1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF REPORT

Eskom plans to extend its electrical distribution network between the Western and Northern Cape Provinces. In doing so, it is proposed that a new 400kV powerline be established between the Juno substation in Vredendal and the Gromis substation near Kleinsee.

As a result, a Visual Impact Assessment (VIA) has to be undertaken for the new infrastructure. The VIA is undertaken as part of the Construction and Operational Environmental Management Programme (C&OEMPr) as part of the Environmental Impact Assessment (EIA) process being facilitated by Nsovo Environmental Consulting, in terms of the National Environmental Management Act 107 of 1998 (NEMA). The report is also informed by the walkdown undertaken by this office as part of the compilation of the C&OEMPr.

The purpose of this report is therefore to assess the proposed activity in terms of the *Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process and the NEMAEIA Regulations of 2010*.

1.2 COMPONENTS OF THE REPORT

The aspects addressed in this report are as follows:

a) Description of the methodology adopted in preparing the report.
b) Description of the receiving environment.
c) Description of the view catchment area, view corridors, viewpoints and receptors.
d) Identification and evaluation of potential visual impacts associated with the proposed activity and the alternatives identified, by using the established criteria, including potential lighting impacts at night.
e) Identification in terms of best practical environmental option in terms of visual impact.
f) Addressing of additional issues such as:
   - Impact on skyline.
   - Negative visual impact.
   - Impact on aesthetic quality and character of place.
g) Assumptions made and uncertainties or gaps in knowledge.
h) Recommendations in respect of mitigation measures that should be considered by the applicant and competent authority.

1.3 STUDY METHODOLOGY

As stated previously, this VIA was undertaken in accordance with the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes*, as issued by the Western Cape Government's Department of Environmental Affairs and Development Planning during 2005.

The VIA was undertaken in distinct steps, each of which informed the subsequent steps. Figure 1 below summarises the methodology adopted for undertaking the assessment.

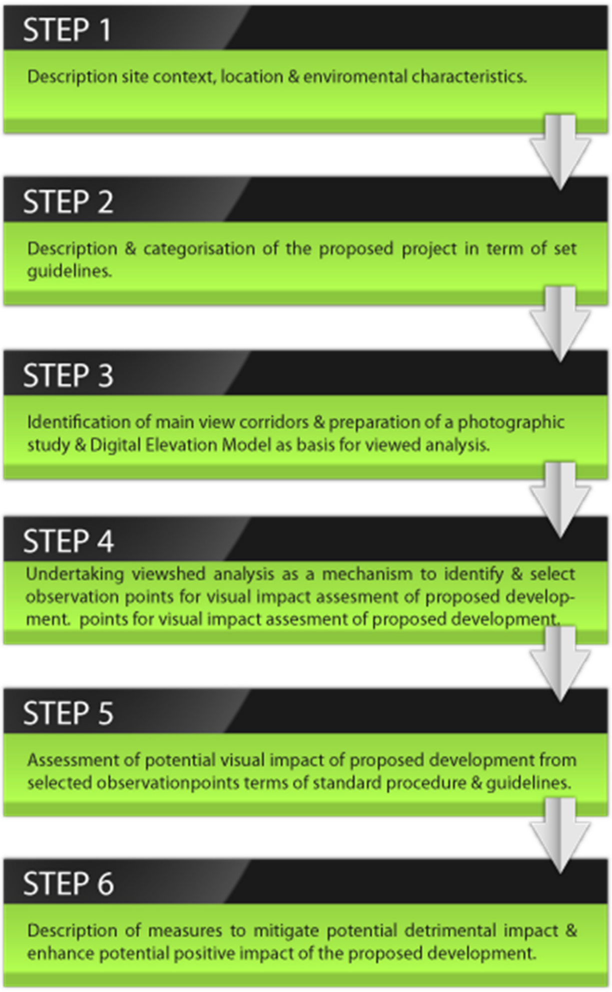

Figure 1: Methodology adopted for the VIA.

1.4 SUPPLEMENTARY DOCUMENTATION

This report is to be read together with Annexure 2 (Selected observation point viewsheds and assessments), which provides an identification of selected observation points and visual assessment of the proposed activity from each of these points.

1.5 GAPS IN KNOWLEDGE, ASSUMPTIONS AND LIMITATIONS

This assessment was undertaken during the C&OEMPr phase of the project and is based on the information provided by Nsovo Environmental Consulting on 11 and 14 July 2016, for the mentioned project. Other than to perform a VIA for the proposed powerline, no specific Terms of Reference has been provided.

Assessments of this nature generally suffer from a number of defects that must be acknowledged:

- **Limited time:** A comprehensive assessment requires a systematic assessment of the environment at different times of the day. Such luxury is not always possible and therefore most assessments are based on observations made at a specific time of day. Educated estimates are made, where applicable, based on the knowledge of the area.

- **Availability of literature:** A thorough assessment requires that all relevant literature on the subject matter is studied, acknowledged and incorporated in the report. Due to a range of factors, forward planning documents are not always available for all spheres of government.

2 LANDSCAPE CHARACTER AND VISUAL AMENITY

Since the late 1980s and early 1990s, the European Landscape Convention adopted the following definition of landscape that has since been widely adopted: *Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'* (Council for Europe, 2000).

This definition was expanded as follows by Sanwick, C. and Land Use Consultants (2002): *'Landscape is about the relationship between people and place. It provides the setting for our day-to-day lives. The term does not mean just special or designated landscapes and it does not only apply to the countryside. It results from the way that different components of our environment - both natural (the influences of geology, soils, climate, flora and fauna) and cultural (the historical and current impact of land use, settlement, enclosure and other human interventions) - interact together and are perceived by us. People's perceptions turn land into the concept of landscape'*.

Landscape results from the interplay of the physical, natural and cultural components of our surroundings and the way that people perceive these interactions. Different combinations of these elements create the distinctive character of landscapes in different places, allowing different landscapes to be mapped, analysed and described. Character is not just about the elements or the 'things' that make up a landscape, but also embraces the aesthetic and perceptual factors that make different places distinctive (GLVIA, 2002).

When the inter-relationships between people and landscape is considered this introduces related, but very different considerations, notably the views that people have of the landscape and the effects of change on their visual amenity. When a landscape is changed in some way there is a probability that the change will be seen by someone and often by several different groups of people. This may affect both particular views of the landscape and have an effect on the overall pleasantness of the surroundings that people enjoy - which is what visual amenity means.

A visual impact assessment should therefore be concerned with how the surroundings of individuals or groups of people may be specifically affected by change in the landscape. This result in assessing potential changes in specific views and in the general visual amenity experienced by general observers in particular places.

3 THE AFFECTED ENVIRONMENT

3.1 LOCALITY

The proposed new Juno-Gromis Powerline is located in the north-west corner of South Africa and stretches for approximately 230km between the Juno substation in the south and the Gromis substation in the north. The powerline spans the Western and Northern Cape Provinces and extends over three local municipalities (Matzikama, in the West Coast District Municipality - Western Cape, and Kamiesberg and Nama Khoi! in the Namakwa District Municipalities - Northern Cape).

The proposed powerline falls within the coastal zone of the area commonly referred to as Namaqualand – the coastal region in the Northern Cape stretching between the Orange River in the north and beyond Garies in the south. The region is most famously known for the yearly wildflower phenomenon which transforms the landscape in a tapestry of colours.

The Namaqualand connects to the Knersvlakte in the south. This region, which is roughly found between the towns of Vanrhynsdorp and Bitterfontein, is characterised by white quartzite plains and miniature succulent plans sheltered from the summer heat by the reflective quartz gravel.

Due to its remoteness and harsh climate, the area is sparsely populated and the settlements which do occur comprise small and isolated urban and quasi-urban settlements scattered across the region. However, many of the settlements find it hard to provide basic services and sufficient income generating-opportunities to their inhabitants. The Northern Cape Provincial Spatial Development Framework (PSDF) states that *the recent move to a global economy has been detrimental for many settlements because of the loss of manufacturing jobs, the vulnerability of export agriculture, and the increased competition in the energy and mining sectors. Larger commercial settlements seem to have a built-in growth dynamic, based on a sufficient level of diversification. The smaller settlements of the province have been characterised by noticeable changes over the past two decades.*

The CSIR (2004) notes that the scarcity of freshwater is also an obstacle to development and the soil along the coast is generally of very poor quality and limits the potential for conventional agriculture in the area. A lack of physical access to coastal resources and isolation from the centre of provincial administration further constrain development opportunities for coastal communities.

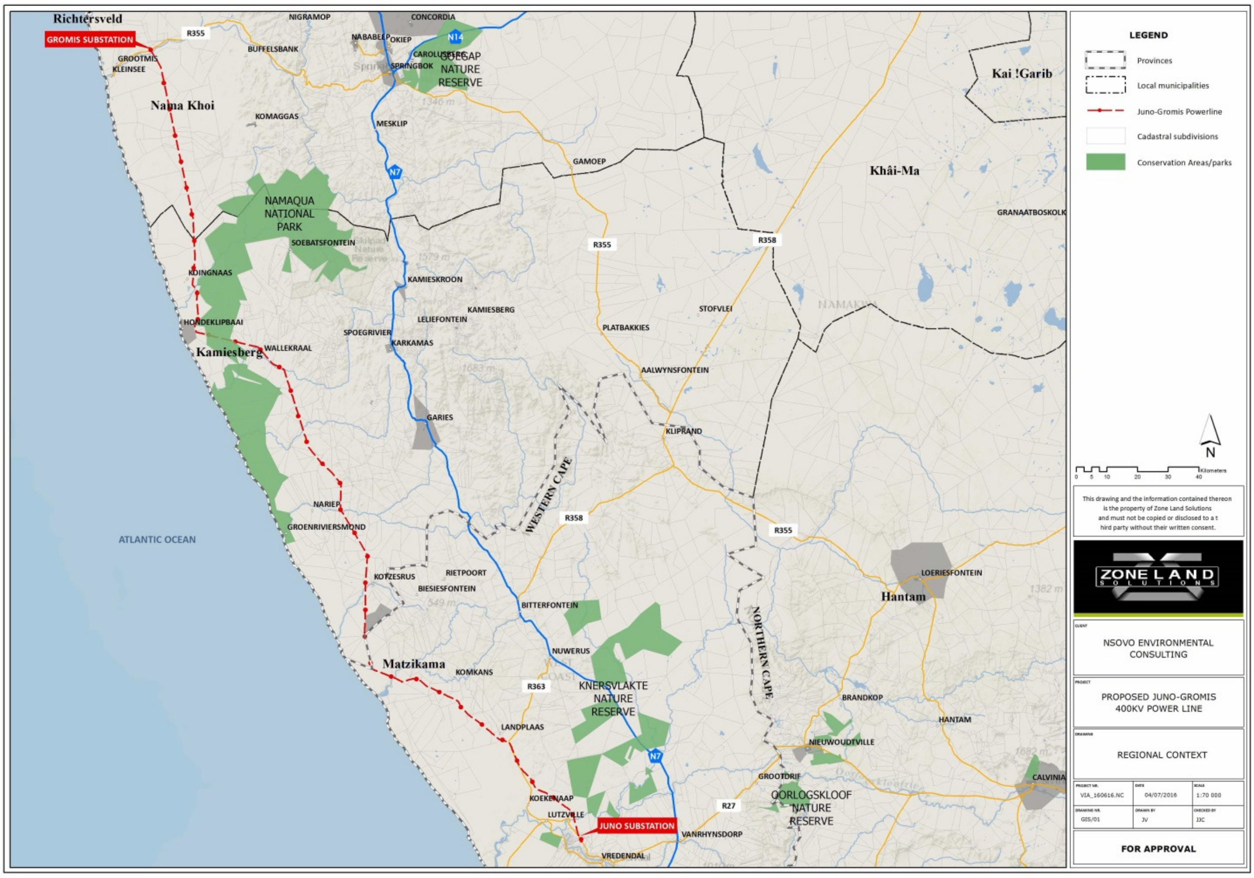

Figure 2: Regional context of the project site.

The West Coast has a rich history dating back millions of years. Rock art and artefact sites dating back thousands of years are found across the region. A number of sites of archaeological or heritage significance is known to occur in the immediate vicinity of the proposed powerline – although it should be verified by a heritage practitioner.

The proposed powerline also crosses through and past several conservation areas. Near the Juno substation in the south, the route of the proposed powerline passes by the Knersvlakte Nature Reserve. The latter is the first nature reserve to be declared for 20 years in the Western Cape and is considered one of the biodiversity hotspots of the world.

While the proposed powerline route passes by the Knersvlakte Nature Reserve, the route crosses through the Namaqua National Park. The park was proclaimed in June 2002 for the purpose of conserving the rich diversity of succulent plants. The Namaqua National Park is constantly expanding and strives to include more succulent habitats and an important coastal section. The park currently comprises ±141 000ha.

Figure 3: General view of the landscape in the vicinity of Komkas.

Figure 4: Panoramic view of the road and environment in the vicinity of Namakwa Sands.

Figure 5: View of the landscape in the vicinity of Kleinsee.

Due to the remoteness of the region, only a limited number of major roads are present. These major roads are inter-linked by a network of minor roads, most of which are gravel roads. The major road in the region is the N7 national route between the Western Cape and Namibia through Namaqualand. Several other secondary roads are also present. Those roads which lead to and from the substations in the south and north are the R27, R363 and R355.

3.1.1 Description of the Landscape Character

As mentioned above, the proposed Juno-Gromis powerline is to be developed in the coastal plain of the Namaqualand Coast. The powerline will run in a narrow band, almost parallel with the coast, as it connects with the two substations in the north and south, respectively. At its furthest point, the powerline will be some 21km from the West Coast while it will be at its closest to the coastline at Hondeklipbaai, some 4km from the shore.

Figure 6: Aerial perspective of the project site indicating the existing uses on site and the surrounding properties.

The landscape of the proposed powerline route varies in height from about 20m above mean sea level to 260m amsl. The powerline route crosses several depressions and river corridors that run perpendicular to the West Coast.

In terms of geology, the region is characterised by Soubattersfontein Quartzite that occurs as low laying ridges or koppies.

Sand movement corridors are a characteristic of the coastal plain landscape and form an integral part of the ecological dynamics of the vegetation and animals that inhabit this landscape. They are regarded as important medium to large scale ecological processes that need to be explicitly considered in conservation plans. Elsewhere in South Africa sand movement corridors have been truncated or destroyed by inappropriate coastal development and stabilization by alien plants. The Namaqualand coastal plain presents the only opportunity in South Africa to conserve these ecosystems (https://www.sanparks.org/parks/namaqua/tourism/history.php).

The proposed powerline route traverses through the Succulent Karoo and Fynbos Biomes, the former being one of the world's 34 biodiversity hotspots. The powerline also crosses through the Central Namaqualand Coast which is a geographic biodiversity priority area in terms of the *Succulent Karoo Ecosystem Plan* (SKEP). The latter identifies key information pertaining to ecosystem parameters, broad habitat units, and important individual habitats, especially those that are highly irreplaceable.

The Succulent Karoo bioregion has approximately 6,356 plant species while Namaqualand alone has about 3000 species. Seventeen present are listed as Red Data species (IUCN, 1994). It is estimated that the Succulent Karoo bioregion has about 16% of the world's succulent plant species. The high level of diversity is a result of a number of factors including:

a) Occasional droughts that increase generation turnover and population fragmentation.
b) Soil depth, moisture and texture.
c) Chemical composition of the bedrock.
d) Animal related disturbance regimes (e.g. heuweltjies).

The Succulent Karoo has its own characteristic fauna with the dominant animals being invertebrates, specifically monkey beetles, scorpions, bee flies, bees and masarid and vespid wasps have concentrations of diversity and endemism in the Succulent Karoo Biome. There is a strong faunal relationship between the Succulent Karoo and the Fynbos biome as it is considered a transitional region (https://www.sanparks.org/parks/namaqua/tourism/history.php).

In terms of the underlying vegetation type, Mucina and Rutherford (2012) identifies at least 11 vegetation types along the route of the proposed powerline. These vegetation types include the following:

- Namaqualand Spinescent Grassland
- Namaqualand Strandveld
- Vanrhynsdorp Gammabosveld
- Knersvlakte quartz Vygieveld
- Namaqua Riviere
- Namaqualand Klipkoppe Shrubland
- Namaqualand Inland Duneveld
- Namaqualand Heuweltjieveld
- Namaqualand Sand Fynbos
- Namaqualand Coastal Duneveld
- Namaqualand Salt Pans

Figure 7: View of the dominant vegetation types along the route of the proposed Juno-Gromis powerline.

The Juno Substation is located in the town of Vredendal, the district and administrative capital of the Matzikama Municipality. Matzikama is relatively isolated from the country’s main centres which mean that the demand for services provided by the larger towns, particularly Vredendal, will continue to grow.

The Matzikama SDF (2014) notes that, although declining, agriculture remains the most important economic sector in the municipal economy. · Mining currently makes a small contribution although this is increasing. ·The two other main economic sectors, manufacturing and wholesale and retail, also declined. · The SDF also notes that it is likely that tourism has increased over this period and some of the increases in the financial sector are due to tourism, a sector which is likely to increase in the future.

Figure 8: Panoramic view of the viticulture landscape in the vicinity of Vredendal.

The harsh environment along the West Coast results in population densities decreasing rapidly from the more tolerable southern climate. While South Africa had an average population density of 40 people per km² in 2007, the Northern Cape, in turn, had a density of 2.9 people per km².

Rural settlements such as Kotzesrus, Lepelsfontein, Komkans, Koningnaas, Hondeklipbaai and several others are dotted throughout this vast landscape. Without a solid economic base, these settlements are more recently orientated towards the tourism industry.

Figure 9: View of the rural settlement of Kotzesrus in the Northern Cape.

Vredendal experiences an annual rainfall of approximately 105mm with most rain occurring during winter. The average midday temperatures range from approximately 19.2°C in July to 31.5°C in February. The region is the coldest during July when the mercury drops to 6.3°C on average during the night.

In stark contrast, Kleinzee, at the northernmost point of the proposed powerline, received only about 42mm of rain per year. The average midday temperatures and coldest months are in the same range as Vredendal in the south.

4 PROJECT DESCRIPTION AND PROPOSED INFRASTRUCTURE

The proposed project entails the construction of a new powerline between the Juno substation near Vredendal in the south and the Gromis substation in the north, near Kleinsee. The proposal forms part of the Kudu Integration.

4.1 PROJECT COMPONENTS

A pylon or electricity tower is a tall structure used to support an overhead power line. They are used in high-voltage AC and DC systems, and come in a wide variety of shapes and sizes. Typical height ranges from 15 to 55m. The Juno-Gromis powerline will consist of 400kV overhead lines carried on lattice steel towers of varying heights. The average span between two towers would be approximately 500m.

The exact details of the towers to be used are listed in the table below.

Table 1: Tower details.

TOWER	HEIGHT	WIDTH	FOOTPRINT
517A	26.9m	16.4m	270m²
517E	27.5m	18.172m	331m²
517F	28.92m	19.716m	389m²
518D	28.92m	26.85m	721m²
518E	40.7m	18m	324m²
518H	27.8m	22.6m	511m²
529A	42.189m	74.614m	3477m²

Figure 10: Examples of the 517E and 517F towers to be erected as part of the Juno-Gromis powerline (left). Example of the 529A cross-rope suspension tower (right).

The conductor cables used to carry current are held up by the pylons. The conductor cables are bare, meaning they are insulated by the air alone. The distance between each conductor, and between the conductors and the ground, ensures that they remain insulated.

The insulator strings, usually made of glass, insulate the pylon from the live cable. The higher the voltage of the line, the more insulators are required. More recent composite insulators have a glass-fibre core with silicon sheds for insulation and are used to connect the conductors to the towers. Composite insulators are lightweight and resistant to both vandalism and pollution.

Shield wires, which do not carry an electric current, typically run above the conductor cables to provide lightning protection.

The type of terrain encountered, as well as the underlying geotechnical conditions determines the choice of foundation. The actual size and type of foundation to be installed will depend on the soil bearing capacity (actual sub-soil conditions).

The servitude width for a 400kV distribution line is about 55m (27.5m on either side of the centre line of the powerline).

Access is required during both the construction and operation/maintenance phases of the lines' life cycle.

5 POLICY CONTEXT

5.1 WESTERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK

The aim of the Western Cape Provincial Spatial Development Framework is to put out a framework that:

a) gives spatial expression to the National and Provincial development agendas;
b) serves as basis for coordinating, integrating and aligning 'on the ground' delivery of National and Provincial departmental programmes;
c) supports municipalities fulfil their municipal planning mandate in line with the National and Provincial agendas; and
d) communicates government's spatial development intentions to the private sector and civil society.

The PSDF has therefore been framed to take forward the NDP's spatial agenda as well as to give effect to the provincial Strategic Objectives. To address the spatial challenges of the Province, the PSDF takes the Western Cape on a path towards (i) more inclusivity, productivity, competitiveness and opportunities in urban and rural space-economies; (ii) better protection of spatial assets, and strengthened resilience of natural and built environments; and (iii) improved effectiveness in the governance of urban and rural areas.

The PSDF recognises the dependence of the province on the national grid to satisfy its energy needs. As a result, the Western Cape Government has put its full weight behind the West Coast gas opportunity, predicated on imports.

The PSDF does not specifically refer to the planned powerline between the Northern and Western Cape Provinces and only provides a land use designation for the broad spatial planning categories in the area of the proposed route. According to the figure below, the planned powerline will traverse areas designated as core, buffer and intensive agriculture.

The figure also indicated Vredendal to be situated in an area referred to as a Rural development Corridor.

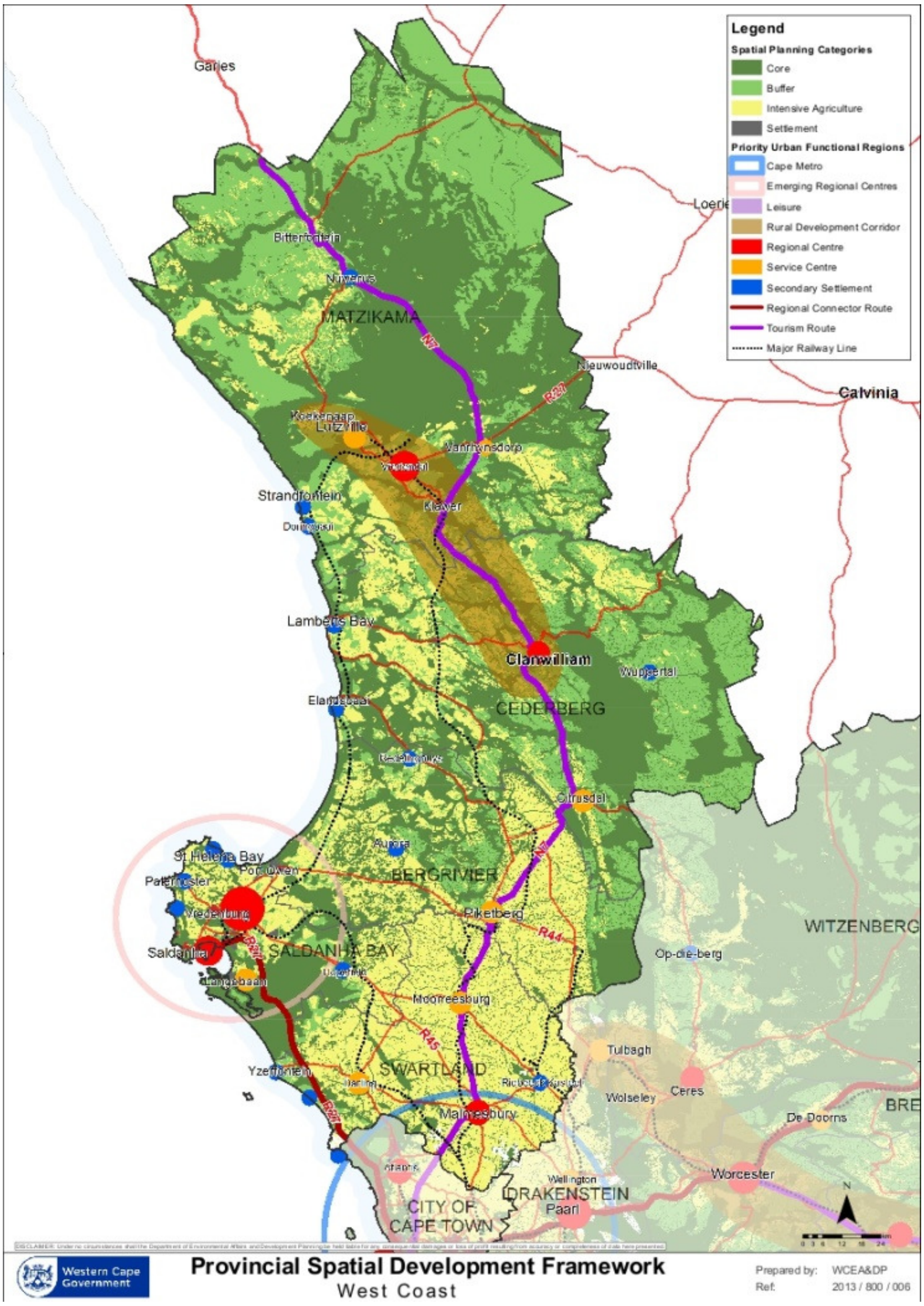

Figure 11: PSDF: West Coast land use designation.

5.2 NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK

It is the intension of the Northern Cape Spatial Development Framework to serve as a -

a) Spatial land-use directive which aims to promote environmental, economic, and social sustainability through sustainable development.

b) Guideline for instilling a developmental state.

c) Basis for prioritising governmental programmes and projects.

d) Premise for governmental performance management.

e) Manual for integrated land-use planning.

In order to give effect to the conceptual spatial vision a composite plan was prepared for the province in accordance with six Spatial Planning Categories (SPCs). These SPCs were formulated in terms of the bioregional planning principles and collectively illustrate the desired matrix of land-uses throughout the province.

The process followed in the articulation of the spatial vision for the Northern Cape was achieved by 'layering' of individual spatial plans that have been articulated for the various SPCs and collating all spatial data into a composite spatial plan for the province.

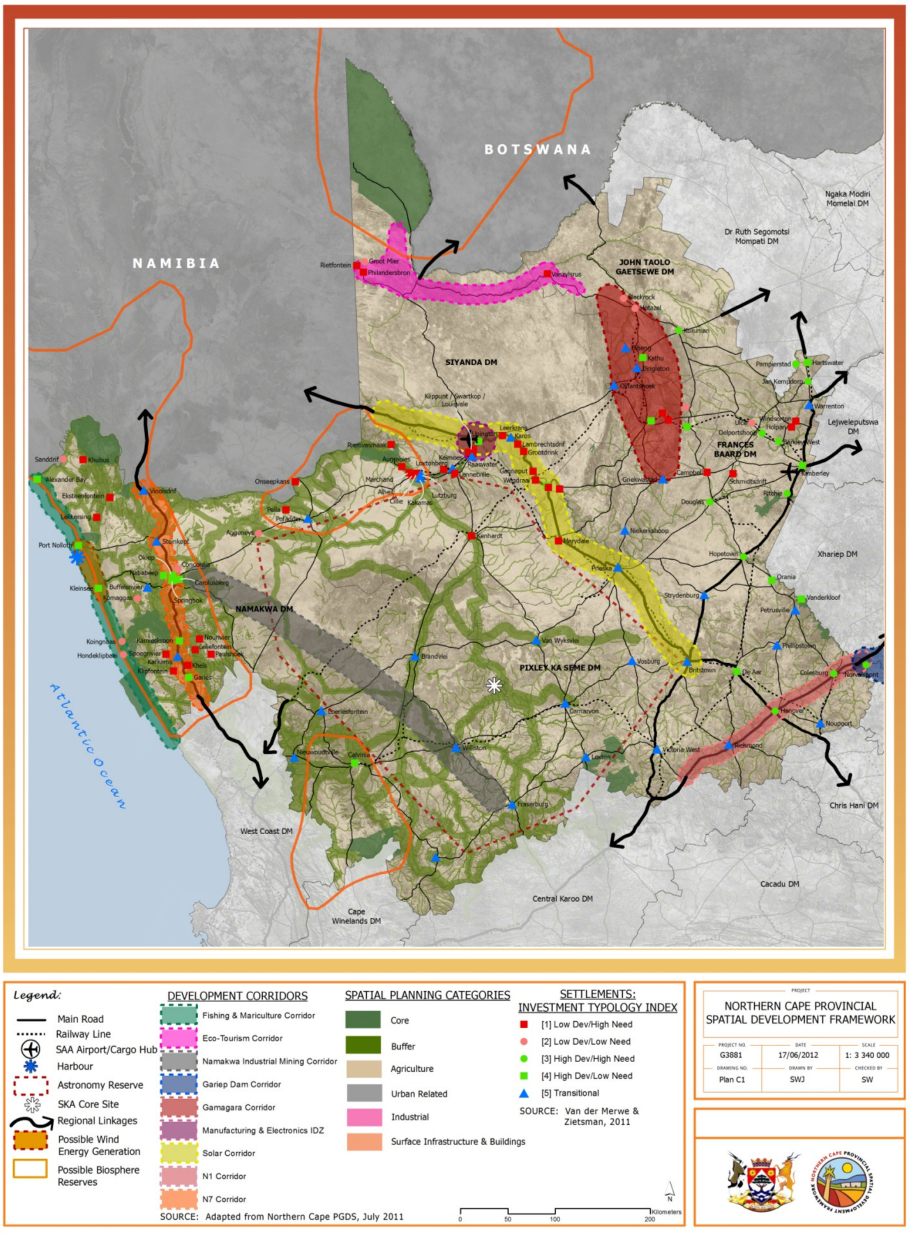

Figure 12: Composite Spatial Plan for the Northern Cape Province.

As with the designation of the WCPSDF, the Northern Cape PSDF does not specifically refer to the planned powerline. The document does, however, provide general broad guidelines and policy directives for surface infrastructure which would contribute to a holistic development plan for the Province. Of importance is to note that the planned powerline route is to be situated west of the N7 development corridor.

6 POTENTIAL 'TRIGGERS' OR KEY ISSUES

A 'trigger' is a characteristic of either the receiving environment or the proposed project which indicates that visibility and aesthetics are likely to be key issues and may require further specialist involvement (DEA&DP, 2005).

The 'triggers', as it relates to the proposed project refer to the following:

Table 2: Potential triggers.

KEY ISSUE	FOCAL POINTS
a) Nature of the receiving environment:	*Areas with protection status, such as national parks r nature reserves.*
	Areas with proclaimed heritage sites or scenic routes.
	Areas with intact or outstanding rural or townscape qualities.
	Areas with a recognised special character or sense of place
	Areas lying outside a defined urban edge line.
	Areas of important tourism or recreational value.
	Areas with important vistas or scenic corridors.
b) Nature of the project:	High intensity type projects including large-scale infrastructure.
	Possible visual intrusion in the landscape.

6.1 DEVELOPMENT CATEGORY

Based upon the 'triggers' and key issues and the environmental context summarised above, the proposed activity is categorised as a **Category 5 Development**.

This categorisation is based upon the *Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes*, which lists the following categories of development:

Box 3: KEY TO CATEGORIES OF DEVELOPMENT

<u>Category 1 Development:</u> e.g. nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.

<u>Category 2 Development:</u> e.g. low-key recreation/resort/residential type development, small-scale agriculture/nurseries/narrow roads and small-scale infrastructure.

<u>Category 3 Development:</u> e.g. low density residential/resort type development, golf or polo estates, low to medium-scale infrastructure.

<u>Category 4 Development:</u> e.g. medium density residential development, sport facilities, small-scale commercial facilities/office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

<u>Category 5 Development:</u> e.g. high density township/residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agriculture land and commercial tree plantations. Quarrying and mining activities with related processing plants.

Based upon the above categorization and the assessment criteria provided in the *Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes* it is expected that a **'moderate to very high visual impact'** could be expected as a result of the proposed activity (refer to the table below).

The objectives of the VIA described in this report is to:

a) determine whether such broad impact categorisation is appropriate and if not, to determine an appropriate category of impact;

b) formulate and implement measures or interventions that would mitigate any detrimental impacts to the extent that the activity will be acceptable.

Table 3: Categorization of expected visual impact (DEA&DP, 2005).

Type of environment	Type of development				
	Category 1	**Category 2**	**Category 3**	**Category 4**	**Category 5**
Protected/wild areas of international or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	**Moderate visual impact expected**	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural or historical significance/disturbed	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

7 VIEWSHED ANALYSIS

7.1 DOMINANT VIEW CORRIDORS

As a first step of this VIA, a survey was undertaken to determine the existence of significant view corridors associated with the project site. A view corridor is defined as *'a linear geographic area, usually along movement routes, that is visible to users of the route'* (DEA&DP, 2005).

When determining dominant view corridors, one has to take into consideration the class of the road, the dominance and nature of the town/settlement/neighbourhood/district in which direction it travels and the distance from the proposed activity. In this regard, the corridors listed below relate directly to the proposed powerline. A number of other larger corridors, such as the

N7, partially fall within the viewshed generated from the project site, but is too far from the new infrastructure to have a direct relation to it.

Having regard for the above, the following dominant *view corridors* were identified in the immediate vicinity of the proposed powerline, namely:

a) **R27** The main connector between Vredendal and the N7 and further on to Calvinia.

b) **R363** The secondary connector route between Klawer, Vredendal and Nuwerus.

c) **R355** The main road between Springbok and Kleinsee.

7.2 RELEVANT TOPOGRAPHIC AND PHYSICAL CHARACTERISTICS

A further key aspect affecting the potential visual impact of any proposed activity is the topography of the project site and the surrounding environment and the existence of prominent biophysical features from where the project site is visible. The topography and the major ridgelines of the area were subsequently determined and mapped by using a *Digital Elevation Model*[1].

As illustrated by the DEM below, the route of the proposed powerline is located at a mean elevation of approximately 120m above sea level. The DEM shows that the wider coastal plain makes way for more mountainous terrain inland at approximately the route of the N7 national road. The DEM also shows the depressions in the landscape associated with the river corridors. It is also evident that there are not prominent ridges or topographical manifestations within the immediate vicinity of the powerline, from where the latter could potentially be visible.

[1] A Digital Elevation Model (DEM) is a geographic information system-based outcome generated from contours for a specific area. In this instance, 20m contour intervals for reference sheet no. 2817ca, 2817cb, 2817cc, 2817cd, 2817da, 2817db, 2817dc, 2817dd, 3017ab, 3017ad, 3017ba, 3017bb, 3017bd, 3017cb 3017da, 3017db, 3017dc, 3017dd, 3117bb, 3117bd, 3118aa, 3118ac, 3118ad, 3118cb and 3118da were used to calculate the DEM for the region.

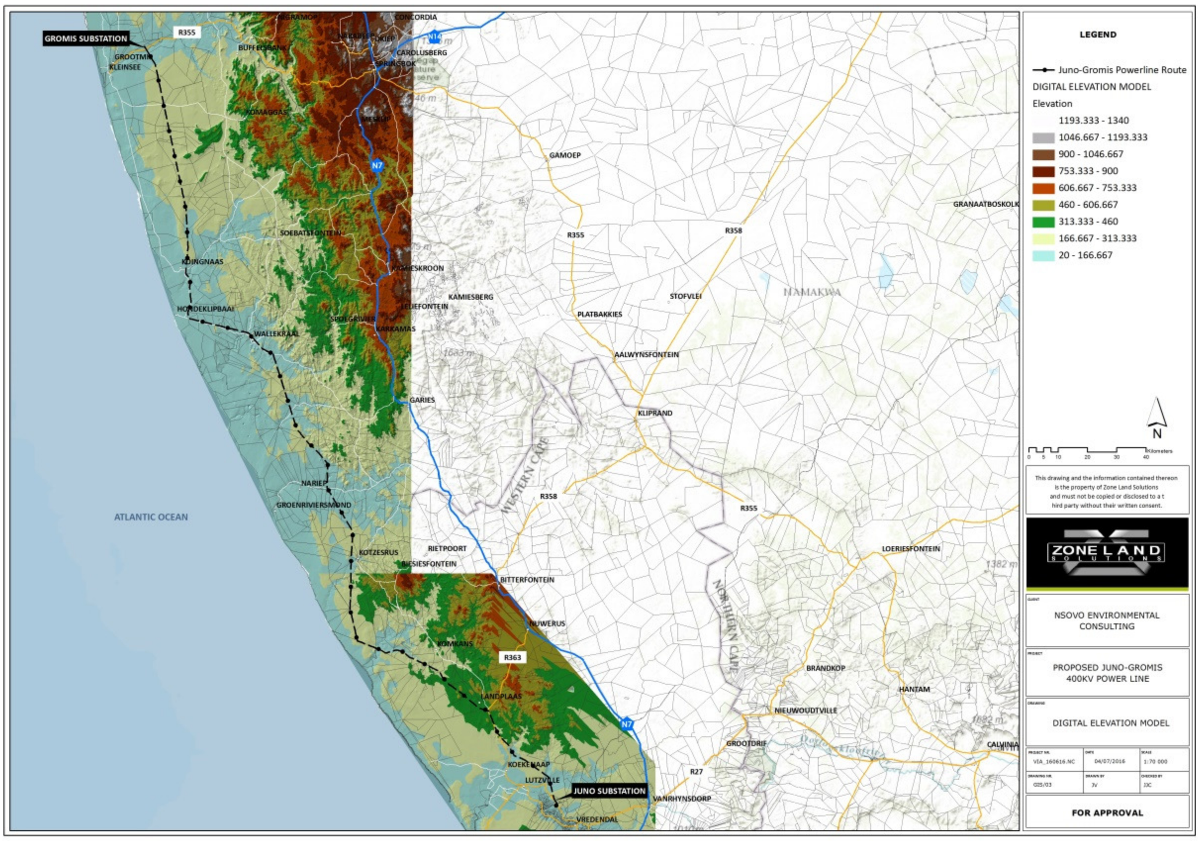

Figure 13: Digital Elevation Model illustrating the landscape of the area and the dominant view corridors in the region.

7.3 PHOTOGRAPHIC STUDY AS SUPPLEMENTARY COMPONENT

In order to quantify and assess the visibility and potential impact of the proposed activity and to provide a basis for selecting appropriate observation points outside of the project site, a photographic study and analysis was undertaken in the vicinity of the project site. The analysis identified several observation points with similar characteristics and assessments outcomes. A selection of Key Observation Points is therefore included under Annexure 2.

Figure 14: Panoramic view from the R363 towards the proposed powerline route.

8 DIGITAL VIEWSHED ANALYSIS

The photographic study summarised above was supplemented with a digital viewshed analysis based upon the Digital Elevation Model (refer to Figure 9). As stated previously, the purpose of these two steps was to provide a basis for the identification and selection of appropriate observation points outside the project site for the VIA.

The viewshed[2] analysis was undertaken in accordance with the *Guideline Document for involving Visual Specialists in EIA Processes*. Geographic Information Systems (GIS) technology was used to analyse and map information in order to understand the relationships that exist between the observer and the observed view. Key aspects of the viewshed are as follows:

- It is based on a *single viewpoint* from the highest point of the project site.
- It is calculated at an average 40m above the existing natural ground level to reflect the highest point of the proposed activity.
- It represents a '*broad-brush' designation*, which implies that the zone of visual influence may include portions that are located in a view of shadow and it is therefore not visible from the project site and *vice versa*. This may be as a result of landscape features such as vegetation, buildings and infrastructure not taken into consideration by the DEM.
- The viewshed generated from each of the selected observation points referred to in Annexure 2 is calculated at 1.7m above the natural ground level to reflect the average height of person either walking or sitting in a vehicle.

As illustrated by the generated viewsheds (refer to Figure 10 below), the *zone of visual influence*[3] is defined to the coastal plain and only stretches as far as the mountains terrain in the east. The viewshed is relatively uniform across the landscape as no prominent features are present in this area. As a result of the combination of the latter and the height of the proposed powerlines, the viewshed stretches up to 60km from the powerlines in a predominantly western direction.

The GIS-generated viewshed illustrates a theoretical *zone of visual influence*. This does not mean that the proposed activity would be visible from all observation points in this area. The distance radii indicating the various viewing distances from the project site are also illustrated by Figure 10.

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[2] A viewshed is defined as *'the outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed'*. A Viewshed Analysis is therefore the study into the extent to which a defined area is visible to its surroundings.

[3] Zone of visual influence is defined as 'An area subject to the direct visual influence of a particular project'.

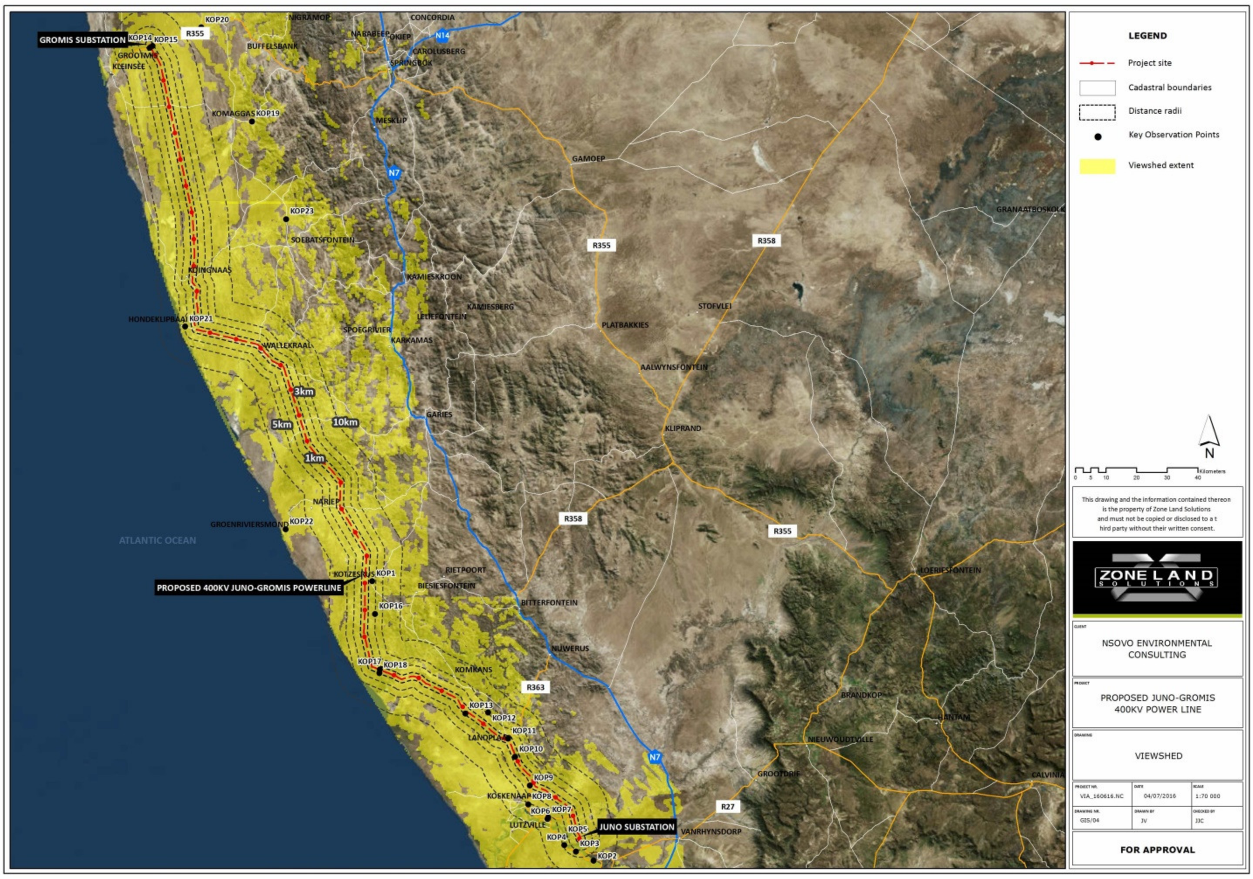

Figure 10: Viewshed generated from the centre of the project site.

8.1 KEY ASPECTS OF THE VIEWSHED

The distance between the observer and the observed activity is an important determinant of the magnitude of the visual impact. This is due to the visual impact of an activity diminishing as the distance between the viewer and the activity increases. Viewsheds are categorised into three broad categories of significance, namely:

a) <u>Foreground:</u> The foreground is defined as the area within 1km from the observer within which details such as colour, texture, styles, forms and structure can be recognised. Objects in this zone are highly visible unless obscured by other landscape features, existing structures or vegetation.

b) <u>Middle ground:</u> The middle ground is the area between 1km and 3km from the observer where the type of detail which is clearly visible in the foreground becomes indistinguishable. Objects in the middle ground can be classified as visible to moderately visible, unless obscured by other elements within the landscape.

c) Background: the background stretches from approximately 3km onwards. Background views are only distinguishable by colour and lines, while structures, textures, styles and forms are often not visible (SRK Consulting, 2007).

9 VISUAL IMPACT ASSESSMENT

9.1 SELECTION OF OBSERVATION POINTS

A number of Key Observation Points (KOPs) were provisionally identified and selected within the defined viewshed for the visual assessment in accordance with the selection criteria stipulated in the Visual Guidelines. These KOPs correspond with movement routes, residential areas and general populated areas, commercial and institutional areas in the region. As a result of the similarity in the assessment results of the KOPs, the description and assessment of only a selected few KOPs are included in Annexure 2.

KOPs selected for the assessment are generally located at the intersection between the zone of visual influence and the defined view corridors (refer to Section 5.1 above). The view corridors are those areas that are accessible to the general observer.

9.2 ASSESSMENT PROCESS

The identified *observation points* were categorised and assessed as summarised in the table below.

Table 4: VIA methodology and process.

KEY	DESCRIPTION
NUMBER	Each observation point was allocated a reference number.
CO-ORDINATES	The co-ordinates of each of the observation points are provided.
ALTITUDE	The altitude of the observation point was provided in meters above sea level.
DESCRIPTION	A brief description where the observation point is located is provided.
TYPE	Each observation point is categorised according to its location and significance rating. These criteria include the following: • Tourist-related corridors, including linear geographical areas visible to users of a route or vantage points. • Residential areas. • Institutional areas. • Commercial areas. • Recreational area.

PHOTOGRAPH	A photograph was taken from each observation point in the direction of the project site to verify the digitally-generated viewshed.
PROPERTY LOCATION	The location of the property was described a *foreground*, *middle ground* or *background*.
PROXIMITY	The distance between the observation point and the project site was provided in kilometres.
VISUAL SENSITIVITY OF RECEPTORS	The visual impact considered acceptable is dependent on the type of receptors. A *high* (i.e. residential areas, nature reserves and scenic routes or trails), *moderate* (e.g. sporting or recreational areas, or places or work), or *low* sensitivity (e.g. industrial, mining or degraded areas) was awarded to each observation point.
VISUAL EXPOSURE	Exposure or visual impact tends to diminish exponentially with distance. A *high* (dominant or clearly visible), *moderate* (recognisable to the viewer) or *low* exposure (not particularly visible to the viewer) rating was allocated to each observation point.
VISUAL ABSORPTION CAPACITY (VAC)	The potential of the landscape to conceal the proposed activity was assessed. A rating of *high* (effective screening by topography and vegetation), *moderate* (partial screening) and *low* (little screening) was allocated to each observation point.
VISUAL INTRUSION	The potential of the activity to fit into the surrounding environment was determined. The visual intrusion relates to the context of the proposed activity while maintaining the integrity of the landscape. A rating of *high* (noticeable change), *moderate* (partially fits into the surroundings) or *low* (blends in well with the surroundings) was allocated.
DURATION	With regard to roads, the distance (in kilometres) and duration (in seconds) for which the property will be visible to the road user, were calculated for each observation point.

9.3 SUMMARY OF ASSESSMENT

Based on the viewshed analysis and the preceding sections, the envisaged visual impact of the proposed activity was assessed in accordance with the criteria for visual impact assessments (DEA&DP, 2005). The findings of the assessment from selected observation points are included under Annexure 2.

9.3.1 Assessment Criteria

It is stated in the DEA&DP's Visual Guidelines that to aid decision-making, the assessment and reporting of possible impacts requires consistency in the interpretation of impact assessment criteria. The criteria that specifically relate to VIAs were therefore described in Table 3 and Annexure 2.

The potential visual impact of the proposed activity was assessed against these criteria, with reference to the summary of criteria in Box 12 of the Visual Guidelines. Table 5 provides a description of the summary criteria used to determine the impact significance.

Table 5: Summary of criteria used to assess the potential impacts of the proposed activity.

CRITERIA	CATEGORY	DESCRIPTION	RATING
Nature of Impact	N.A.	The nature of the impact refers to the visual effect the proposed activity would have on the receiving environment. The nature of the development proposals are described in the preceding sections.	
Extent of Impact	Site-related	Impact extends only as far as the activity.	1
	Local	Impact limited to the immediate surroundings.	2
	Regional	Impact affecting a larger metropolitan or regional area.	3
	National	Impact affecting large parts of the country.	4
	International	Impact affecting areas across international boundaries.	5
Duration of Impact	Immediate	Impact lifetime 0	1
	Short Term	Impact lifetime <1 year	2
	Medium Term	Impact lifetime 1-5 years	3
	Long Term	Impact lifetime 5-15 years	4
	Permanent	Impact lifetime >15 years	5
Magnitude of Impact	No effect		0
	Low	Visual and scenic resources not affected	2
	Minor	Will not result in impact on processes	4
	Medium	Affected to a limited scale	6
	High	Scenic and cultural resources are significantly affected	8
	Very high	Result in complete destruction of patterns	10
Probability of Impact	None	Impact will probably not happen.	0
	Improbable	Very low possibility of impact occurring.	1
	Low	Low possibility of impact occurring.	2
	Medium	Distinct possibility that the impact will occur.	3
	Highly probable	Most likely that impact will occur.	4
	Definitive	Impact will occur regardless of preventative measures.	5
Reversibility of Impact	Reversible	Impact can be reversed after cause or stress is removed or remedial steps have been taken.	
	Irreversible	The activity will lead to a permanent impact.	
Irreplaceability of Impact	Replaceable	Mitigation steps following the impact will lead to conditions similar prior to impact, e.g. grazing veld.	
	Irreplaceable	Conditions prior to impact are permanently lost and mitigation is unlikely to restore previous environmental state.	
Significance of Impact	The significance is calculated by combining the criteria in the following formula:		

	S = (E+D+M)P S = Significance E = Extent D = Duration M = Magnitude P = Probability		
	Low Medium High	Where it will not have an influence on the decision. Where it should have an influence on the decision unless it is mitigated. Where it would influence the decision regardless of any possible mitigation.	<30 30-60 >60
Status of Impact	Positive Negative	Impact will enhance environmental functions and processes. Impact will negatively affect environmental functions and processes.	

9.4 ASSESSMENT OF IMPACTS

9.4.1 Assessment of Impact on the Landscape Character

Scenic landscapes, historic settlements and the sense of place which underpins their quality are being eroded by inappropriate developments that detract from the unique identify of towns. Causes include inappropriate development, a lack of adequate information and proactive management systems (WCPSDF, 2014).

The sensitivity of the landscape character is an indication of '*the degree to which a particular landscape can accommodate change from a particular development, without detrimental effects on its character*' (GLVIA, 2002). A landscape with a high sensitivity would be one that is greatly valued for its aesthetic attractiveness and/or have ecological, cultural or social importance through which it contributes to the inherent character of the visual resource (Axis Landscape Architect, 2014).

A landscape sensitivity rating was adapted from GOSW (2006) and applied in the classification of the study area into different sensitivity zones.

Table 6: Landscape character sensitivity rating (adapted from GOSW, 2006).

	DESCRIPTION
Low Sensitivity	These landscapes are likely to: • Have distinct landforms; • Have a strong sense of enclosure that reduces visual sensitivity; • Have been affected by man-made features; • Have reduced tranquillity; • Have little inter-visibility with adjacent landscapes; and • Exhibit a low density of sensitive landscape features.
Moderate sensitivity	These landscapes are likely to: • Have moderately prominent landforms that provide some form of enclosure; • Have been affected by some man-made features; • Have little inter-visibility with adjacent landscapes; and • Exhibit a moderate density of sensitive landscape features.
High sensitivity	These landscapes are likely to: • Have poorly defined landforms; • Be open or exposed with a remote character and an absence of man-made features; • Be highly visible from adjacent landscapes; and • Exhibit a high density of sensitive landscape features.

Having regard for the rural nature of the West Coast region, it is argued that the sense of place of the area is, to a large degree, intact. As a result, the sense of place of the area is commonly associated with natural resources and extensive agriculture uses. However, due to the extensiveness of the area, it is also evident that disturbed landscapes are traversed by the powerline. The landscape character of the area is therefore considered to be **low to moderate to high sensitivity**, depending on the specific location.

The table below attempts to summarise the significance of the activities in relation to the landscape character.

Table 7: Impact table summarising the significance of visual impact on the landscape character.

NATURE:	**Potential visual impact on the landscape character and sense of place.**			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Regional	**3**	Regional	**3**
DURATION	Permanent	**5**	Long term	**4**
MAGNITUDE	Minor	**4**	Minor	**4**
PROBABILITY	Low	**2**	Improbable	**1**
SIGNIFICANCE	Low	**24**	Low	**11**

STATUS	Negative		Negative	
IRREPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Partially			
CUMULATIVE IMPACTS:	It is expected that the cumulative effect of the proposed activity would be indirect/secondary as the impact would be experienced over time. The cumulative effect would also be synergistic (e.g. incremental development resulting in a loss of character of the area).			
RESIDUAL IMPACTS:	It is argued that the status quo could be regained if the activity would be removed altogether.			

9.4.2 Assessment of Impact on Tourist Value of the Area

Specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed activity. The visual receptors are grouped according to their location and significance. Differentiation is made between:

a) Tourist-related and areas of cultural significance.
b) Motorists along roads.
c) Residential Areas and Farmstead.
d) Recreational areas.

Tourists are regarded as visual receptors of exceptional high sensitivity. Their attention is focused towards the landscape which they essentially utilise for enjoyment purposes and appreciation of the quality of the landscape.

Residents of the affected environment are classified as visual receptors of high sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

Motorists are generally classified as visual receptors of low sensitivity due to their momentary view and experience of the proposed development. As a motorist's speed increases, the sharpness of lateral vision declines and the motorist tends to focus on the line of travel (USDOT, 1981). This adds weight to the assumption that under normal conditions, motorists will show low levels of sensitivity as their attention is focused on the road and their exposure to roadside objects is brief.

Motorists on scenic routes will present a higher sensitivity. Their reason for being in the landscape is similar to that of the tourists and they will therefore be categorised as part of the tourist viewer group (Axis Landscape Architects, 2014).

Table 8: Impact table summarising the significance of visual impact on the tourism value of the area.

NATURE:	**Potential visual impact on the tourism value of the area.**			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Regional	**3**	Local	**2**
DURATION	Long term	**4**	Long term	**4**
MAGNITUDE	Medium	**6**	Minor	**4**
PROBABILITY	Medium	**3**	Low	**2**
SIGNIFICANCE	Medium	**39**	Low	**20**
STATUS	Negative		Negative	
IRREPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Partially			
CUMULATIVE IMPACTS:	It is expected that the cumulative effect of the proposed activity would be indirect/secondary as the impact would be experienced over time. The cumulative effect would also be synergistic (e.g. incremental development resulting in a loss of character of the area).			
RESIDUAL IMPACTS:	It is argued that the status quo could be regained if the activity would be removed altogether.			

It is submitted that many other receptors are located in the immediate vicinity of the route of the proposed powerline. In addition to the users of scenic routes, these sensitive receptors represent tourist-related areas along the Namaqualand Coast and well as the conservation areas along the route. As illustrated by the results of the assessment included under Annexure 2, only those receptors in the immediate vicinity of the proposed powerline will be visually impacted upon by the new infrastructure. Receptors situated further away tend not to be impacted by the proposed activity due to the visual absorption capacity of the landscape within which the project site is located.

7.4.3 Assessment of Reflectivity and Glare of Structures

Glare is an adverse consequence of using large smooth and polished surfaces as a building material. Glare is characterised by alight, often reflected, within the field of vision that is brighter than the surroundings resulting in visual discomfort or impairment. Glare also occurs when the light level of a region is brighter than the level to which the eyes are adapted.

The impact of glare source depends on the nature of the receptor, the size of the source relative to the visual field, the position of the source within the visual field and intensity of the source. Glare can pose, at minimum, a nuisance and in other cases can create a safety risk. Areas of particular sensitivity include roads, airports and rail as individuals are guiding vehicles and are required to visually scan their environment without averting their gaze (www.rwdi.com).

It is noted from the information provided that the infrastructure will be fabricated using S355JR steel that might have a reflection value. These should be actively managed to prevent a potential negative visual impact.

Table 9: Impact table summarising the significance of visual impact of reflectivity and glare of structures.

NATURE:	**Potential visual impact of reflectivity and glare of structures.**			
	Without Mitigation	**Score**	**With Mitigation**	**Score**
EXTENT	Regional	**3**	Local	**2**
DURATION	Long term	**4**	Long term	**4**
MAGNITUDE	Medium	**6**	Minor	**4**
PROBABILITY	Probable	**3**	Improbable	**2**
SIGNIFICANCE	Medium	**39**	Low	**20**
STATUS	Negative		Negative	
IRREPLACEABLE LOSS OF RESOURCE?	No		No	
CAN IMPACTS BE MITIGATED?	Yes			
CUMULATIVE IMPACTS:	It is expected that the cumulative effect of the proposed activity would be indirect/secondary as the impact would be experienced over time. The cumulative effect would also be additive (e.g. the sudden introduction of new infrastructure in the landscape).			
RESIDUAL IMPACTS:	It is argued that the status quo could be regained if the activity would be removed altogether.			

10 IMPACT STATEMENT

The on-site verification from the selected Key Observation Points and the viewsheds generated from the latter points indicated that the proposed activity will be clearly visible from observation points in the foreground of the proposed powerline. To this end, the results of the viewshed analysis from defined Key Observation Points, together with photographs indicating the actual view has been included under Annexure 2.

The results of the Visual Impact Assessment for the proposed Juno-Gromis powerline consequently found that the overall visual impact is summarised as being of a **medium to high negative significance**. Should the recommendations and mitigation measures be implemented, as proposed below, the expected impact could be reduced to **medium to low negative significance**. The primary informants of this assessment are as follows:

a) The proposed powerline will add to the existing infrastructure in the area which might have an additive cumulative effect.
b) Although the proposed powerline will be developed primarily in the coastal plain, the height of the structure might result in a potential impact on the skyline.
c) The proposed powerline will travers landscapes of high scenic and conservation value. The powerline will, however, be located relatively far from the scenic routes, as described in forward planning documentation.
d) All forward planning documents reference the importance of services infrastructure to supply in the needs of the greater community. The documents also do not specifically note that such installations could not be considered in the area.

It is therefore concluded that the sense of place, and most other expected impacts of the proposed activity, will not alter to such an extent where users might experience the visual landscape in a less appealing or less positive light.

10.1 RECOMMENDATIONS AND PROPOSED MITIGATION MEASURES

The following mitigation measures should be implemented:

a) Keep disturbed areas to a minimum.
b) No clearing of land to take place outside the demarcated footprints.
c) The contractor should maintain good housekeeping on site to avoid litter and minimise waste.

d) Erosion risks should be assessed and minimised.

e) The steel components should not be painted but be galvanised and allowed to oxidise naturally over time. The grey colour produced in this process will help to reduce the visual impact.

f) New road construction must be kept to a minimum. Utilise existing roads and tracks to the extent possible.

g) Create stormwater channels alongside access roads and divert stormwater in the natural veld at regular intervals along the road.

h) All contractors to adhere to a construction phase Environmental Management Plan.

11 ENVIRONMENTAL MANAGEMENT PROGRAMME

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 10: Environmental Management Programme – Construction Phase

OBJECTIVE:	Mitigate the potential visual impact associated with the construction phase.	
Project component/s	Construction site	
Potential Impact	Visual impact of general construction activities and associated impacts.	
Activity/risk source	Potential impact on sensitive receptors within the foreground.	
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and general acceptance and compliance with Environmental Specifications.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
An Environmental Control Officer (ECO) must be appointed to oversee the construction process and ensure compliance with conditions of approval.	Eskom	Pre-construction
Demarcate sensitive areas and no-go areas with danger tape to prevent disturbance during construction.	Eskom / contractor	Pre-construction
Plan construction times in such a manner to have the least impact on surrounding properties.	Eskom / contractor	Pre-construction
Keep disturbed areas to a minimum.	Eskom / contractor	Throughout construction
Identify suitable areas within the construction camp for fuel storage, temporary workshops, eating areas, ablution facilities and sashing areas.	Eskom / contractor	Throughout construction
Institute a solid waste management programme to	Eskom / contractor	Throughout

minimise waste generation on the construction site and recycle where possible.		construction
Reduce and control dust through the use of approved dust suspension techniques as and when required.	Eskom / contractor	Throughout construction
Construction to occur only during daytime. Should the ECO authorize night work, low flux and frequency lighting shall be used.	Eskom / contractor	Throughout construction
Rehabilitate all disturbed areas in accordance with the development plan.	Eskom / contractor	Throughout construction
Performance Indicator	Construction site is confined to the demarcated areas identified on a Development Plan. No transgression of the Environmental Specifications visible and natural processes occurring freely outside boundaries of the construction site.	
Monitoring	Monitoring to be undertaken by an appointed Site Engineer who will enforce compliance with the Environmental Specifications.	

Table 11: Environmental Management Programme – Operational Phase

OBJECTIVE:	**Mitigate the possible visual impact associated with the operational phase.**	
Project component/s	Overhead powerlines	
Potential Impact	Potential visual intrusion in the area and damage to the natural environment.	
Activity/risk source	Potential impact on sensitive receptors within the *foreground*.	
Mitigation: Target/Objective	An activity that results in the least visual impact on all receptors.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Maintain the general appearance of the facility as a whole.	Eskom / contractor	Throughout operational phase
Monitor land surface in the vicinity of the substation to prevent loss of vegetation and first signs of desertification.	Eskom / contractor	Throughout operational phase
Maintain access roads to prevent scouring and erosion, especially after rains.	Eskom / contractor	Throughout operational phase
Performance Indicator	Well maintained activity that has little or no impact on the environment. All actions to be measured against the Operational Phase Environmental Management Plan.	
Monitoring	ECO to undertake monitoring functions for 1 year after the construction has been completed to ensure compliance and effectiveness of mitigation measures. Management thereafter to be undertaken by the responsible	

	entity.

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