PROJECT:  ESKOM TRANSMISSION IMPROVEMENT PROJECT
COUNTRY:  REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT SUMMARY

Date: February 2017

Appraisal Team

<table>
<thead>
<tr>
<th>Team Leader:</th>
<th>F. Kanonda – Chief Energy Investment Officer, RDGS0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Members:</td>
<td>D. Goyal – Chief Financial Management Coordinator, RDGS0</td>
</tr>
<tr>
<td></td>
<td>F. Oku, Senior Environmental Specialist, SNSC, RDGE</td>
</tr>
<tr>
<td></td>
<td>J M. Kumar – Chief Regional Procurement Coordinator, SARC</td>
</tr>
<tr>
<td></td>
<td>L. Harmse – Senior Power Engineer RDGS0</td>
</tr>
<tr>
<td></td>
<td>S. O’Brien – Consultant Power Engineer</td>
</tr>
<tr>
<td></td>
<td>A. Hamza – Principal Gender Expert RDGS0</td>
</tr>
</tbody>
</table>

Sector Manager: E. Negash / A. Nalikka
Sector Director: A. Rugamba
Regional Director: T. Kandiero
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

SUMMARY

Project Title : Eskom Transmission Improvement Project
Project Number : P-ZA-FA0-002
Country : South Africa
Department : PESD
Division : PESD1
Project Category : Category 1

1. INTRODUCTION

Eskom Holdings State-Owned-Company (SOC) Ltd, is South Africa’s primary electricity supplier which is wholly owned by the South African government through the Department of Public Enterprises. Since 2005, Eskom has undertaken a significant programme to expand and maintain its ageing infrastructure, which has required significant capital investments. The capital expenditure related to the capacity expansion programme, from its inception in 2005 until expected completion in the 2020/21 financial year is estimated to be approximately ZAR348 billion. The Government of South Africa (GoRSA) has been assisting Eskom raise the required debt funding by pledging to guarantee up to ZAR350 billion of financing of which about ZAR160 billion has already been utilised.

The Bank proposes to support Eskom’s Capacity Expansion Programme by providing a loan of ZAR 3.6 billion towards the financing of the construction of four transmission lines namely;

1. Construction of approximately 148km of 2 x 400kV new transmission lines for the integration of the new Kusile Power station and Zeus substation consisting of
   a) A 74km 400kv line from Kusile Power station to Zeus Substation
   b) As well as integration between the existing Kendal Power station and Zeus via a 74km 400kv line from Kendal Power station to Zeus Substation. This component also includes financing Underrated Equipment Replacement in Mpumalanga Region (comprising substations work within Duvha, Kendal Apollo and Minerva substations).

2. Construction of approximately 297km of 2 x 400kv lines namely;
   a) A 123km 400kv line to replace existing 275kv line from Ariadne – Venus and
   b) A 174km 400kv line aligning along the coast from Ariadne – Eros to ensure strengthening of the Eskom East network grid as well as integration of the Pinetown and Empangeni areas.

KUSILE LINES

The Kusile Power Station Transmission lines consist of construction of approximately 148km of 2 x 400kV new transmission lines for the integration of the new Kusile Power station and Zeus substation as well as integration between the existing Kendal Power station and Zeus (74km). See Figure A.1 in the Annex to this Summary for a schematic design layout of the Kusile lines.
The Environmental Impact Assessment (EIA) for the proposed project lines was completed in May 2009 under the Bravo Integration Project – Bravo 4: Construction of two 400 kV Power Lines from Kendal Power Station to Zeus Substation\(^1\). The study was undertaken in accordance with the national Environmental Impact Assessment (EIA) Regulations promulgated in terms of Section 24 (5) and 44 of the National Environmental Management Act (NEMA). A positive record of decision was issued on 8 October 2009 by the Department of Environmental Affairs and validated through the submission of several site specific Construction Specific Environmental Management Plan (EMPs) since April 2013. The Environmental Authorization was renewed on August 2016 due to administrative error in the omission of a listed activity during the earlier submission. A Basic Assessment Report (BAR) was prepared by Eskom as part of the submission to address the earlier omission. A water use license was issued on November 2015.

The Underrated Equipment Replacement in Mpumalanga Region sub-component consists of Upgrade of terminal equipment (+50 bays) limiting the capacity of lines associated with Kusile Power Station integration at Duvha, Kendal, Minerva and Apollo substations as well as the upgrade of underrated switchgear and earth mats at Kendal and Duvha power stations. Environmental Impact Assessments were not required for such activities.

**ARIADNE LINES**

The proposed Ariadne-Eros 400/132 kV (approximately 174km) multi-circuit transmission power line from Ariadne Sub-station to Eros Sub-station and the expansion and upgrade of the Ariadne Sub-station and the Eros Sub-station, in KwaZulu-Natal had the Final Environmental Impact Report\(^2\) completed in January 2011. A positive record of decision or environmental authorization was granted to Eskom on 12 August 2011 for a validity period of 5 years to commence construction.

The Final Environmental Impact Report for the proposed second transmission line from Ariadne to Venus sub-station and the upgrade of both substations in KwaZulu-Natal Province was completed on 13 February 2012 and submitted to the Department of Environmental Affairs\(^3\). A positive record of decision and environmental authorization was issued to Eskom on 29 March 2012 for a validity period of 2 years. On 11 March 2013, the validity of the environmental authorization was extended to 29 March 2017.

According to AfDB’s Environmental and Social Assessment Procedures, power transmission lines of more than 110kv capacity traversing densely populated areas, forests or cultivated land are classified as Category 1, and these require detailed environmental and social impact assessments. Similarly, according to South Africa’s National Environmental Management Act (Act 107 of 1998, NEMA) as amended and its EIA Regulation published in July 2006 (repealed in 2010 and 2014), an environmental impact assessment is required as an integral part of project planning in order to obtain environmental authorization for a proposed activity such as this project that may have a potentially negative effect on the environment. The focus of this ESIA Summary is on financing of the four transmission lines. The replacement of underrated equipment do not require environmental impact assessment as the proposed works will result in minimal or no potential environmental and/or social impacts.

\(^{1}\) DEAT Ref No: 12/12/20/1095.
\(^{2}\) DEA EIA: 12/12/20/1272 and DEA EIA: 12/12/20/1277 respectively
\(^{3}\) DEA Ref No: 12/12/20/1755
Furthermore, where there are social and resettlement impacts affecting over 200 persons a full Resettlement Action Plan (RAP) has been prepared in accordance with the Bank’s Operational Safeguards 2 on Involuntary Resettlement as well as Eskom’s Procedures for the Management of Involuntary Resettlement and Relocation of legal occupiers on affected Eskom land and associated national legislation. The Summary of the RAPs have been prepared and posted on the Bank’s website.

2. POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK

The Constitution of South Africa states that everyone has the right to an environment that is not harmful to his or her health or well-being and to an environment protected for the benefit of present and future generations. The Constitution of South Africa implies that measures must be implemented to: (1) Prevent pollution and ecological degradation; (2) Promote conservation; and (3) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

According to the National Environmental Management Act 107 of 1998 and the EIA Regulations 2006 (repealed in 2010 and 2014), a full EIA is required for all projects likely to have significant impacts on the environment because of the nature or extent of the activity. In terms of the 2014 Government Notice Regulation R984 No. 9: the development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275kV or more, outside an urban area or industrial complex require a full EIA. Similarly, Regulation 983 No. 47: The expansion of facilities or infrastructure for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase, require a full EIA. The South African Constitution, the NEMA Act, EIA Regulations and various sectoral legislation and regulations are consistent with the Bank’s Integrated Safeguards System Policy (ISS).

Some of the key national legislation reviewed and considered in the EIA studies and found to be consistent with the Bank’s ISS Policy include; (i) The National Environmental Management Act, 1998 (Act No. 107 of 1998); (ii) National Water Act, 1998 (Act No. 36 of 1998); (iii) the National Heritage Resource Act, 1999 (Act No. 25 of 1999); (iv) the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004); (v) the National Environmental Management: Air Quality Act, 2005 (Act No. 39 of 2004); (vi) the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008); (vii) the National Environmental Management: Protected Areas Act, 2003 (Act No. 59 of 2003); (viii) the National Forests Act, 1998 (Act No. 84 of 1998); (ix) the Conservation of Agricultural Resources Act, 1983 (Act No. 84 of 1983); (x) the National Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002); (xi) the Occupational Health and Safety Act (Act No 85 of 1993); (xii) the Expropriation Act (No. 63 of 1975) among others.

The transmission lines exceed the Bank threshold of 110kV capacity and traverse various landscapes with a likelihood to cause significant impacts on the biophysical and social environment within the line corridors hence Operational Safeguards (OS)1 on Environmental Assessment and OS2 on Involuntary Resettlement have been triggered. The transmission lines in some cases are traversing new corridors hence OS 3 on Biodiversity is triggered as well. Eskom has prepared Biodiversity studies on Avi-fauna impacts, Botanical Impacts and Heritage Impact for the project lines. OS 4 on Pollution Prevention and Hazardous Substances
is triggered since construction will involve use of fuels and possibly some hazardous materials. OS 5 on Labour, Working Conditions, Occupational Health and Safety is applicable since the construction will involve a significant number of construction workers.

3. PROJECT DESCRIPTION AND JUSTIFICATION

The Project: Eskom Grid Planning requested Transmission Land and Rights to conduct environmental assessments and acquire servitudes for the construction of; two new 400 kV Transmission Lines from Kendal Power Station to Zeus Substation; Zeus to Kusile Power Station; a multi-circuit transmission power line from Ariadne Sub-station to Eros Sub-station and the expansion and upgrade of the Ariadne Sub-station and the Eros Sub-station; and a second 400kV line from Ariadne Substation to Venus Substation and the associated expansion and upgrade requirements of Ariadne Substation as well as Venus substation. The project forms part of the strengthening plans proposed in the Strategic Grid Planning against the revised load forecast and site locations. According to the Transmission Development Plan, the projects are critical to avoid load shedding as a result of limited transmission capacity and to comply with Grid code requirements.

Servitude: The proposed 400kV transmission power lines will require a servitude of 55m in width, i.e. 27.5 m both sides of the centre line. No structures are allowed within the servitude. For forestry, the required servitude is 76 m wide, i.e. 38 m each side of the centre line, due to fire risk and tree-felling. The servitude is required for the safe operation (as required in terms of the Occupational Health and Safety Act regulations) of the power line and reliability (quality of supply) of electricity supply to consumers.

A servitude does not mean that the holder of the servitude, i.e. Eskom, is the owner of the land, but merely that Eskom has the right of way to convey electricity across the land, subject to conditions agreed between Eskom and affected landowners. A servitude provides Eskom certain defined rights for the use of the specific area of land: (i) Access to erect a transmission line along a specific agreed route; (ii) Reasonable access to operate and maintain the line inside the servitude area; and (iii) The removal of trees and vegetation that will interfere with the operation of the power line.

The registration of servitudes can be a lengthy process, as it requires contractual negotiations with each affected landowner. Once this is completed, an application for registration of the servitude is lodged with the Provincial Deeds Office against the property deed. The actual location of the towers on which the conductors will be strung is determined by a number of different factors such as: (a) The outcome of Eskom negotiations with landowners, including landowner preferences; and (b) Environmental features and technical requirements. As a result of these factors, it is challenging to predict the exact position of the towers within the EIA process, and final positions are identified at the stage when the Final Environmental Management Plan is compiled, with site-specific input from specialists.

Towers: Steel towers will be constructed at intervals along the route of the transmission line, at a spacing of approximately 300 - 400 m. Each tower is approximately 30 - 35 m high and it is anticipated that the majority of these will be Guyed V towers, Strain towers will be used for bends greater than 3° and/or in difficult terrain. Cross-roped suspension towers could also be used for this transmission line. Final towers to be used will be determined after surveying and profiling of the line.
**Access Roads:** The project will also entail the construction of associated infrastructure such as access roads and a centre line track within the servitude. Access roads will be established in areas where access is presently unavailable and are required to move construction equipment and personnel to and from the construction sites (tower positions). The centre line track is required for conductor stringing and on-going line inspections and maintenance activities.

Furthermore, access roads will be aligned and constructed within the provisions and to the specifications of private landowners. This is considered important for two primary reasons: (i) Access roads should fulfil multi-purpose functions serving the needs of Eskom and the landowners; and (ii) Landowners are acutely aware of sensitivities on their land and will be in an excellent position to inform Eskom of optimum alignments. The specifications for the access road will be contained within the Environmental Management Plan (EMP) that will be prepared for construction and which will become legally binding on Eskom and contractually binding on the Eskom-appointed contractors (with special care being taken with river/stream crossings, where potential environmental impacts are greatest, with due consideration for water use licences that must be obtained from the Department of Water and Sanitation - DWS).

**Minimum Clearance Distances:** For safety reasons (as set out in regulations of the Occupational Health and Safety Act), the transmission line requires minimum clearance distances. These are summarized as follows: (i) The minimum vertical clearance distance between the ground and power line conductors is 8.1 m; (ii) The maximum crop height permitted within the servitude is 4.3 m; (iii) The minimum vertical clearance to any fixed structure that does not form part of the power line is 5.6 m; (iv) The minimum distance of a 400 kV power line from a proclaimed public road is 95 m from the centre line of the road. (v) The minimum safe distance required from the centre of the power line to the edge of a domestic house is 40 – 50 m. (vi) Farming activity, except for sugarcane and commercial forestry, can be practiced under the conductors, provided that there is adherence to safe working clearances, crop height restrictions and building restrictions.

**Sub-station Upgrades:** A substation is an important element of electricity generation, transmission and distribution system. Its function is to transform voltages from high to low or vice versa, using transformers and other heavy-duty electric switchgear. The proposed 400kV lines will require 400kV feeder bay on each substation for connection purposes. The extension of the substation will entail the expansion of the substation terraces within the substations HV yards. It must also be indicated that the extension of the substations terraces will occur within Eskom property.

**Contractors:** Most contractors have teams of between 40 and 50 people. The construction of transmission lines is a fairly technical activity and therefore the majority of contractors use their own teams of skilled and trained personnel for construction purposes. The opportunities for new/additional people are, therefore, fairly limited although there will be a number of activities such as bush clearing and fencing with which local contractors can be involved.

**Construction Activities:** The construction of the transmission line is expected to require 14 months to complete. During construction, five teams are responsible for the excavation of foundations, concrete works, erection of steel structures, stringing of conductor cables, and site rehabilitation. All these activities, including vehicular access and the pylon anchors, are required to take place within the negotiated servitude.
Construction activities will not be continuous for long but intermittent over periods of time. It is anticipated that any impacts associated with construction workers are likely to be of medium intensity as a result of the low numbers of people employed intermittently over a large area.

**Justification of the Project:**

The final integration of Kusile into the Eskom network involves the construction of three new lines as well as the reconfiguration of six existing lines. Additionally, the transmission lines are required for the strengthening of the transmission system, which is ahead of the Kusile plant transmission integration dates. The two lines form part of a wider network integration programme aimed at effectively evacuating power generated at Kusile. The two line projects will ensure compliance to the Grid Code requirement for integration of power stations producing more than 1,000MW. The 400kV Kendal-Zeus line is required in order to restore the fifth evacuation path out of Kendal. This power supply into Zeus will result in increased power flow to the Cape region. The proposed integration approach was selected based on the review criteria and also because it had the lowest cost impact in terms of the replacement of under-rated equipment at various substations. As a result of the integration projects for Kusile, a number of substations in the network will be exposed to elevated fault levels during fault conditions. Based on the detailed network analyses and the simulation of the impact of network faults at various points, equipment upgrades were recommended for a number of substations. Under the proposed project only the following substations will be refurbished: Duvha, Kendal, Minerva and Apollo. Earth mats will be upgraded at Kendal and Duvha.

At present, there is only one 400 kV transmission line between the Ariadne and Eros substation feeding the area south of Pietermaritzburg to Harding. It is Eskom’s Transmission Licence requirement that the transmission network must be able to withstand a loss of a power line without affecting customers. The current situation is that unplanned loss of the existing Ariadne – Eros 400 kV line during peak demand will result in low voltages in the networks being supplied from Eros Sub-station to surrounding users in the Kokstad-Harding-Port Shepstone-Margate complex. To improve reliability and avoid shedding of load, Eskom proposes to construct a second 400 kV transmission line running from south of Pietermaritzburg (Ariadne Sub-station) to the vicinity of Port Shepstone (Oribi Sub-station) and on to Harding (Eros Sub-station). This will create a much-needed second 400kV circuit linking the Ariadne and Eros sub-stations.

In order to alleviate current and future network constraints under N-1 contingency (loss of one of the Transmission power lines) in KwaZulu-Natal, it was proposed that a 765kV ring must be built. The proposed plan consists of 765kV lines from the generation pool in Mpumalanga, one line to the Empangeni area and the other line to Pinetown area. It is also proposed to construct 400kV link between Empangeni and Pinetown 765kV networks. With the 765kV ring in place, the critical contingency (critical loss of a power line) for the Pinetown network is the loss of the Venus – Ariadne 400kV line. The reason for this is because Venus is a strong 400kV source since the Majuba and Drakensberg power stations feed into this substation. During the loss of Ariadne – Venus 400kV line, the power evacuation from Venus is mostly through the single Mersey – Venus 400kV line which ends up overloading. To address this problem it is proposed that the existing Georgedale – Venus 275kV lines be recycled or upgraded to 400kV or a new 400kV line be built as part of the Pinetown Strengthening Phase 1.

In order to accommodate the new multi-circuit transmission line, Ariadne, Venus and Eros Substations will need to be expanded and upgraded. This will entail the establishment of a 400
kV feeder bay and 132 kV feeder bay at Ariadne Sub-station and a 400 kV feeder bay at Eros Sub-station and Venus Sub-station. This will take place within the existing Sub-station terrace, and thus, no extension of Sub-station terrace is required. The existing telecommunication infrastructure within the sub-stations will be used.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

Location of the Study Areas: Towns closest to the Kusile and Kendal – Zeus Substation transmission lines project area include Ogies and Delmas in the north, Leandra in the central part and Evander and Secunda in the south. It falls within Emalahleni local municipality and Govan Mbeki local municipality.

The study area for the Ariadne-Eros transmission line is located in the southern part of KwaZulu-Natal (KZN) and extends from near Pietermaritzburg (Ariadne Sub-station) in a south-easterly direction to Port Shepstone (Oribi Sub-station) and then westerly to Harding (Eros Sub-station). It falls within three district municipalities: uMgungundlovu District Municipality (DC22), Ugu District Municipality (DC21) and Sisonke District Municipality. Within these district municipalities, there are 10 local municipalities affected by the proposed development.

The study area for Ariadne-Venus transmission line is located within the KZN Province. The area stretches from north of the town of Estcourt to the south of the city of Pietermaritzburg in the form of a bean or boomerang. The proposed powerline will run between Ariadne substation situated south of Pietermaritzburg and Venus substation north of Estcourt – a length of approximately 103 km. There are existing transmission power lines between these two substations (i.e. two 275kV lines and one 400kV line). In terms of hectares, the study area covers approximately 322,543.01 ha. The study area affects two district municipalities: uMgungundlovu District Municipality (DC22) and uThukela District Municipality. Within these district municipalities there are 6 local municipalities affected by the proposed line.

Climate: The Kusile (Kendal) – Zeus Substation study area displays warm summers and cold winters typical of the Highveld climate. The region falls within the summer rainfall region of South Africa, rainfall occurs mainly as thunderstorms (Mean Annual Precipitation 662 mm) and drought conditions occur in approximately 12% of all years. Mean annual potential evaporation of 2 060 mm indicates a loss of water out of the system. The region experiences frequent frosts, with mean frost days of 41 days, winds are usually light to moderate, with the prevailing wind direction north-westerly during the summer and easterly during winter. In addition to frost the area is prone to hail storms during the summer time.

A temperate, sub-tropical climate with warm temperatures and summer rainfall is typical of the climate of the Ariadne – Eros study area. Summers are hot and humid with an average temperature of 20 - 30o C and regular showers, with a mean annual precipitation of 500 – 1,000 mm. Winters are milder and drier with an average temperature of 12 - 24o C. The more inland sections of the study area such as Pietermaritzburg and Harding experience lower winter temperatures due to increased altitude and greater distance from the coast. Frost and occasional light snowfalls are regular in the winter months. Snowfalls in the Harding area have on occasion been severe and could affect the transmission lines and supportive infrastructure. Lightning storms are frequent in the summer months, particularly in the Pietermaritzburg area, but generally occur throughout the study area.
The Ariadne-Venus study area experiences summer rainfall and winter frost. Morning fog and mist and even snow are common. Two climatic zones occur within the study area, namely Drakensberg escarpment and Eastern Coastal Belt and Zululand. The Drakensberg escarpment is the most prominent. The Drakensberg escarpment is associated with the interior of KwaZulu-Natal and Eastern Cape. It has a warm temperature with summer rainfall and the dry season in the winter and the warmest month mean temperature average at 22°C. The overall rainfall ranges between 500 mm and 1,000 mm; which implies that it belongs to the sub-humid level of the five annual precipitation levels.

**Topography:** The topography of the Kusile Kendal-Zeus line study area is gently undulating to moderately undulating landscape of the Highveld plateau. Some small scattered wetlands and pans occur in the area, rocky outcrops and ridges also form part of significant landscape features in the area. Altitude ranges between 1420-1800 metres above mean sea level (m amsl).

The terrain morphology within the Ariadne-Eros line study area is typical for KwaZulu-Natal, in that it is diverse and varied. The Drakensberg mountain range inland and to the west has a multitude of rivers that drain from its watershed into river catchments that follow an easterly course dissecting the corridor and emptying into the Indian Ocean on the KZN South Coast. The river catchments dominate the landscape creating a terrain of closed hills and mountains, with a moderate to high relief, deep valleys and hilltop plains with a moderate relief. It is further characterised by extensive river gorges and hilly areas, for example, the Oribi Gorge found in the south of the study area.

The altitudinal range within the Ariadne-Venus study area is between 1,000 and 1,500 m above sea level. Three major landforms occur within the study area, namely plains, hills/ridges and mountains. Of these three major landforms, the most dominant are those associated with plains and ridges, namely tablelands, hills and plains.

**Geology:** The Kusile Kendal – Zeus Substation area is dominated by Dolerite flows along with Arenite. These main two geologies are prevalent for more than 80% of the study area. Several small sections of Granite, Shale and Tillite also occur within the study area. The Arenite (sandstone) overlies the majority of the Mpumalanga coal fields and has been extensively disturbed by opencast mining operations all over the study area. This geology weathers to form the main agricultural red and brown soils of the province. The Dolerite originates from lava intrusions throughout the area and can be distinguished by the “dinosaur egg” weathering of the rock. The Dolerite in the region weathers to a dark clayey soil that is not ideal for cultivation and is mostly used for grazing.

The Ariadne-Eros line study area geological foundation comprises two distinct geological units, i.e, (i) the Kaapvaal Craton (a composition of early granite greenstone terrains, older gneisses and granitic plutons). (ii) the Natal Metamorphic Group (deep mountain roots of granite and gneiss). This geological unit gives rise to the impressive folded rock forms such as those found in the Oribi Gorge region. The following groups overlay the aforementioned geological foundations: the Natal Group (sandstone); the Dywka Group (tillite rocks) and the Ecca Group (shale and sandstones).

The northern and central parts of the Ariadne-Venus line study area are covered mostly by sedimentary and igneous rocks of the Karoo Supergroup. The sedimentary rocks started to form in a depositional basin around 270 Ma (Ma - million years) ago. The main stratigraphic unit,
ESIA Summary  Page 9 of 31  Eskom Transmission Improvement Projects, South Africa

according to surface area, is the Normandien Formation (± 36%) consisting of sedimentary rocks (mudstone, siltstone, shale and sandstone). There are some other stratigraphic units consisting also of sedimentary rocks that cover minor portions of the study area (Tarkastad Subgroup, Vryheid and Volksrust Formations). The second most widespread is the dolerite (igneous rock) of the Karoo Supergroup, which covers approximately 27% of the study area. Towards the southern part of the study area the most prevalent stratigraphic units are (in order of decreasing coverage) the Pietermaritzburg Formation (shale with siltstone and sandstone), Dwyka Group (diamictite) and Natal Group (sandstone with some sandstone, granulestone and conglomerate).

Avi-fauna: An assessment was done on avi-fauna in the Kendal-Zeus Substation study area. In total 32 bird species were identified during the site investigations. The species on site include waterfowl, grassland specialists and common generalists. This is attributed to the variety of habitats that occur on site, as well as the adequate supply of fresh water.

There are two protected nature reserves within the Ariadne-Eros study area, which are administered by Ezemvelo KZN Wildlife. The largest and most prominent is the Oribi Gorge Nature Reserve, which is located near Port Shepstone within the Hibiscus Coast Municipality. The Oribi Gorge and its surrounding areas have been flagged as having high sensitivity regarding avi-faunal activity. Vernon Crookes Nature Reserve, a smaller reserve, is located near uMzinto within the Vulamehlo Municipality. The reserve encompasses open grassland (Ngongoni Veld and KZN Coastal Belt), rolling hills, small pockets of scarp forest and ocean views. There is an abundance of bird life which includes raptors such as the Crowned and Martial Eagle. This area is a high sensitivity zone regarding avi-faunal activity. See Figure A.3 in the Annexure showing extent and linkage of these areas with the proposed Ariadne-Eros Line.

The Eros Sub-station site (Harding) falls within an area where the rare Blue Swallow has its habitat and, thus, this area is classed as having medium to high sensitivity. The turn-in from the transmission line has to feed into this sub-station and it is inevitable that this habitat will be disturbed. According to the avi-faunal specialist, Endangered Wildlife Trust (EWT), there are fifty-two red data species within the study area, including bird species classified as critically endangered (1), endangered (3), near-threatened (31) and vulnerable (17).

From an avi-faunal perspective, the KZN Province boasts an impressive list of approximately 690 species. The study area is rich in bird species, which is easily explained by the high spatial heterogeneity in habitat and vegetation types. The number of bird species recorded for each quarter degree square ranges from 249 species at New Hanover to as many as 349 species at Pietermaritzburg. The study area is part of BirdLife’s Midlands Birding Route (part of the southern KZN birding route) with a number of ‘birder-friendly’ establishments (as part of the Midlands Meander) located near Curry’s Post, Howick and Nottingham Road. Many of these farms provide a secure breeding habitat for a variety of Red Listed and range-restricted bird species.

5. PROJECT ALTERNATIVES

No development Alternative: This alternative simply means that of not implementing the projects - Eskom does nothing to address the purpose and need for the transmission lines. The most significant outcome of this approach would be a negative impact on current and future
KZN Eskom supply networks, and the possibility of complete blackouts at times of high and peak demand. Eskom Transmission would not be able to ensure consistent supply into KZN and therefore would be in contravention of the Grid Code (Transmission Licence). This would result in load shedding to protect the network from collapsing completely when any of the 400kV lines into KZN is out of service. Doing nothing would have a major impact on the economics of the region, as no new customers or load increase would be able to be accommodated by the network. This approach will also severely limit the evacuation capacity of energy from any planned new power station.

On a positive note this would reduce the impact on the aesthetic value of the natural environment, because the introduction of power lines into the landscape changes the sense of place (tourism impacts). It would also benefit the current status quo of the biophysical environment. However, the need for electricity is a national concern and not increasing the capacity to generate electricity within KZN could potentially stunt economic growth both in KZN and in South Africa in general. Considering the need for a steady supply of electricity in the province and country in general, this option was considered unrealistic.

**Alternatives considered on the Kendal – Zeus Substation line**

**Alternative Route 1:** Alternative 1 is to construct the two proposed 400 kV power lines, running parallel, approximately 76 km from Zeus Substation to Kendal Power Station. This proposed line will run furthest to the west. This alternative is the longest alternative, and will be along an existing power line servitude.

**Alternative Route 2:** Alternative 2 is to construct the two proposed 400 kV power lines, running parallel, approximately 70 km from Zeus Substation to Kendal Power Station. The line will follow the same corridor as alternative 1 for the first 60 km’s and later divert south before heading east towards the Zeus Substation for 30 kms.

**Alternative Route 3 (The Preferred Route):** Alternative 3 is to construct the two proposed 400 kV power lines, running parallel, approximately 63 km from Zeus Substation to Kendal Power Station. This alternative will lead to a shorter power line length and is the alternative furthest to the east of the area. This alternative is the preferred alternative.

**Alternatives considered on the Ariadne-Eros line:**

Three (3) major corridor alternatives (Western, Central and Eastern Alternatives) including eight (8) linking corridors were investigated in the EIA. These were identified by Eskom Transmission, the Consultants and the public based on a set of the technical and environmental criteria.

**Central Alternative:** From the Ariadne Sub-station en route to Eston, the Central Alternative route passes through an area of Ngongoni veld of which a large portion of the area has been converted to commercial agriculture, such as sugarcane, timber plantations and vegetables. South of Eston the route follows a southerly direction to the town of Dududu. From Dududu to Port Shepstone (Oribi Sub-station), the route passes through Ngongoni Veld in the Breamar area, it then heads southwards into the dominant vegetation type in this region - KZN Coastal Belt, an endangered veld type. From the Oribi Sub-station the route heads westward leaving the KZN Coastal Belt, and crossing through Pondoland-Ugu Sandstone Coastal Sourveld (a...
very vulnerable veld type), into Eastern Valley Bushveld, which dominates the Oribi Gorge, and finally into Ngongoni veld leading up to the Eros Sub-station (Harding).

**Eastern Alternative:** The Eastern Alternative follows a similar route as that of the Central Alternative, passing through predominantly Ngongoni veld and similar land use. East of Umbumbulu the route passes through KZN Hinterland Thornveld, a vulnerable veld type. As the route enters the Umkomaas River Valley it follows the river course for a section before redirecting out of the valley towards the town of Dududu. The proximity and parallel route of the transmission line to the river would affect the riverine vegetation and associated fauna and avifauna. From Dududu the route enters the KZN Coastal Belt, mostly under agriculture or utilised as communal land. Towards uMzinto an area of rugged undeveloped terrain exists and patches of Scarp Forest are found. This route runs parallel (sometimes within 4 km of the seashore) to the coast and traverses areas of mixed land use including mostly communal land, sugarcane, forestry and banana farming. From Oribi Sub-station the route turns westward, crossing through Pondoland-Ugu Sandstone Coastal Sourveld, it crosses the expansive Oribi Gorge where Scarp Forest dominates the valley floor and sides, heading through Eastern Valley Bushveld, Ngongoni Veld and small pockets of Southern Mistbelt Forest (Least Threatened) towards the Eros Sub-station. Most of this area is under intensive commercial agriculture.

**Western Alternative (Preferred Alternative):** The Western Alternative passes through Ngongoni Veld and then dissects pockets of Midlands Mistbelt Grassland (one of the most threatened vegetation types in KZN), heading towards the rugged terrain of the Mid-Illovo area where KZN Sandstone Sourveld and Eastern Valley Bushveld dominate, into the Umkomaas River Valley. Where the route crosses the Umkomaas River it follows the river course for a section before redirecting out of the valley. The proximity and parallel route of the transmission line to the river would affect the riverine vegetation and associated fauna and avifauna. From here the Western Alternative takes an inland course through terrain that is undulating, the valleys are moderately deeper and more incised, with the land use being predominantly communal subsistence farming and small-scale agriculture. The route passes through areas dominated by Ngongoni Veld, Eastern Valley Bushveld, small pockets of KZN Hinterland Thornveld and pockets of KZN Coastal Belt. Where the route takes a westward course to link with the Eros Sub-station it passes through areas of commercial agriculture including sugarcane and forestry.

**Alternatives considered on the Ariadne – Venus line:**

For the Ariadne-Venus line, three alternatives were considered during the ESIA study: **Alternative 1a:** This alternative was derived during the period of consultation with the public and stakeholders on Draft Scoping Report. Alternative 1a. The Purple Corridor cut across green-field areas (i.e. areas where there are no existing power lines). On this corridor an entire new 55m servitude will be required as part of the requirements of the proposed 400kV power line.

**Alternative 1b:** This alternative came to the fore during the period of consultation with the public and stakeholders. Alternative 1b was part of the Alternative 3 that was considered to have significant issues on Social, Economic and Environmental level that led for Alternative 3 to be recommended to be discarded from the EIA investigation process. In this instance, though, part of Alternative 3 at the southern section of the study area, it merges with Alternative 1 and from there it runs on the existing two 275kV lines of which one (of these two 275kV lines) is proposed to be rebuilt to accommodate the 400kV line. Most of Alternative 1b is on
the existing servitude of 275kV line that goes to Georgedale Substation however new servitude will required where it turns to Ariadne Substation since both the 275kV do not connect to Ariadne Substation.

Alternative 2 runs almost parallel to Alternative 1 from the Venus Substation on the eastern side of the N3 highway. Between Estcourt and Mooi Rivier this alternative crosses the N3 highway and runs parallel to the highway (on its western side) until it reaches the town of Mooi River. There it again crosses the N3 highway to run parallel to Alternative 1 to the east of the N3. It passes the Midmar Dam on the eastern side, traverses some areas of Howick or in close proximity thereto (e.g. Howick West, Tweedie and Merrivale) until it reaches the Ariadne Substation. The length of Alternative 2 is approximately 108.27km. This alternative crosses over less biologically sensitive areas than those affected by Alternatives 1 and 3. This is because the alignment is located alongside or running mostly parallel to the N3.

The Alternative selected was Alternative 1b. The 400 kV Power line will be located in section of the area(s) of Escourt, Mooi River, Nottingham Road, Howick and Pietermaritzburg in the KwaZulu-Natali Province, and extends for approximately 130 kilometres. It is important to note that it will mostly transverse parallel other major existing power lines. (i.e. two 275kV lines and one 400kV line). In terms of hectares, the study area covers approximately 322,543.01 ha. The proposed power line will traverses over a variety of landscapes, including mountainous, flat and open plains, old and new agricultural fields, mixed bushveld, dense forest, built-up area and mining activities. It also transverses over several rivers, Transnet railway line, roads and the N3 Highway.

Technical Alternatives:

Underground transmission lines: It is not economically viable to place a high voltage (400 kV) transmission line underground as the cost is estimated at 10 times more than for conventional overhead transmission lines. In addition to the financial factor, it must be noted that transmission lines produce heat and require cooling. Overhead transmission lines are air cooled while for underground transmission lines, the conductors are oil-cooled. However, these conductors are significantly larger in diameter than overhead conductors. The larger conductors require a larger servitude to keep the conductors apart. Ultimately, a servitude approximating the width of a 10-lane highway may be required for one underground transmission line. Of significance with this servitude is that the line would need to be buried to a depth of between 1.5 m and 2 m, generating significant spoil that will need to be disposed. Also, once completed, the servitudes would need to be maintained as open grassland. Not only is this inappropriate for some parts of the study area, but, importantly for landowners, the servitude area becomes sterile for the purposes of continued agricultural activities.

Upgrading Existing Transmission lines: The option to upgrade the existing, inland Ariadne-Eros 400 kV transmission power line has been considered by Eskom Transmission. However, this option would not address the need and purpose of the project. The added benefit of building a second transmission power line is the establishment of a closed circuit, therefore improving the reliability of electricity supply. In addition, by designing the proposed transmission line as a multi-circuit line, Eskom is able to better serve its distribution needs. With respect to upgrading other existing, large distribution power lines (mainly 88 kV and 132 kV lines), larger steel towers would be required, as existing towers would not be strong enough to carry larger conductors carrying a higher voltage (400 kV). Secondly, the temporary decommissioning of an existing power line, therefore de-enegises the line, for a significant period of time to carry
out the necessary upgrade will negatively affect consumers who would not have a supply for the period of construction (greater than 12 months). The supply-demand scenario for the KZN region is such that all existing lines are needed at any one time to meet the current power needs. The upgrade of existing lines is not seen as optimising the existing infrastructure.

In time, when the KZN Strengthening Project has been completed and there is sufficient capacity in the system, it may be possible to decommission some older and smaller lines with a view to using these now vacant servitudes for new and larger lines into the future.

6. POTENTIAL IMPACTS

Positive Impacts

It is anticipated that there will be nationwide positive economic impacts as the increase in new business sales, generation of additional Gross Value Adding (GVA), creation of new employment opportunities, and an increase in local government earnings as a result of the construction phase of the project.

The operational phase is expected to provide positive impacts such as improved supply of electricity to the project regions, electrification of households in the rural areas and creation of additional employment for maintenance of the servitude. The improvement of the supply of electricity to the region would enable it to continue growing. Employment creation during the operational phase (such as for the maintenance of the servitude) will have a relatively low impact on the regional economy, however this will still provide much needed income for poor households. In cumulative terms, the significance of the positive economic impacts during operation is high.

Negative Impacts

Impacts on Avifauna: The potential impacts regarding transmission lines on birds are follows: Electrocuti

Electrocuti

Electrocution; Collision; Loss and disturbance of habitat during construction and operation; Nesting on towers; Impact on quality and reliability of supply (as a result of bird streamers and bird excreta).

Electrocution occurs when a bird attempts to perch on an electrical structure and causes an electrical short circuit by bridging the gap between live components (called phases). Birds commonly use transmission towers and sub-stations for perching, roosting and hunting. Collisions are the biggest single threat posed by electrical infrastructure to birds in Southern Africa. Most heavily impacted upon are cranes and various species of water birds. These species are mostly heavy-bodied birds with limited maneuverability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines.

Impacts on Fauna: The following potential impacts were identified as potentially influencing ecological processes and functioning of the various study sites as well as on regional and provincial scale: (i) The loss and/or degradation of sensitive faunal habitat within the study area as a result of the construction of access roads, construction camps and other infrastructure/activities associated with the construction phase; (ii) The loss and/or degradation of sensitive faunal habitat as a result of tower placements; (iii) The loss and/or degradation of sensitive faunal habitat as a result of the operation of the new transmission power – specifically
with regards to maintenance; (iv) The loss and/or disruption of mammal migration routes; (v) The loss of regional ecosystem processes, functions and services; and (vi) The pollution of air, soils and surface water during the construction phase.

**Impacts on Social Environment:** The potential impacts on the social environment include: (i) Impacts on Existing Residential area and Estates; (ii) Impacts on Towns and Dense settlement; (iii) Impacts on Schools and Colleges; (iv) Impacts on Tourism; (v) Impact on Land Value; (vi) Inflow of workers; (vii) Impacts on health and social well-being; (viii) Impacts on the economy and material well-being; (ix) Impacts on cultural aspects; and (x) Impacts on family and community aspects.

**Involuntary Displacement:** The Kusile – Zeus line and the Zeus – Kendal lines traverse mainly farmlands resulting in only economic displacement but no physical displacement requiring resettlement. Eskom has reached agreements and acquired the servitude from the affected farmers for the works and as such no RAPs have been developed for this works in line with South African and International lender’s (AfDB’s ISS) requirements. All the affected farm owners (reported number of 58) have granted right of way to Eskom for the works following payment of compensation for the servitude. The associated works within the Sub-Stations (Duvha substations) do not result in any displacement as all the works are within an already acquired Eskom premises.

However, the implementation of the Ariadne (the Ariadne-Venus and Ariadne-Eros) power transmission lines, will set into motion social and economic change processes within the communities affected by the project. Resettlement of homesteads will be a key impact that will arise from project implementation. The preferred transmission line routes for each of the lines (following a robust project alternative analysis for location and technical design) run through settlements of varying degrees of intensity, and the resettlement of homes in certain areas will be unavoidable. Many of these homesteads support medium sized family units (an average of 4-6 individuals), of mixed ages and some of which include vulnerable groups (e.g. orphaned children, women, the sick or elderly). Resettlement Action Plans have been developed by Eskom to manage the social impacts from these lines in compliance with South African legislative requirements and AfDB’s ISS requirements.

**Impacts on Agriculture:** The potential impacts on agricultural activities include: (i) Impact on stock farming activities; (ii) Impact on timber farms and plantations; (iii) Impact on agricultural and irrigation activities; (iv) Impact on agricultural land use (loss of productive agricultural land); (v) Interference with the financial sustainability [economic viability] of farms; (vi) Impact on areas of formal conservation and areas of conservation significance; (vii) Impact on land reform programmes; and (viii) Impact on the visual character of the environment.

**Impacts on Flora:** The potential impacts on Flora include: (i) Habitat degradation; (ii) Loss of sensitive plant species; (iii) Loss of sensitive plant communities; (iv) Pollution of surface water bodies (wetland, rivers and others); (v) Impacts on and near surface water bodies (access roads, working areas, etc); (vi) Management of alien vegetation; (vii) Plant rescue control; (viii) Medicinal plants (poaching); and (viii) Loss of groundcover and soil erosion.
Climate Change

The project has been classified as Category 2 in accordance with the Bank’s Climate Safeguards System. This implies that the proposed project could be at risk from climate change and further review is therefore required to consider broad climate trends and identify practical risk management and adaptation measures that should be integrated into the project design and implementation plans. Eskom approved its Climate Change Policy 2014-2018 which is a direct response of Eskom’s strategic response of “reducing Eskom’s Environmental Footprint and pursuing low carbon growth opportunities”. This is consistent with the Bank’s Climate Change Safeguards System and the Climate Risk Management and Adaptation Strategy.

Eskom has an aspiration to reduce its relative emissions (tons/MWh) until 2025 and subsequently reduce absolute emissions as old stations are decommissioned and lower carbon emitting plants are commissioned in terms of the current Department of Energy’s Integrated Resource Plan (IRP). Eskom also approved an Adaptation to Climate Change Strategy on 1 February 2013. The objective of the strategy is two-fold; (i) to improve current Eskom’s adaptive capacity to adverse climate related impacts through the implementation and integration of various climate change adaptation actions and measures; and (ii) to improve and review Eskom’s resilience to the long term impacts of climate change of its existing Generation, Transmission and Distribution networks.

Eskom’s Climate Change strategic initiatives include (i) Establishment of the Centre of Excellence on Climate Change Research in partnership with one of the key research institutions in South Africa in order to establish Eskom’s weather and climate portal; and (ii) Undertake Eskom’s vulnerability assessments and climate thresholds for the overall business infrastructure and processes across Eskom value supply chain in order to define Eskom’s Adaptation to Climate Change Baseline. Furthermore, the Strategy outlines Eskom’s Six Point Plan that covers both Mitigation and Adaptation elements and these include; (1) Diversification of the generation mix to lower carbon emitting technologies; (2) Energy Efficiency measures to reduce demand and Green House Gas (GHG) emissions; (3) Innovation through Research, demonstration and development; (4) Adaptation to negative and positive impacts of Climate Change; (5) Investment through carbon market mechanisms; and (6) Progress through advocacy, partnerships and collaboration.

7. MITIGATION MEASURES AND COMPLIMENTARY INITIATIVES

Mitigation Measures

Mitigation for Avi-fauna impacts: The proposed mitigation measures include: (i) A walk down of the selected route must be conducted prior to the construction phase to identify areas where marking of lines by means of “deterrent devices” is considered to be beneficial or compulsory; (ii) All intact/primary grassland, wetland, river and drainage line crossings should by default be marked; (iii) Where the line crosses a wetland/river, the actual crossover span as well as one span on either side of the wetland/river should be marked; (iv) Marking devices to be used should include large dynamic “bird flappers”. Spans in close proximity to crane nesting sites or areas known to provide foraging habitat should be marked by alternating between large dynamic devices and the Inotec BFD88; (v) All devices should be applied in a staggered fashion to the phase while alternating between black and white diverters. The maximum distance between the diverters should not exceed 5 m; (vi) The construction sites must be confined to disturbed areas or those identified with low conservation importance.
Additional measures for the avifauna include; (vii) The breeding status of Red listed species, in particular bustards and korhaan species, should be evaluated prior to construction/decommissioning. If breeding is confirmed, the nest site must be barricaded and appropriately buffered (by at least 500 m); (viii) Construction/decommissioning activities shall only commence once the fledglings are successfully reared and has left the nesting site; (ix) Construction/decommissioning activities are not allowed within 500 m of a known crane breeding site – even when the nesting site is not in use/occupied; and (x) Depending on the crane species, construction/decommissioning activities should cease during the peak breeding period when within 1 km of a nesting site: May to August for Wattled Cranes and November – February for Grey Crowned Cranes. The breeding status of known nesting sites should be verified by avifauna specialists.

**Mitigation for Impacts on Fauna:** Some of the proposed mitigation measures for fauna include:
(i) Prohibit the loss of and degradation of sensitive faunal habitat by avoiding construction activities (both construction camps and construction or access roads) in the faunally sensitive areas (i.e. wetlands, forests, outcrops etc.) – keep all construction activities away from these areas; (ii) Use the walk down phase to ensure that towers are placed in areas that are not in sensitive faunal habitat areas (i.e. outside of wetlands, outcrops, forests etc.); (iii) Prohibit the construction of maintenance roads in any of the faunally sensitive habitat; (iv) All chemicals used during the construction phase and related activities (such as oil, diesel etc.) must be properly contained and leakage of these as well as all other potential contaminants must be avoided at all costs.

**Mitigation for Impacts on Social Environment:** The following mitigation measures are proposed: (i) Resettlement Action Plans have been prepared for each line in compliance with the Bank’s Involuntary Resettlement Policy and Eskom’s Procedures for the Management of Involuntary Resettlement; (ii) Careful consideration should be given to the tower designs in order to minimise impacts on existing structures and activities on affected properties; (iii) Careful consideration should be given to the final route alignment and tower placements to ensure minimal disruption of resources and infrastructure, especially on the smaller properties; and (iv) Where possible, towers should be placed on the border of properties. The negotiation process would have to determine whether this is acceptable for the property owners involved and whether feasible.

Additional mitigation measures to support communities include: (i) Establish a Community Management and Monitoring Committee (CMMC) to monitor the process according to a set of relevant monitoring indicators. This committee would serve as a communication channel between the community and Eskom. Members of the committee should be representative of all sectors within the affected environment; (ii) An Environmental Control Officer must be appointed to ensure contractors conduct themselves in an appropriate way. A fining system for non-compliance, under the custody of the CMMC, could be put in place; (iii) Labour should, as far as possible, be sourced locally during the construction and operation of the project. This will minimise the risk of conflict among local residents and newcomers, and obviate the need for developing temporary housing for construction workers; (iv) Large projects such as the construction of transmission power lines often raise the expectations of local people that large amounts of jobs will be created. It is recommended that Eskom should declare their intentions, in terms of the amount of jobs that will be created, at their soonest possible convenience to dispel any unrealistic expectations; and (v) Construction materials should be locally sourced as far as possible.
Mitigation for Impacts on Agriculture: The following mitigation measures are proposed: (i) Eskom should discuss the construction schedule and activities with the affected farmers to enable them to plan their farming activities and animal movement accordingly; (ii) Conditions and/or specific requests relating to construction activities raised by land/property owners should be included in the Construction EMP; (iii) Placement of the line and towers should preferably not impact on income generating activities; (iv) Sensitivities with regards to farming practices should be considered when finalising the alignments; (v) The location of the construction camp where workers would be housed should be carefully considered to limit any possible negative social impacts; (vi) The construction camp should be located near support services, and ideally not in the vicinity of residential dwellings; (vii) Construction camp management should adhere to the EMP specifications; (viii) Eskom should review the policy on sugarcane-free servitudes, the subsequent cost to the local economy and sustainability of the South Coast sugar industry against the cost of allowing servitudes with sugarcane and Eskom incurring the costs of transmission line maintenance; and (ix) Eskom must liaise with the farmers’ associations and a protocol for gaining access to farms should be established and distributed to all parties involved. The impact of careless conduct on the side of contractors must be acknowledged and the contractors should receive an induction in terms of the relevant code of conduct to which they should adhere.

Mitigation for Impacts on Flora: Some of the proposed mitigation measures include: (i) Prior to the construction of towers, input must be obtained from a flora specialist on the final location of towers within the 2 km wide corridor, avoiding sensitive areas of vegetation (including tower sites, access routes, the 8 m wide centre line required for stringing and the 55 m wide servitude, where relevant); (ii) Sensitive areas of vegetation can be avoided firstly by routing the transmission line around sensitive vegetation or secondly routing over sensitive vegetation. This will require placement of towers within transformed land, i.e. either within areas of agriculture or degraded natural vegetation; (iii) Placement of towers in wetlands should be considered a fatal flaw in the tower site selection process and alternative sites should be considered; (iv) Where sensitive vegetation is found within the 55 m wide servitude, stringing of the conductors should be done via helicopter, or shot over the sensitive vegetation (irrespective of topography), where significance of impacts associated with vehicular movement between towers will be high. In these situations, maintenance will also need to be done via helicopter to avoid impacts associated with vehicular movement in the servitude between towers; (v) Where construction occurs close to any sensitive areas of natural vegetation or any rare/threatened or protected species, these must be suitably and visibly demarcated and cordoned off prior to and during the construction phase; and (vi) The construction footprint should be kept to a minimum and no works should occur outside of the negotiated servitude.

8. RESIDUAL IMPACTS AND ENVIRONMENTAL HAZARD MANAGEMENT

Residual impacts are those that are likely to remain, notwithstanding the implementation of the proposed mitigation measures. Potential residual impacts are those associated with the following: (i) Limited Faunal displacement and destruction; (ii) Limited Floral destruction; (iii) An increase in ambient noise levels; (iv) Reduced viability of agricultural potential land; (v) Visual Impact; (vi) The maintenance of the storm water management system to ensure limited effect on the valley bottom and sites further down the system is essential especially on the substation sites; and (vii) Storm water must be relayed within a storm water management
system and end up in attenuation ponds to be released at a similar rate as the current water flow rate on site. This will significantly limit soil erosion.

**Hazard Management:** Emergencies which are likely to occur during the construction of the transmission lines may include one of the following events: (i) Worker injury at construction sites or workshops (mechanical, steel); (ii) Injuries to workers or member of the public due to unprotected open excavations, tower erection or collapse or accident with construction traffic; (iii) Fires or explosions at camp sites; (iv) Mishap spills of hazardous material such as large amount of oil, fuel, or paint on the ground or in a river system; and (v) Serious pollution to the water source (by hydrocarbons) which is relied on by the local people for living.

**Accident and Emergency Response Plan:** The Contractor(s) shall develop an Accident and Emergency Response Plan (ERP). The ERP is a detailed program of action to control and/or to respond to hazards by minimizing the effects of emergency requiring prompt corrective measures beyond normal procedures, protecting human life, minimizing injury, optimize loss control, and reducing the exposure of physical assets and the environment from an accident. The contractors shall form emergency response teams which will report through the normal, internal management chain-of-command. Due to the vast locations, and variety of field activities, which will be involved during construction, establishment of more than one emergency team may be necessary. Under all circumstances, prompt and proper treatment of the injured employee or person, as well as response of hazardous spills, fires, or explosions, is of utmost importance. Weekly reports to the Health and Safety Officer, including the number of the accidents, fatalities and the causes of the accidents shall be done.

**Safety Training:** The Environmental Control Officer (ECO) and the Health and Safety Officer (HSO) shall present important environmental requirements as part of the compulsory Health and Safety induction meetings presented to all site staff and sub-contractors on site before such staff can perform duties on site. The contractor shall arrange for the site induction on the hazardous materials awareness and job safety analysis issues before commencement of the project. The contractor shall ensure that adequate training of all the personnel working on the site familiarize with the contents of the spillage prevention plans which are outlined in each Construction EMP. The contractor shall also make this training and awareness programme be conveyed to the personnel on site to the satisfaction of the HSO, either in written format or verbal, in the employees’ language of choice. Records of all training sessions, including names, dates and the information presented should be kept by the contractor.

The field personnel will also be trained by the Contractors in a variety of measures to make the job site safe: (i) When and how to notify all others when actions or activities undertaken by them could affect health or safety of employees; to inform the Contractor of all injuries to workers; and who/how to report to Contractor any unsafe conditions that come to their attention; (ii) If in the course of the work an employee could be exposed to hazardous chemicals, or harmful physical agents, the location of material safety data sheets will be specified and made available for review; and (iii) PPEs are expected to be worn that may include protective eyewear, gloves, hard hat, safety harnesses and footwear appropriate for the job site.

**Occupational Health and Safety:** The Contractors shall comply fully with the requirements of the Occupational Health and Safety Act (Act No. 85 of 1993). A list of all relevant emergency numbers should be kept in an easily accessible location on site. A record of all incidents, accidents and illnesses on site shall be kept and the information shall be made available at
meetings. The site manager shall ensure that employees are issued with and make use of the necessary safety equipment when working in dusty, noisy and/or dangerous situations. Such equipment may include, but is not necessarily limited to hardhats, goggles, masks, earplugs, gloves, safety footwear and safety ropes as required. The site manager shall ensure that adequate drinking water, wash water and sanitary facilities are available at all times and on all work sites. The site manager shall provide a designated place for food storage, preparation and consumption on site. This should be a shaded area. The site manager shall ensure that personnel are transported legally, and in a safe and responsible manner. The site manager shall ensure that all vehicle and machine operators are qualified and licensed to operate their vehicles/machines. Dangerous excavations or works that may pose a hazard to humans and animals must be protected. These areas must be demarcated with hazard tape or fencing as required and the appropriate danger signs must be posted. The contractor/site manager must respect workers’ right to refuse to work in unsafe conditions. Ensure that strict safety measures are employed around open trenches and excavations.

9. ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

The ECO and Eskom shall establish a schedule and procedures for monitoring and reporting at the outset in order to: (i) identify any negative impacts from construction activities; (ii) assess the effectiveness of control measures; (iii) demonstrate compliance with regulatory conditions and objectives and targets set in the CEMPr; (iv) Identify if further controls/corrective action is required.

In addition, monitoring may be required as a result of a complaint, a request by a statutory body or a trigger point in an inspection or checklist being exceeded. Monitoring and reporting should also reflect any requirements identified or commitments made in the Construction Method Statement.

In addition to the routine monitoring conducted by the ECO, a schedule of regular inspections, audits and reporting will be required by the contractor. These inspections should provide a record of site conditions and activities and provide a mechanism by which the contractor, ECO and Eskom can establish the effectiveness of the CEMPr for each line. These checklists and reports should be kept at the site office and should be updated and used in the day to day operation of the site. The ECO shall also develop a schedule of inspections and auditing of the CEMPr in order to ensure that established standards of environmental controls are being maintained by the contractor.

Some of the environmental monitoring indicators include: (i) weekly inspection of hazardous material storage areas; (ii) bush clearance, vegetation management and protection of rare/threatened flora species; (iii) water quality for surface water traversed by the project; (iv) erosion control and sedimentation retention devices; (v) number of accidents, fatalities and causes of accidents; (vi) weed/invasive species management on disturbed areas.

On the monitoring of Social Impacts, it is recommended that a Community Management and Monitoring Committee (CMMC) be established. The establishment of monitoring indicators and coordinating and facilitating the establishment of a Monitoring Committee will be the responsibility of the Environmental Control Officer (ECO). The ECO appointed must ensure contractors conduct themselves in an appropriate way. A fining system, under the custody of the CMMC, could be put in place.
The Monitoring Committee would serve as a communication channel between the community and Eskom. Members of the committee should include representatives from the various affected sectors including stakeholder representatives, representatives from the various institutions, representatives of the general public, environmental groups, civil society, Ward Councilors, Traditional Authorities, Government departments, construction teams and Eskom Project Managers. A committee of this nature would play an important role in executing the proposed mitigation measures. The CMMC should be established prior to the construction phase and upon the commencement of the construction phase, meet on a monthly basis. The CMMC should act as a watchdog in terms of implementing the relevant labour policies to ensure that (as much as is possible) labour are sourced from the surrounding communities.

Some proposed monitoring indicators are detailed in Table 9.1:

Table 9.1: Indicative monitoring indicators

<table>
<thead>
<tr>
<th>Major Issue</th>
<th>Monitoring Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment opportunities and use of local contractors</td>
<td>Number of people employed per employment category</td>
</tr>
<tr>
<td>Employment opportunities and use of local contractors</td>
<td>Number of local people employed per employment category</td>
</tr>
<tr>
<td>Employment opportunities and use of local contractors</td>
<td>Number of local contractors, SMEs, and ABEs employed</td>
</tr>
<tr>
<td>Employment opportunities and use of local contractors</td>
<td>Rand value per employment category and per local employee</td>
</tr>
<tr>
<td>Employment opportunities and use of local contractors</td>
<td>Rand value of local, SME, and ABE contracts</td>
</tr>
<tr>
<td>Health and safety</td>
<td>HIV/AIDS awareness as part of all contractor induction</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Availability of HIV/AIDS awareness materials and condoms on site</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Inclusion of road and construction safety campaigns as part of contractor induction</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Number of construction vehicles involved in accidents documented in the accident log</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Number of complaints documented in the complaints register</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Number of construction site accidents and incidents documented in the accident log</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Nature of complaints documented in the complaints register</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Actions taken to address these complaints</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Feedback from aggrieved parties regarding the efficacy of resolving complaints.</td>
</tr>
<tr>
<td>Landowner and general public grievances</td>
<td>Availability of grievance registers to the general public at construction camps</td>
</tr>
<tr>
<td>Landowner and general public grievances</td>
<td>Number of relevant grievances documented</td>
</tr>
<tr>
<td>Landowner and general public grievances</td>
<td>Actions taken to address the grievance</td>
</tr>
</tbody>
</table>

10. PUBLIC CONSULTATION AND DISCLOSURE

Public participation forms an integral part of the full EIA process and the consultation of Interested and Affected parties (I&AP’s) is key to ensuring adherence to the legal requirements as set out in NEMA.

The important elements relating to public participation process that are required by the South African EIA Regulations Chapter 6 are the following: (i) The manner in which potential Interested and Affected Parties (I&APs) were notified of the application for authorization, and that a public participation process was mandatory. This includes notice boards, giving written
notice to land owners, letters, information documents and advertisements in the media. Opening and maintaining a register of the names and addresses of I&APs. These include all persons who have attended meetings, submitted comments, organs of State who have some form of jurisdiction in the assessment process, and all those who have requested that they be placed on the register as registered I&APs. (iii) Registered I&APs are entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing the application, and to bring to the attention of the competent authority any issues which that party believes may be of significance when the application is considered for authorization. The comments of registered I&APs must be recorded and included in the reports submitted to the competent authority.

The consultation and public participation for the Kusile Lines included direct letters of invitation to identified key stakeholders such as individuals, organizations as well as I&APs during both the Scoping Report and Impact Assessment stages. The identified stakeholders details were kept captured on Maximiser 9, an electronic database management software programme that automatically categorizes every mail to the stakeholders, thus providing an ongoing record of communication. Comments and contributions received from the stakeholders are recorded, linking each comment to the name of the person who made it. Four public meeting were held each for the Scoping and Impact Assessment Stages as follows in Table 10.1 using the public news media and copies of the reports at contacts detailed out in Table 10.2

<table>
<thead>
<tr>
<th>Table 10.1: Details of public consultation and participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Scoping Report Stage</td>
</tr>
<tr>
<td>Monday, 28 July 2008 at 18:00</td>
</tr>
<tr>
<td>Tuesday, 29 July 2008 at 18:00</td>
</tr>
<tr>
<td>Wednesday, 30 July 2008 at 18:00</td>
</tr>
<tr>
<td>Thursday, 31 July 2008 at 18:00</td>
</tr>
<tr>
<td>Impact Assessment Stage</td>
</tr>
<tr>
<td>Monday, 2 March 2009 at 18:00</td>
</tr>
<tr>
<td>Tuesday, 3 March 2009 at 18:00</td>
</tr>
<tr>
<td>Wednesday, 4 March 2009 at 18:00</td>
</tr>
<tr>
<td>Thursday, 5 March 2009 at 18:00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 10.2: List of contacts used during public consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place</td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Blue Valley Golf and Country Estate, HALFWAY HOUSE</td>
</tr>
<tr>
<td>City of Johannesburg: Human Development, HALFWAY HOUSE</td>
</tr>
<tr>
<td>Delmas Public Library, DELMAS</td>
</tr>
<tr>
<td>Kungwini Public Library, BRONKHORSTSPRUIT</td>
</tr>
<tr>
<td>Leandra Public Library, LEANDRA</td>
</tr>
<tr>
<td>Lebogang Public Library, LESLIE</td>
</tr>
<tr>
<td>Midfield Homeowners Association, MIDSTREAM ESTATES</td>
</tr>
<tr>
<td>Midlands Homeowners Association, MIDSTREAM ESTATES</td>
</tr>
<tr>
<td>Midstream Homeowners Association, MIDSTREAM ESTATES</td>
</tr>
</tbody>
</table>
For the consultation on Ariadne – Eros transmission line, the public participation process during Scoping involved the following activities: (i) Announcement of the project and the distribution of the Background Information Document and Comment Sheets to stakeholders (February 2009); (ii) Conduct key stakeholder meetings (March 2009) and one-on-one meetings with affected Farmers’ Associations and Traditional Authorities (March – June 2009); (iii) Compile, and continuously update, the Issues and Response Report (IRR); (iv) Announcement of the Draft Scoping Report including the Issues and Response Report (July 2009), a public review period (July – August 2009) and public meetings (July – August 2009); and (v) Distribution of a Stakeholder Update Letter following the submission of the Final Scoping Report to the competent authority, DEA (December 2009).

In conjunction with the public participation process, a comprehensive landowner identification process was done where affected landowners were contacted and notified about the project. Landowners were also provided the opportunity to raise concerns and issues. Affected landowners are part of the stakeholder database, and such, continue to receive information about the project on an on-going basis.

The Public Participation Process for the Ariadne-Venus transmission line EIA Phase kicked off with an exercise to ensure that the team had the most up-to-date contact details of parties. The initial stages of the scoping process were done in June/July 2010. For the EIA stage, public meetings and Focus Group Meetings were held during the week of Monday 24 to Friday 28 October 2011. The following ways were used to notify people of the Public Meetings and the availability of the Draft Environmental Impact Report (DEIR) for public perusal and comment: (i) Newspaper advertisements; (ii) Site Notices; and (iii) Notifications to existing registered I&APs.

The public comment period for the DEIR initially ran for a 30-day period until 14 November 2011 (to ensure that the people had the opportunity to study the DEIR before and after the Public and Focus Group Meetings). On 25 October 2011, the consultants were informed by two I&APs that the report was not yet loaded onto the Eskom website (one of the places where the report could be obtained). Subsequently a notice was sent out to all registered I&APs to inform them that the DEIR would be available for comment until 21 November 2011 to make up for the lost time. However, many I&APs made arrangements with the consultation team and only submitted their comments later (the last was received on 19 December 2011). These comments were taken up into the Issues and Responses Register that are part of the ESIA.

For the Ariadne – Eros line the Ezemvelo KZN Wildlife was consulted on 19 May 2010. The following recommendations were proposed for consideration: (i) While some of the mitigatory measures identified within the Faunal Specialist Report are supported, Ezemvelo recommends that the Faunal Specialist Report be reviewed; (ii) Ezemvelo KZN Wildlife fully supports the recommendations for the Faunal, Avi-Faunal and Flora Specialist Studies to identify an alignment that constitutes a combination of the proposed alternatives, which would have the least impact on biodiversity; and (iii) For Environmental Management Plan, it is recommended
as a guide to align with Final Draft Norms and Standards for Biodiversity Offsets in KwaZulu-Natal (EKZN Wildlife), especially for sensitive areas that can be avoided.

On the farmers associations, various consultations were held with the farmers and farmers associations in March and April 2010. Farmers associations such as the Umzimkhulu SA Cane Growers Association, Umzumbe Farmers Association and Beaumont Eston Farmers’ Association were consulted. A number of the association representatives were provided with presentations from EIA Specialist and the Agricultural Specialist on the project. Generally the stakeholders upheld the findings for the draft EIA Report – especially with regard to the agricultural report findings on Sugar Cane Agriculture. As sugarcane growers in the Umzumbe region, sugarcane is supplied to the Umzimkhulu Mill. The report established that diminishing cane supply in the area will materially impact on the economic viability of the Umzimkhulu Mill. They noted that cane supply across all three Illovo Mills is linked and a drop off in the Eston cane supply will result in a cascading of cane from Sezela and then Umzimkhulu – thereby affecting the viability of the Umzimkhulu Mill.

Eskom held further consultations after the EIA Report completion and signed a Memorandum of Understanding with the South African Sugarcane Farmers Associations (SASA). The MoU came into effect on 5 October 2013. In terms of the Memorandum of Understanding between Eskom and the South African Sugar Association, in areas where the line is crossing the sugar cane plantations, the tower specifications are: Conductor attachment heights - 35m to 44m, structure height – 50m to 69m (this is to allow the farmers to burn sugar cane under the line while at the same time ensuring that the line continues to operate safely).

11. ESMP ARRANGEMENTS

An ESMP (one each for construction and operation) has been compiled for each transmission line. The Construction Environmental Management Programme (CEMPr) details the specific controls, which must be in place for the duration of construction and operation phases. An independent and qualified Environmental Control Officer (ECO) will also be appointed. The ECO will: (i) Act as an intermediary between individual landowners, Eskom and the contractors; and (ii) Ensure compliance with the CEMPr.

The initial CEMPr will outline all activities that have to be undertaken, where they will take place, the responsible persons, all possible environmental or social impacts, mitigation measures, rehabilitation plans, monitoring methods, the frequency of monitoring and performance indicators. The CEMPr will be legally binding document and stand-alone document, which will be used to ensure that Eskom adheres to all conditions of the Environmental Authorization (EA) and Environmental Impact Assessment Report (EIR). Only once this document has been approved by the Department of Environmental Affairs (DEA), the appointed contractor can commence with construction.

The Contractor: The contractor, as the Eskom’s agent on site, is bound to the CEMPr conditions through its contract with the Eskom, and is responsible for ensuring that it adheres to all the conditions of the CEMPr. The contractor must be familiar with the CEMPr requirements before coming onto site and must request clarification on any aspect of these documents, should they be unclear. The contractor must ensure they have provided sufficient budget for complying with all CEMPr and EA conditions at the tender stage. The contractor
must comply with all orders (whether verbal or written) given by the ECO, Project Manager or Site Engineer in terms of the CEMPr.

**Environmental Control Officer (ECO):** The Environmental Control Officer (ECO) is appointed by the Eskom as an independent monitor of the implementation of the CEMPr, the Environmental Authorization (EA) and to monitor project compliance. The ECO must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site. The ECO must attend relevant project meetings, conduct inspections to assess compliance with the CEMPr and be responsible for providing feedback on potential environmental problems associated with the development. In addition, the ECO is responsible for: (i) Liaison with relevant authorities including cases of severe misconduct whereby the ECO could report the matter to the DEA directly; (ii) Liaison with contractors regarding environmental management; (iii) Undertaking routine monitoring and identifying a competent person/institution to be responsible for specialist monitoring, if necessary; and (iv) The ECO has the right to enter the site and undertake monitoring and auditing at any time, subject to compliance with health and safety requirements applicable to the site (e.g. wearing of safety boots and protective head gear).

The ECO must be appointed before construction commences. It is advised that the appointment must be before the planning phase (three months before commencement of construction) as the ECO will be required during this phase as well to ensure that the planned construction is in line with the EA and CEMPr. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation. the ECO will be responsible for liaising with the National Department of Environment (DEA). The ECO must submit monthly environmental reports. These environmental and audit reports must contain information of the contractor and Eskom’s levels of compliance with the CEMPr.

**Contractor’s Environmental Liaison Officer:** The contractor must appoint an Environmental Liaison Officer (CELO) to assist with day-to-day monitoring of the construction activities. Any issues raised by the ECO will be routed to the CELO for the contractors’ attention and subsequently, CELO liaise with the main contractor for his or her attention. The CELO shall be permanently on site during the construction phase to ensure daily environmental compliance with the CEMPr and should ideally be a senior and respected member of the construction crew.

**Construction Method Statements:** The Contractor shall submit written method statements to the ECO for review, recommendations and acceptance, covering the all activities, which are identified in the CEMPr and/or by the ECO, as being potential harmful to the environment. Method statements must indicate how compliance with the Environmental Specification will be achieved. The approval of the method statements will be undertaken by both the ECO in consultation with Eskom’s Senior Environmental Advisor.

The Method Statements shall state clearly: (i) Timing of activities; (ii) Materials to be used; (iii) Equipment and staffing requirements; (iv) Proposed construction procedure designed to implement the relevant environmental specifications; (v) The system to be implemented to ensure compliance with the specifications; and (vi) Other information deemed necessary by the ECO.

The method statements shall be submitted at least 14 working days prior to projected commencement of work on all the activities, to allow the ECO time to review and provide
recommendations on the method statement. The Contractor shall not commence work on that activity until such time as the method statement has been approved in writing by ECO, which shall be done within five (5) working days of receipt. Due to changing circumstances, it may be necessary to modify method statements. In such cases, the proposed modifications must be indicated and agreed upon in writing between Eskom, the ECO and the Contractor.

**Department of Environmental Affairs (DEA) Requirements:** Monthly reporting to the DEA shall include the following information: (i) Description of all activities on site; (ii) Problem identified; (iii) Transgressions noted; and (iv) A schedule of tasks undertaken by the ECO. All documentation, reports and notifications, required to be submitted to the department in terms of the environmental authorization, must be submitted to the Director: Compliance Monitoring at the department.

At a minimum, the following will be maintained on site: (i) Records relating to monitoring and auditing must be kept on site and made available for inspection; (ii) Site diary; (iii) Copies of all monthly reports submitted to DEA; (iv) Schedule of current activities on site as well as monitoring activities schedule; and (v) Compile a register of complaints by the public as well as the remedies applied to the complaints.

**Budget for ESMP:** The budget for the ESMP implementation shall be determined during the design of each site specific Construction Environmental Management Plan (CEMP) for the tower and conductor line stringing works. This is in line with the Environmental Authorisation issued for the construction of the four transmission lines. As part of the conditions of the Environmental Authorization, the ECO shall monitor, prepare and submit regular environmental and social monitoring reports to the Environmental Regulator (DEA) to assess effectiveness of performance of each approved site specific EMP and compliance with the relevant legislative requirements. Each EMP shall be disclosed in country in line with South African legislative requirements which are consistent with the AfDB Disclosure and Access to Information Policy requirements.

**12. CONCLUSION**

The construction and operation of transmission lines will have negative effects on the environment. However, when appropriate mitigations are implemented, the intensity of the impacts is reduced.

For the Kusile Integration lines (Kendal –Zeus Substation), three alternative routes were considered. Based on the findings from ESIA, Alternative 3 was selected as the preferred alternative to construct the two proposed 400 kV power lines, running parallel, approximately 63 km from Zeus Substation to Kendal Power Station.

The impact of the proposed Ariadne-Eros transmission line on the Eastern and Central alignment alternatives was found to be of medium and medium-high significance in certain areas. The latter includes ecologically-sensitive areas such the Oribi Gorge Nature Reserve. Other key factors which were taken into consideration during the comparative assessment of alternatives include: the resettlement of homesteads, the loss of use of productive agricultural land (mainly sugarcane and forestry due to servitude requirements), the resulting consequences from the loss of agricultural production (job losses and the possible closure of mills), the visibility of the power lines, socio-economic benefits of electricity and the justification for a
new transmission power line in the region. The probability for a reduction of agricultural production is a major concern on all three major alternatives (Eastern, Central and Western). However, by comparison, the intensity of the impact on the Western Alternative and Alternative E3 will be lower as the percentage of land use classified or classed as agriculture is lower. Hence the preferred corridor alternative is a combination of the Western Alternative and Alternative E3.

In particular, a number of stakeholders raised concerns about the loss of the use of productive agricultural land within commercial farming areas (Eston, Mid Illovo, Sawoti, Harding and others) and the potential impacts on mills. Although it is Eskom Transmission’s present policy to establish sugarcane-free servitudes, it is recommended that, where feasible, sugarcane cultivation is allowed to continue subject to agreement with Eskom. This will require cane farmers to green-trash instead of burning. However, given that green-trashing is not feasible throughout the study area, an alternative would be for Eskom to reconfigure tower placement (closer together) or tower height (higher) to enable cane farmers to burn underneath the transmission lines.

Eskom Transmission is open to green-trashing and has been in discussion with cane growers. An important aspect with regard to continued cultivation of sugarcane under transmission lines is that where green-trashing is practiced, landowners (cane growers) must play their part by not burning sugarcane under the lines, which puts the security of supply at risk and damages infrastructure. On 5 October 2013, a Memorandum of Understanding was signed between Eskom and the South African Sugar Association to change the design of tower heights in sugarcane growing areas to allow farmers to continue with farming under the servitudes and harvest sugarcane in accordance with existing sugar-farming practices.

The Ariadne-Venus transmission line study area is rich in biodiversity in terms of flora, fauna, and avifauna and many Red Data species were identified across the taxa. The most notable threatened species of high conservation value within the study area were crane species. Most habitats associated with crane species were delineated or marked as highly sensitive areas and all efforts were made to ensure that the preferred corridors avoided those sensitive areas. Other sensitive areas that were taken into cognizance were based on agriculture in terms of commercial (avoiding centre pivot point), social (avoiding resettlement, school, and other infrastructure) whereby the preferred corridors should avoid those areas.

After careful consideration of the key aspects of environment (i.e. biophysical, social and economic aspects), the preferred corridor is Alternative 1b on the basis that it follows two existing 275kV until where it turns into Ariadne Substation. Therefore, it makes sense that the recycling or decommissioning of one of the two existing 275kV line in favour of the proposed new 400kV line be decommissioned in its entirety.

As part of the Environmental Authorization issued by DEA for the construction of the four lines, site specific CEMPs shall be developed by Eskom to managed the identified residual E&S impacts associated with both tower and conductor stringing works. The CEMPs shall include site specific implementation arrangements for managing all the residual impacts including Health and Safety and budget.

The appointed ECO shall monitor, prepare and submit regular environmental and social monitoring reports to the Environmental Regulator (DEA) to assess effectiveness of performance of each approved site specific CEMP and compliance with the relevant legislative
requirements. Each CEMP shall be disclosed in country in line with South African legislative requirements which are broadly consistent with the AfDB Disclosure and Access to Information Policy requirements.

13. References


**Patrick, B. January 2010.** Floral Impact Assessment Specialist Study for the Proposed Ariadne-Eros 400/132 kV Multi-circuit Transmission Power Line from Ariadne Sub-station to Eros Sub-station, and the Expansion and Upgrade of the Ariadne and Eros Sub-stations, KwaZulu-


ANNEXURE

Figure A.1: Schematic Design Layout for Kusile Lines

Figure A.2: Schematic Design Layout for the Ariadne Lines
Figure A.3: Map showing areas of potential collisions of birds with the proposed power lines as well as crane nesting and flocking sites (EWT, 2009)