the R27, Brakkefontein and Dassenberg (R307) roads that it would be exposed to observers travelling along these routes. At the R27 and Brakkefontein roads the power line will be adjacent to the existing power lines. It is only at the Dassenberg Road that the power line will cross over this road, traverse adjacent to it, and cross it again before entering the Ankerlig Power Station.

500 – 1500m

The 500-1500m buffer zone generally encompasses vacant natural land, as well as the roads mentioned under the previous heading. It may theoretically be visible from the *Melkpost* homestead, although it is expected to be shielded by

the vegetation cover present at this locality. Within this zone the proposed power line will become increasing difficult to distinguish as a separate entity, especially where it traverses adjacent to the existing power lines. Along the northern section it may be visible from the Atlantis sand dunes, especially from the crests of the taller dunes. The power line will however be seen against the backdrop of the existing, taller 400kV power lines and the Ankerlig Power Station structures.

1500 – 3000m

Visual exposure at 1500-300m of the power line is expected to be greatly diminished due to the presence of the existing power line and power station structures. Most of this zone encompasses vacant land, with the exception of the *Brakfontein* and *Donkergat* homesteads, and the Atlantis industrial area.

Beyond 3000m

Visibility of the power line beyond a 3km radius of the alignment is highly unlikely and generally expected to be negligible from a visual impact perspective.

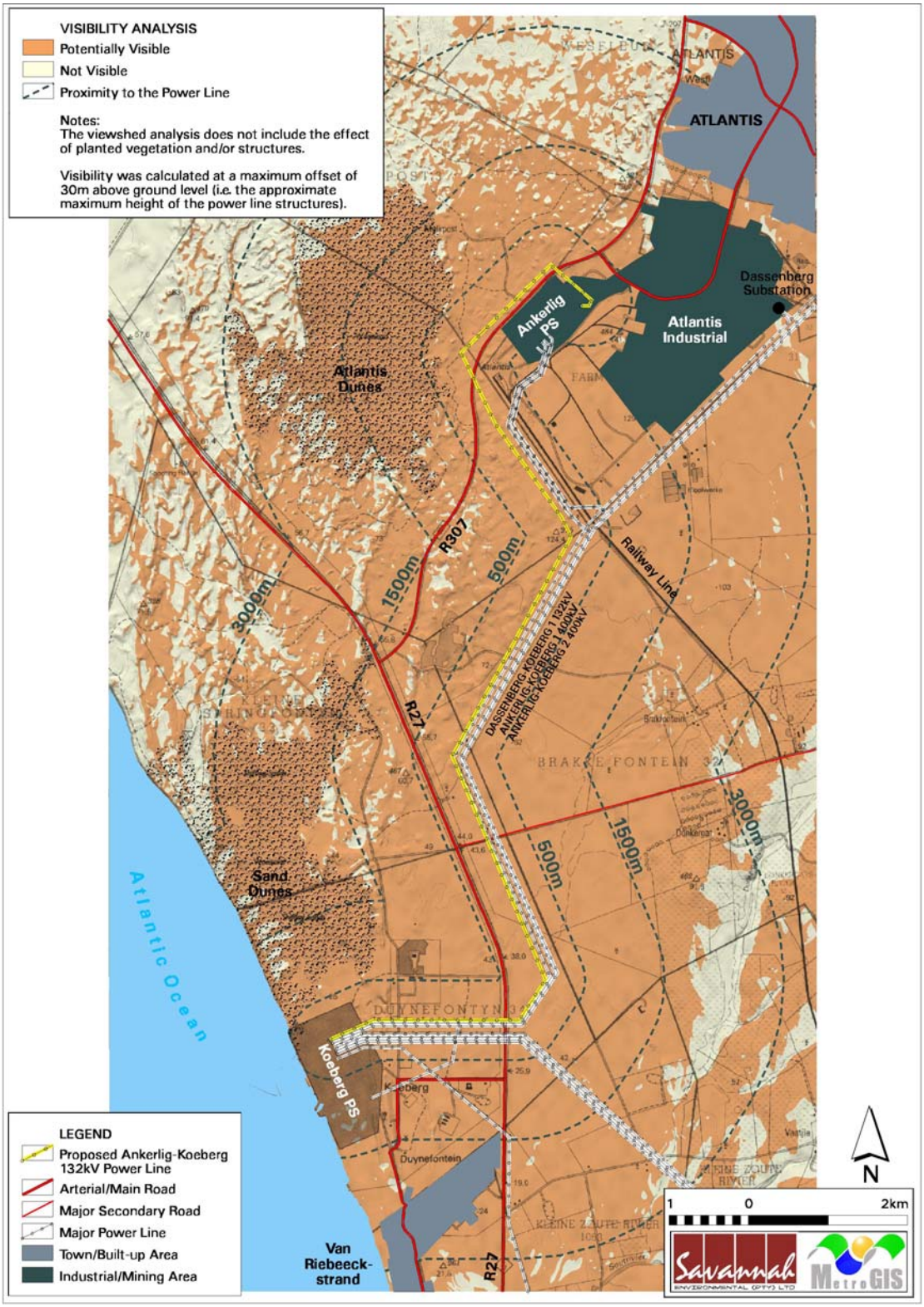

Figure 6: Potential visual exposure of the proposed Koeberg-Ankerlig power line.

Visual distance / observer proximity to the power line

MetroGIS determined the proximity radii based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger power line structures (e.g. 400kV) and downwards for smaller power lines (e.g. 132kV). MetroGIS developed this methodology in the absence of any known and/or acceptable standards for South African power line infrastructure.

The proximity radii (calculated from the proposed project infrastructure) are shown on **figure7** and are as follows:

- 0 – 0.5km - Short distance view where the structures would dominate the frame of vision and constitute a very high visual prominence.
- 0.5 – 1.5km - Medium distance views where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 1.5 - 3km - 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 3km - Long distance view where the structures may still be visible though not as easily recognisable. This zone constitutes a low visual prominence for the power line.

Viewer incidence / viewer perception

Commuters using these roads could be negatively impacted upon by visual exposure to the power line, and are thus considered to be sensitive to visual intrusion. The Atlantis sand dunes are also considered as an area that may contain sensitive visual receptors, due to its popularity as an outdoor recreation area. Visitors to these dunes are generally expected to be preoccupied with sand boarding or off-road driving activities, but expect to do this within the distinct scenery of the white dunes without additional visual intrusions.

Other than the above, viewer incidence (and expected negative viewer perception) will be concentrated within the homesteads and farm residences within the study area. Refer to section 6.1 (Potential visual exposure). These are generally far removed from the alignment, but are still included for completeness sake.

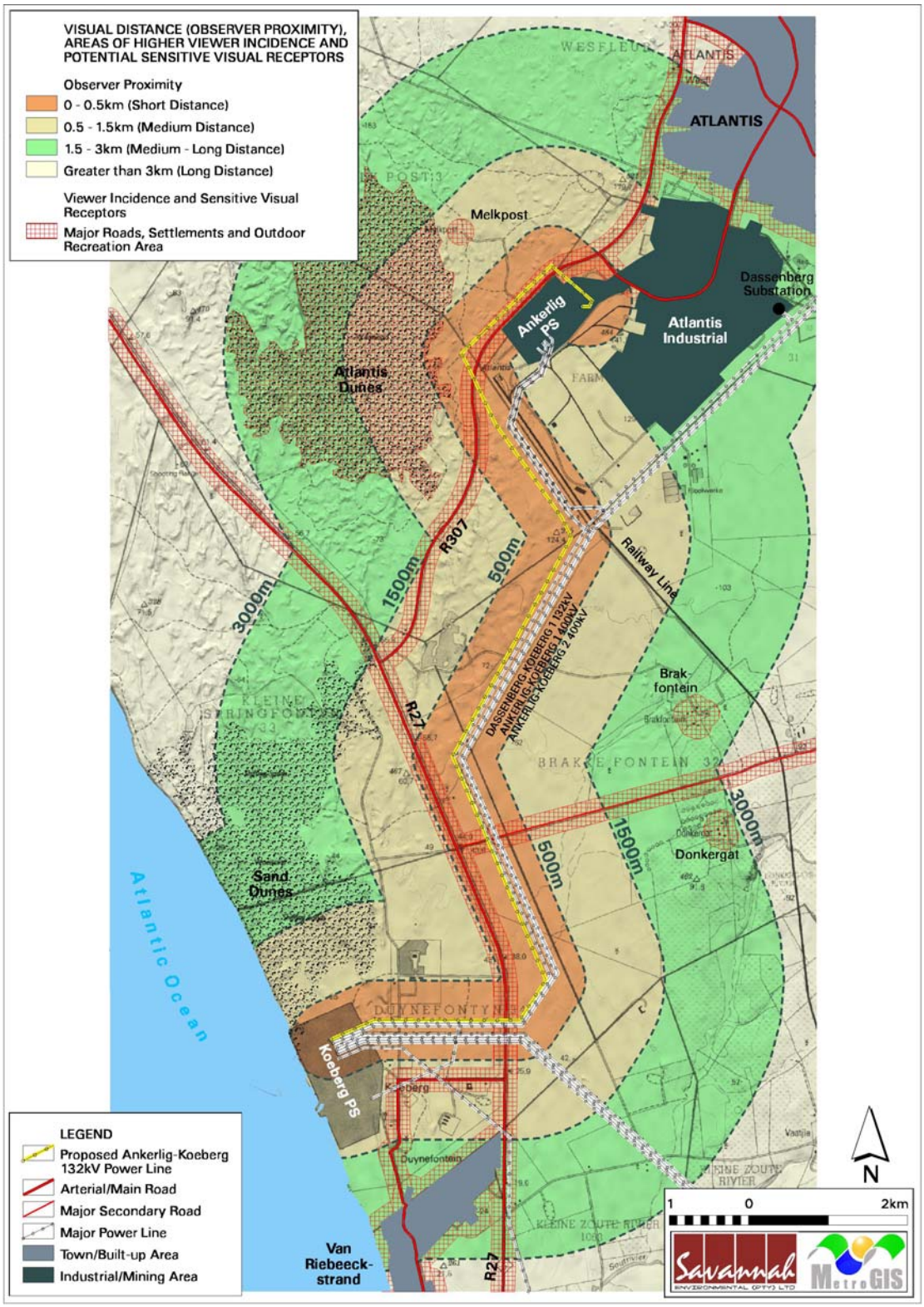

Figure 7: Observer proximity to the proposed Koeberg-Ankerlig power line and areas of higher viewer incidence/sensitive visual receptors.

Visual absorption capacity

The broader study area receives between 300mm and 500mm of rainfall per year (i.e. a Mediterranean climate) and the proposed alignment is situated primarily within *Thicket*, *Bushland*, *Bush Clumps*, and *High Fynbos.* These land cover types are described as:

Communities typically composed of tall, woody, self-supporting, single or multi-stemmed plants (branching at or near the ground), with, in most cases no clearly definable structure. Total canopy cover is greater than 10%, with canopy heights between 2 – 5 metres. It is essentially indigenous species, growing under natural or semi-natural conditions (although it may include some areas of self-seeded exotic species, especially along riparian zones).

Overall, the Visual Absorption Capacity (VAC) of the receiving environment and especially the area in close proximity to the proposed alignment is deemed *moderate* by virtue of the nature of the vegetation and the low occurrence of urban development.

The significant height of power line structures adds to the potential visual intrusion of the power line, with the tall towers (pylons) against the background of the horizon. In addition, the scale and form of the structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics.

Where homesteads and settlements occur, some more significant vegetation and trees may have been planted, which would contribute to visual absorption. As this is not a consistent occurrence, however, VAC will not be taken into account for any of the homesteads or settlements, thus assuming a worst case scenario in the impact assessment.

Within the built-up areas of Van Riebeeckstrand and Atlantis, as well as the industrial area, VAC will be of relevance, due to the presence of buildings, structures and equipment, referred to as visual clutter. In this respect, the presence of the built-up environment will 'absorb' the visual impact to a large extent.

In areas where no VAC is present (e.g. where vegetation cover had been removed along the power line servitudes; see **Figure 8**), especially in close proximity of the alignment, no VAC will be considered. This would ultimately simulate a worst case scenario.

Figure 8: Power line structures partially obscured by thicket and bushland.

Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed power line are displayed in **Figure 9**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

An area with short distance visual exposure to the proposed power line, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact when evaluating the issues related to the visual impact.

The visual impact index indicates a potentially **moderate** area of visual impact within a 500m radius of the power line, along the entire length of the alignment. This area generally represents a zone within close proximity of the power line structures, where observers are absent. Where sensitive visual receptors are present within this 500m radius (e.g. along roads) the visual impact may potentially be **high**.

These areas along the southern section of the alignment (i.e. along the R27 and Brakkefontein Road) are indicated as **high**, although this impact is unlikely to occur due to the 132kV power line traversing adjacent to the much taller 400kV power line structures (an existing visual disturbance).

Areas of *likely potential visual impact* are indicated to the north of the alignment, where the power line cross over (and traverse adjacent to) the Dassenberg Road (R307). A similar area of likely visual impact includes the eastern section of the Atlantis sand dunes. This includes the parking area for visitors to the dunes. Even here (within these likely areas of visual impact), the Ankerlig Power Station and 400kV power lines are expected to dominate the visual landscape. The additional power line may however contribute to the cumulative visual impact within this area.

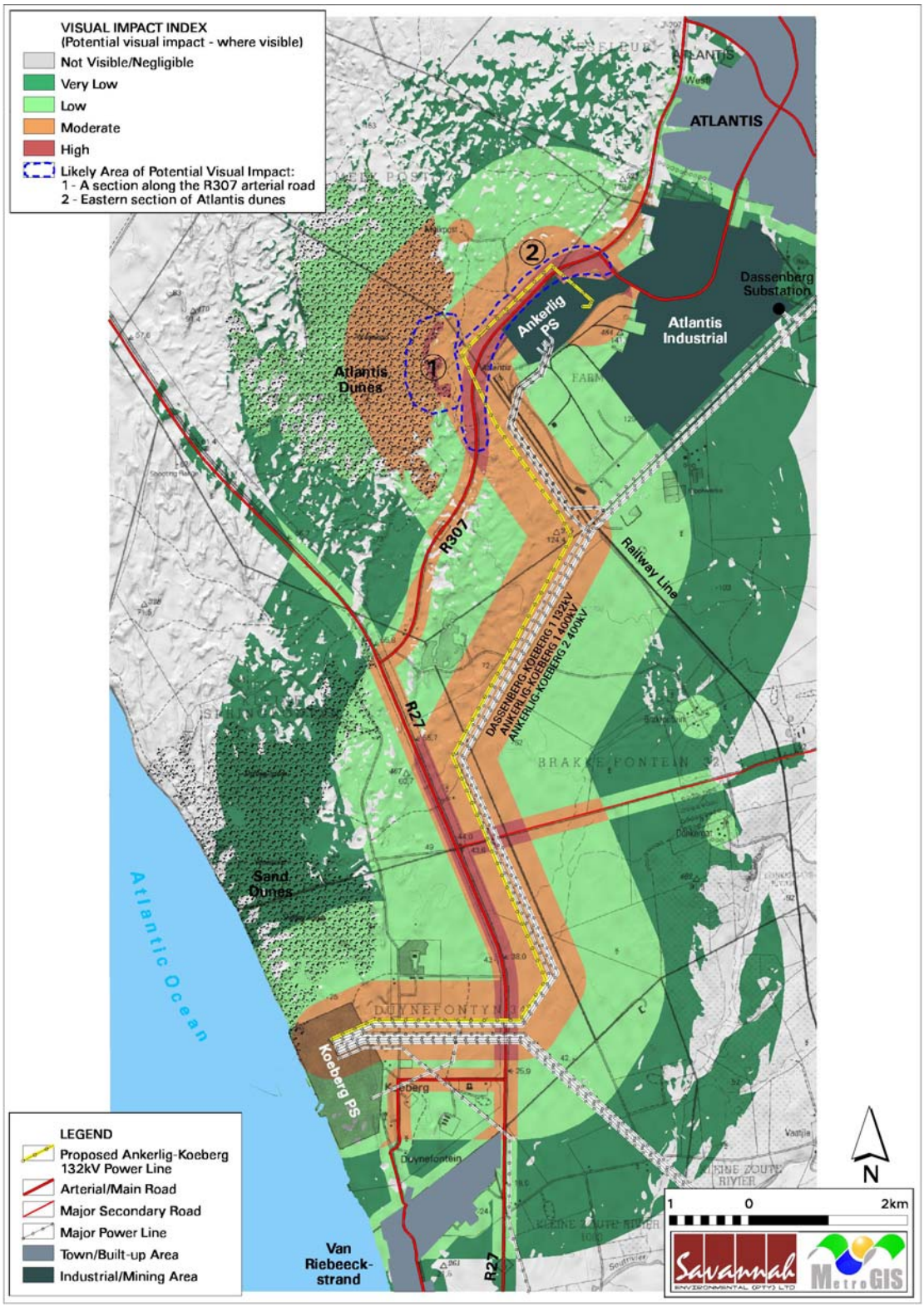

Figure 9: Visual impact index of the proposed Koeberg-Ankerlig power line.

The primary visual impacts of the proposed power line are further assessed as follows:

Potential visual impact on users of the R307 arterial road in close proximity to the proposed power line.

The proposed Koeberg-Ankerlig power line may impact on observers travelling along the Dassenberg (R307) arterial road where the alignment crosses over this road and traverses adjacent to it. This impact is expected to be of **moderate** significance.

No mitigation of this impact is possible (i.e. the power line structures will be visible regardless), but measures are recommended as best practice. The table below illustrates this impact assessment.

Visual impact on users of the R307 arterial road in close proximity to the proposed power line.

Nature of Impact: Visual impact on users of the R307 arterial road in close proximity to the proposed power line.	
	With Mitigation
Extent	Local (4)
Duration	Long term (4)
Magnitude	High (8)
Probability	Probable (3)
Significance	**Moderate (48)**
Status (positive, neutral or negative)	Negative
Reversibility	Recoverable (3)
Irreplaceable loss of resources?	No
Can impacts be mitigated?	Yes

Mitigation / Management: *Planning:* » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. *Operations:* » Maintain the general appearance of the servitude as a whole. *Decommissioning:* » Remove infrastructure not required for the post-decommissioning use of the servitude. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions.
Cumulative impacts: The construction of this power line, together with the existing power lines, power station and the potential future wind energy facilities, is likely to increase the potential cumulative visual impact of electricity generation and distribution infrastructure within the region.
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.

Potential visual impact on visitors to the Atlantis dunes in close proximity to the proposed power line.

The potential visual impact on visitors to the Atlantis dunes adjacent to the proposed alignment is expected to be of **moderate** significance, largely due to the fact that there is an existing visual disturbance in the form of the current power station and power line infrastructure.

No mitigation of this impact is possible, but measures are recommended as best practice. The table below illustrates this impact assessment.

Visual impact on visitors to the Atlantis dunes in close proximity to the proposed power line.

Nature of Impact: Visual impact on visitors to the Atlantis dunes in close proximity to the proposed power line	
	With Mitigation
Extent	Local (4)
Duration	Long term (4)
Magnitude	High (8)
Probability	Probable (3)

Significance	**Moderate (48)**
Status (positive, neutral or negative)	Negative
Reversibility	Recoverable (3)
Irreplaceable loss of resources?	No
Can impacts be mitigated?	Yes
Mitigation / Management: *Planning:* » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. *Operations:* » Maintain the general appearance of the servitude as a whole. *Decommissioning:* » Remove infrastructure not required for the post-decommissioning use of the servitude. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions.	
Cumulative impacts: The construction of this power line, together with the existing power lines, power station and the potential future wind energy facilities, is likely to increase the potential cumulative visual impact of electricity generation and distribution infrastructure within the region.	
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.	

Potential visual impact on sensitive visual receptors within the region.

The visual impact on the users of roads and the residents of towns, settlements and homesteads within the region (i.e. beyond the 1.5km radius) is expected to be **low.**

Visual impact on sensitive visual receptors within the region.

Nature of Impact: Visual impact on sensitive visual receptors within the region	
	With Mitigation
Extent	Regional (3)
Duration	Long term (4)
Magnitude	Low (4)
Probability	Improbable (2)
Significance	**Low (22)**
Status (positive, neutral or negative)	Negative
Reversibility	Recoverable (3)

Irreplaceable loss of resources?	No
Can impacts be mitigated?	Yes
Mitigation / Management: *Planning:* » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. *Operations:* » Maintain the general appearance of the servitude as a whole. *Decommissioning:* » Remove infrastructure not required for the post-decommissioning use of the servitude. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions.	
Cumulative impacts: The construction of this power line, together with the existing power lines, power station and the potential future renewable energy facilities, is likely to increase the potential cumulative visual impact of electricity generation and distribution infrastructure within the region.	
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.	

Construction Impacts

Potential visual impact of construction on sensitive visual receptors in close proximity to the proposed power line.

During construction, there may be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and land owners in the area.

Access to the proposed alignment will be along the existing power line servitude and very limited removal of vegetation cover is expected and no new access roads are required. This anticipated impact is likely to be of **low** significance.

Visual impact of construction on sensitive visual receptors in close proximity to the proposed power line.

Nature of Impact: Visual impact of construction on sensitive visual receptors in close proximity to the proposed power line.	
	With Mitigation
Extent	Local (4)
Duration	Long term (4)
Magnitude	Low (4)
Probability	Improbable (2)
Significance	**Low (24)**
Status (positive, neutral or negative)	Negative
Reversibility	Recoverable (3)
Irreplaceable loss of resources?	No
Can impacts be mitigated?	Yes

Mitigation:

Planning:

» Retain and maintain natural vegetation in all areas outside of the development footprint/servitude.

Construction:

» Ensure that vegetation is not unnecessarily removed during the construction period.
» Reduce the construction period through careful logistical planning and productive implementation of resources.
» Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
» Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
» Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
» Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
» Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
» Rehabilitate all disturbed areas immediately after the completion of construction works.

Cumulative impacts:

None.

Residual impacts:

None, provided rehabilitation works are carried out as specified.

Visual impact assessment: secondary impacts

Potential visual impact of the proposed power line on the visual quality of the landscape and sense of place of the region.

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), play a significant role.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban and industrial developments (i.e. power stations, power lines, etc.) represent existing visual disturbances.

The anticipated visual impact of the proposed power line on the regional visual quality, and by implication, on the sense of place, is expected to be of **low** significance. This is largely due to the presence of the existing power line infrastructure and Ankerlig power station.

No mitigation of this impact is possible, but measures are recommended as best practice. The table below illustrates this impact assessment.

Visual impact of the proposed power line on the visual quality of the landscape and sense of place of the region.

Nature of Impact: Visual impact of the proposed power line on the visual quality of the landscape and sense of place of the region	
	With Mitigation
Extent	Local (4)
Duration	Long term (4)
Magnitude	Low (4)
Probability	Improbable (2)

Significance	**Low (24)**
Status (positive, neutral or negative)	Negative
Reversibility	Recoverable (3)
Irreplaceable loss of resources?	No
Can impacts be mitigated?	Yes
Mitigation / Management: *Planning:* » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude. *Operations:* » Maintain the general appearance of the servitude as a whole. *Decommissioning:* » Remove infrastructure not required for the post-decommissioning use of the servitude. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions.	
Cumulative impacts: The construction of this power line, together with the existing power lines, power station and the potential future renewable energy facilities, is likely to increase the potential cumulative visual impact of electricity generation and distribution infrastructure within the region.	
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.	

Implications for Project Implementation

» Loss of Natural vegetation in around the development footprint/servitude. This will affect the appearance intrinsic visual characteristic of the area.
» Intrusion of construction activities into the conventional routine activities.
» Reduced natural footprint due to the construction of the power line and support structures (camps).
» Increased traffic from construction workers and vehicles at construction site and access roads.
» Increased generation of waste and dust emissions from construction activities.
» Visual Impacts will be visible during the operational of the new power line.
» Access roads will increase the levels of soil erosion and to dust emissions.
» Visual impacts may persist post decommissioning, if remedial actions implemented are not adequate.

6. Potential social impacts during construction

The following potential negative social impacts may occur during construction (i.e. the absence of proper management of the construction process):

» Influx of construction workers employed on the project;
» Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;
» Increased risk of veld fires associated with construction related activities;
» Impact of heavy vehicles, including damage to roads, safety, noise and dust;

While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on the local community. In this regard the most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to the potential behaviour of male construction workers, including:

» An increase in alcohol and drug use
» An increase in crime levels
» The loss of girlfriends and or wives to construction workers
» An increase in teenage and unwanted pregnancies
» An increase in prostitution
» An increase in sexually transmitted diseases (STDs)

Construction workers are likely to be sourced from the local area. The potential risk posed by these workers to local communities will therefore be low. These workers will be from the local community and form part of the local family and social network and, as such, the potential impact will be low. The use of local residents to fill the low and semi-skilled job categories will also reduce the need to house construction workers on the site. However, due to the potential mismatch of skills and low education levels, the potential employment opportunities for the members from these local communities may be low.

Nature: The presence of construction workers poses a potential risk to family structures and social networks in the area. In addition there are a number of potentially vulnerable farming activities, such as livestock farming.		
	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)
Probability	Probable (3)	Probable (3)
Significance	**Low for the community as a whole (27)** Moderate-High for specific individuals who may be affected by STDs etc. (57)	**Low for the community as a whole (24)** Moderate-High for specific individuals who may be affected by STDs etc. (51)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	

Mitigation:

The potential risks associated with construction workers can be mitigated. The aspects that should be covered include:

» Where possible, it should be made as a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks;

» The contractor should develop a Code of conduct for the construction phase. The code should identify what types of behaviour and activities by construction workers are not permitted. Construction workers that breach the code of good conduct should be dismissed. All dismissals must comply with the South African labour legislation;

» The contractor should implement an HIV/AIDS awareness programme for all

construction workers at the outset of the construction phase; » The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis; » The contractor should make the necessary arrangements for allowing workers from outside the area to return home over weekends and or on a regular basis during the 12 month construction phase. This would reduce the risk posed by construction workers to local family structures and social networks; » It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay overnight on the site. This will make it possible to manage the potential impacts effectively.
Cumulative impacts: » Impacts on family and community relations that may, in some cases, persist for a long period of time. » In cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.
Residual impacts: » Job loss » Increased poverty in the general area » Increased crime as a result of the increased poverty

Implications for Project Implementation

» Increase business and job opportunities for the local communities.
» Social benefits in terms of training, skills development. These skills can be transferable to other employment sectors and would result in further sustainable benefits.
» The likelihood of increased incidence of conflict with neighbouring property owners
» Increased incidences of Sexually Transmitted diseases during the construction phase including HIV/Aids

IMPACTS THAT MAY RESULT FROM THE DECOMMISSIONING PHASE

Alternative (preferred alternative)

The impacts during the decommissioning and closure phases will be similar to impacts of the construction phase as discussed in this assessment. Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning.

In addition, the social impacts associated with final decommissioned are likely to be limited due to the relatively small number of permanent employees affected. The potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme. With mitigation, the impacts are assessed to be Low (negative).

No Go Alternative (Compulsory)

This is the option of not constructing the proposed power line deviation within the proposed corridor. This option will result in limited impacts occurring on the biophysical environment (i.e. biodiversity, soils), and will result in a low visual impact being experienced. However, this will result in the situation where the Koeberg Power cannot have a backup power line or (as the current authorized connection does not meet the National Nuclear Regulator (NNR) guidelines). This will result in the Koeberg power station operating with the current backup power line that is prone to interference from other power lines in cross proximity.

Assessment of No-Development Option

The No-Development option would maintain the existing situation. Eskom have however indicated that the required Ankerlig deviation forms a key component of the energy grid for the Western Cape and CoCT. The No-Development Option is therefore not a viable alternative and would have a negative impact on the energy security of the region. Furthermore, the No-Development option would represent a lost opportunity for South Africa to insure stable operations at the

Koeberg Nuclear Power Station. Disruptions to Koeberg operations would result in the loss of ~5% of the national grid power supply and this can have adverse impacts on the economy of the Western Cape.

Nature: The no-development option would maintain the current energy supply and distribution status quo		
	Without Mitigation	**With Mitigation (N/A)**
Extent	Local and Regional (4)	N/A
Duration	Permanent (5)	N/A
Magnitude	High (8)	N/A
Probability	Definite (5)	N/A
Significance	**High (75)**	N/A
Status	Negative	N/A
Reversibility	Yes	N/A
Irreplaceable loss of resources?	No	N/A
Can impact be mitigated?	Yes	N/A
Enhancement: See below		
Cumulative impacts: Negative impact on integrity of the energy distribution and supply network for the region.		
Residual impacts: See cumulative impacts		

Cumulative Impact

A cumulative impact, in relation to an activity, refers to the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area[1].

The cumulative impacts associated with the proposed deviation and operation of the 132kV Dassenberg Koeberg power line is predominantly of **low to medium** significance:

[1] Definition as provided by DEA in the EIA Regulations.

- **Ecology:** Although the extent of transformation and habitat loss resulting from the new power line section is likely to be of relatively **low significance**, this must be considered in light of the high conservation value of the affected area which falls within listed ecosystems as well as priority Critical Biodiversity Areas defined by the City of Cape Town Biodiversity Network. In addition, the actual amount of habitat loss resulting from the development could vary significantly depending on the management of the vegetation beneath the power line which could vary from a positive outcome to a large negative outcome.
- **Heritage:** No potential cumulative impact where identified for the proposed power line deviation.
- **Visual:** The construction of this power line, together with the existing power lines, power station and the potential future renewable energy facilities, is likely to increase the potential cumulative visual impact of electricity generation and distribution infrastructure within the region. The impacts are considered to be of **low to moderate** significance
- **Social:** The power lines associated with the proposed Ankerlig deviation have the potential for cumulative impacts associated with Combined Visibility (more than one set of power lines visible from one location) and Sequential Visibility (e.g. the effect of seeing more than one set of power lines along a single journey, e.g. road or walking trail). However, as indicated above, what should be viewed within context is that of the existing power lines in the area associated with the Koeberg NPS, Ankerlig power station and Dassenberg substation. The potential cumulative impact associated with an additional set of power lines on the areas sense of place is therefore likely to be negligible and of **low significance**.
- **Soils:** The overall loss of agricultural land in the region due to other developments is of **low significance** due to the limited agricultural potential of the land in the area, and due to the small footprint of impact associated with this development.
- **Avifauna:** Based on the nature and extent of the proposed project, it is concluded that the potential impacts associated with the proposed power line and associated access roads within the identified corridor are of moderate significance but can be mitigated to an acceptable level from an environmental perspective.

SUMMARY OF IMPACTS

The following is a summary of impacts remaining, assuming mitigation as recommended is exercised:

Ecology: Majority of impacts on ecology are of **low to medium significance** and relate to the following:

- Impacts on vegetation and listed or protected plant species.
- Impacts on terrestrial fauna at the site due to operation of heavy machinery and the presence of construction personnel.
- Ecological impacts associated with power line servitude maintenance activities.

Heritage: The impacts on heritage resources by the proposed development are not considered to be highly significant. The recorded sites that will potentially be impacted on are all of **low significance**. The identified impacts include;

- Impacts to cultural landscape
- Impacts to pre-colonial archeology

Soils: The impacts on soils during the construction and decommission phase will have an impact on the agriculture suitability of soils in the area. The impacts are considered to be of **low significance** and will include;

- Loss of agricultural land use.
- Soil erosion and alteration to surface characteristics.
- Loss of top soils.

Visual: The Visual impacts during the construction, operational and decommission phase will have an impact on the aesthetics of the area. The impacts are considered to be of **low** to moderate **significance** and will include;

- Visual impact on users of the R307 arterial road in close proximity to the proposed power line.
- Visual impact on visitors to the Atlantis dunes in close proximity to the proposed power line.
- Visual impact on sensitive visual receptors within the region
- Visual impact of construction on sensitive visual receptors in close proximity to the proposed power line.
- Visual impact of the proposed power line on the visual quality of the landscape and sense of place of the region.

Avifauna: The avifauna impacts during the construction, operational and decommission phase will have an impact on the areas in the vicinity. The impacts are considered to be of **moderate significance** and will include;

- Electrocution of Avifauna

- » Collision of Avifauna with power line
- » Positive influence for nesting of large threatened raptors

Social: The social impacts during the construction, operational and decommission phase will have an impact on the areas in the vicinity. The impacts are considered to be of **low to high significance** and will include;

- » Creation of employment opportunities.
- » Impacts associated with the presence of construction workers on site.
- » Impacts associated with movement of heavy vehicles during the construction phase.
- » Provision of energy infrastructure
- » Impact on tourism activities;
- » Impact on sense of place and character of the area.

Cognisant of the above-mentioned conclusions established through the Basic Assessment investigation, there were areas of ecological sensitivity identified in the power line corridor. Areas of ecological sensitivity that were identified in the power line corridor are regarding vegetation and avifauna sensitivities which are shown in the environmental sensitivity map (refer to Appendix). Through implementation of the EMP (Refer to Appendix G) impact on these sensitive area type can be mitigated to acceptable levels.

The overall **cumulative impact** for the proposed project as having a **low - medium sensitivity** should the recommended mitigations be implemented.

There are no environmental or social impacts of high significance that would prevent the establishment of the proposed deviation of the exiting 132kV Dassenberg–Koeberg power line. Although areas of sensitivity were identified, no environmental fatal flaws are associated with the proposed project.