FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT
For
THE PROPOSED
KALAHARI UMTU SUBSTATION AND
TWO 132KV SUB-TRANSMISSION LINES

Prepared for:

ESKOM DISTRIBUTION
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Bloemfontein
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DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM
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ENVIRONMENTAL ASSESSMENT PRACTITIONER

Strategic Environmental Focus (Pty) Ltd is undertaking the Environmental Impact Assessment (EIA) process for the proposed Kalahari Umtu substation and distribution lines. The Environmental Assessment Practitioner (EAP) is represented by Mr. Andrew Woghiren.

Professional affiliation(s)	Registered as a Professional Natural Scientist with the South African Council for Natural Science Professions.

Expertise of the EAP to carry out the Scoping Process	• 10 years experience with environmental impact assessment processes, including processes undertaken in terms of the Environment Conservation Act, 1989 and the National Environmental Management Act, 1998.
	• Experience in similar large linear projects, including the following:
	  • Project Manger: Eskom Spencer – Tabor 275kV Transmission Line and Construction EMP, Limpopo Province
	  • Project Manager: Eskom Mercury – Perseus 765kV Transmission Line and Construction EMP, Free State Province
	  • Project Manager for the Voorspoed 132kV Distribution Line, Free State Province
	  • Project Manager: Muldersdrift – Libertas 33kV distribution Line, Krugersdorp, Gauteng Province
	  • Project Manager: Environmental Impact Assessment for the Vaal River Eastern Sub-system Augmentation Project
	  • Project Manager for the Eskom Kudu Integration Project, Western Cape and Northern Cape Provinces
	  • Project Leader: Strategic Environmental Assessment for Eskom Western Cape Penninsula Master Plan

The EIA process requires the undertaking of specialist studies to inform the Scoping Report and the EIA Report. The following specialists are involved with the above-mentioned application:

Name	Organization	Specialist assessment
Antoinette Eyssell	Strategic Environmental Focus (Pty) Ltd.	Terrestrial Ecology Impact Assessment.
Frans Prins	Strategic Environmental Focus (Pty) Ltd.	Heritage Impact Assessment.
Ilse Mathys	Strategic Environmental Focus (Pty) Ltd.	Agricultural Potential Soils Assessment.
Kingstone Matanda, Christa de Waal	Strategic Environmental Focus (Pty) Ltd.	Visual Impact Assessment.
Hilda Bezuidenhout	Strategic Environmental Focus (Pty) Ltd.	Social Impact Assessment.
Jon Smallie	Endangered Wildlife Trust.	Avifauna Impact Assessment.

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EXECUTIVE SUMMARY

INTRODUCTION

Kalahari Resources (Pty) Ltd (Kalagadi Manganese) made an application to Eskom Distribution for the provision of a new substation at the Kalahari Resources Umtu site in order to supply the power required for a new Manganese mine and sinter plant situated in close proximity to Hotazel, on the Farm Umtu No. 281, in the Kgalagadi District Municipality, Northern Cape. Eskom has also identified the Kalahari Resources application as an opportunity to strengthen the Hotazel Distribution network by building a new 132kV line from the new substation at the Umtu site through to Hotazel Distribution Substation (DS).

The proposed development will therefore involve two components, the provision of new power to Kalahari Resources (Kalagadi Manganese) and the strengthening of the Hotazel Distribution Network.

The provision of power to the Kalahari Resources (Umtu) site will require the construction of a new 2x20MVA, 132/22kV substation equipped with two 132kV feeder bays, a 132kV bus bar and two 22kV feeder bays at the Kalahari Resources (Umtu) site. In order to supply power to the new Umtu Substation, a new ± 70 km 132kV sub-transmission line will be installed between the new Umtu Substation and the existing Ferrum Main Transmission Substation (MTS).

In order to strengthen the Hotazel Distribution Network, Eskom intends to link the new Umtu Substation to the Hotazel Distribution Network, via a new 7.33 km 132kV sub-transmission line to the existing Hotazel Distribution Station (DS), in order to create a ring network. A new 132kV feeder bay will be installed at the Hotazel DS to accommodate the new sub-transmission line.

ENVIRONMENTAL IMPACT ASSESSMENT REQUIREMENTS

The proposal to construct a new substation and install new overhead power lines triggers activities listed under the regulations in terms the National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]. Environmental authorisation is therefore required from the relevant competent authority, which in this case is the national Department of Environmental Affairs and Tourism (DEAT).

Eskom Distribution has thus appointed Strategic Environmental Focus (Pty) Ltd (SEF) as independent environmental assessment practitioners to conduct the relevant Environmental Impact Assessment (EIA) process required for application for environmental authorisation. The listed activities triggered by the proposed development fall under Government Notices No R 386 and 387 (see Section 1.2) and a Scoping and EIA process was therefore conducted.

The following activities listed under Government Notices No R 386 and 387 are applicable to the proposed development:

Government Notice R. 386:

1. (m) The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including:

(i) canals;

(ii) channels;

(iii) bridges;

(iv) dams; and

(v) weirs.

12. The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

15. The construction of a road that is wider than four (4) metres or that has a reserve wider than six (6) metres excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.

Government Notice R. 387:

1. (l) The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more.

The Scoping Report outlined the initial issues and alternatives identified during the Scoping phase of the project and provided terms of reference for the Environmental Impact Assessment phase. This EIA report seeks to investigate in detail these issues and examine the extent of the environmental impact. Mitigation measures are hence recommended and the preferred alternative is proposed.

PROJECT MOTIVATION

Forecast levels of growth in the steel industry for the medium term future predict a need for new manganese production capacity. Since South Africa, with more than 80% of the World's high grade manganese ore reserves, produces about 20% of the worlds manganese ore per year, with a production of 3.635 million tons in 2000, the Kalagadi Manganese mine near Hotazel presents opportunity for a well-situated, modern plant with low operating costs and access to their own ore deposits.

The Kalagadi Manganese mine requires 4.5 Mega Watts (MW) of power during the construction phase and construction of the surface plant requires 1.5 MW. The entire operation will require 15 MW during production. The provision of power to the Manganese mine will offer the necessary support for the manganese mining activities, thereby contributing to employment opportunities and economic

development in the surrounding area and the Northern Cape Province. The project will ultimately result in a modest contribution to foreign exchange earnings of South Africa.

APPROACH TO THE PROJECT

The identification of key issues and concerns was guided by the relevant authorities, interested and affected parties (I&APs) and professional judgement by the Environmental Assessment Practitioner (EAP). The EIA Report further includes the results of the specialist studies, a full assessment of impacts, associated mitigation measures and proposed alternatives.

PUBLIC PARTICIPATION

The principles of NEMA govern many aspects of EIA processes, including consultation with Interested and Affected Parties (I&APs). These principles include the provision of sufficient and transparent information to I&APs on an ongoing basis, to allow them to comment and ensuring the participation of historically disadvantaged individuals, including women, the disabled and the youth.

The initial public participation process undertaken by SEF commenced on Tuesday, 26 August 2008 and ended on Thursday 25 September 2008 process entailed the following:

- An advertisement in a local newspaper;
- Site notices along the route of the sub-transmission line; and
- Direct (hand delivered) notification of identified I&APs.

The most significant concerns raised by I&APs are:

- Impacts on raptors and other birds such as Vultures, Eagles and Kori Bustards should be minimised; and
- Removal of Camel thorn trees should be done on condition that a permit is obtained from the Department of Water and Environmental Affairs.

I&APs who responded during the public participation process included:

- Authorities;
- Service Providers; and
- Landowners directly adjacent to the proposed routes.

The Draft Scoping Report was made available for public review from 21 October to 20 November 2008. Subsequently a public meeting was held on 21 January 2009. The main concern raised during the meeting was raised by Mr Attie du Toit of Eskom: He asked if Khumba Resources was involved in the EIA as they are proposing to expand their mine adjacent to Ferrum MTS, which may have impact on the proposed route of the line. He requested that Eskom's project team meet with Khumba to discuss a way forward. A meeting was held on 25 February 2009. The outcome of the meeting was that Eskom would not have to change the route of the line completely but rather to realign the servitude for that first part of the route.

The draft EIA report was made available for public review from 12 May 2009 to 12 June 2009. A public meeting was held during public review on 21 May 2009 to address concerns of the farmers and landowners affected by the project. The main concerns raised at this public meeting pertained to communication with Eskom with regards to access to their properties to undertake maintenance work on existing lines, as well as the fact that some of the farmers in the area have existing lines on their land but no electricity for their use. Subsequent to the meeting a committee which included local farmers and Eskom representatives was formed. This committee will facilitate communication between Eskom, farmers and contractors during the construction phase of the project.

IDENTIFICATION OF ANTICIPATED IMPACTS

The key environmental issues that are identified have been based on the experience of the EAP, information obtained through public participation processes as well as information obtained from the site visit. Integration of specialists' input has also contributed to the identification of key environmental issues.

The potential impacts and key issues identified include:

- Soil erosion and pollution;
- Soil and water (surface and groundwater) contamination;
- Suitability of geotechnical and soil conditions for construction of the proposed infrastructure, particularly pylon positioning;
- Destruction of flora and displacement of fauna;
- Impacts on the bird life and habitat;
- Loss of soils with high agricultural potential;
- Impacts on features with historical and cultural value;
- Socio-economic and tourism impact;
- Visual and aesthetic impacts;
- Noise impacts during the construction phase;
- Safety and security of the sub-transmission lines; and
- Impact of electromagnetic fields created by the sub-transmission lines.

ASSESSMENT OF KEY ENVIRONMENTAL IMPACTS

Soil erosion (Construction phase): There will be clearance of vegetation for the construction of the sub-transmission lines. The impact has medium significance because vegetation clearance will be kept to a minimum and will mainly occur around the footprint of the pylon erection area. The preferred alternative is near the existing servitude hence there will be no need to create new access roads. Areas of disturbance must be rehabilitated once construction is completed.

Disturbance to flora: Bush encroachment will occur as a result of transmission line servitudes disturbances by the cutting down of *Tarchonanthus camphorates* (Camphor Tree and *Acacia meliffera* (Black thorn) in the servitude. This will result in loss of grasslands in the area. If this impact is not managed appropriately, the aforementioned species could spread to adjacent properties. This impact must be managed through regular surveillance and control during all phases of the development. Loss of protected species *Acacia erioloba* (Camel Thorn), the removal of this species requires removal permits from Department of Water and Evironmental Affairs.

Collision and Electrocution of Birds by the sub-transmission line:

a) Collision

The route of the sub-transmission passes through bushveld which is a good habitat for different bird species. The sub-transmission line will have a high negative impact on birds like the Kori Bustard, Ludwig's Bustard, Black Stork and the Secretary bird due to increased collisions with the line. Provided that the new transmission lines is placed as close as possible to the existing lines, and that bird deterrent devices are installed in the recommended positions (to be confirmed by the Avifauna specialist), then the significance of this impact can be mitigated to medium.

b) Electrocution

Electrocution is likely to affect large eagles and vultures such as the Martial Eagle and African White-barked Vulture. Provided that the new transmission lines is placed as close as possible to the existing lines, and that bird deterrent devices are installed in the recommended positions (to be confirmed by the Avifauna specialist), then the significance of this impact can be mitigated to medium.

Visual Impact (Altering of the landscape character): The sub-transmission line will have a visual impact on the landscape and will alter the character of the landscape. This however does not have a high significance because there are existing transmission lines along the preferred route and hence this is not a new feature in the area. This visual impact can be mitigated by using guyed cross rope or cross rope suspension pylons, where possible and this will reduce the significance to medium.

Social Impact:

The main issues with regards to the social well being of the communities along the route of the power line include:

- Employment creation;
- Feelings in relation to this project; and
- Security, personal safety and risk exposure including Access to sites for construction and maintenance.

a) Employment creation

The construction of the new line and substation will create approximately on average of 40 temporary jobs. The line will indirectly increase job creation as the line will supply Kalagadi Manganese mine with power. The provision of power to the mine will facilitate over 1000 temporary and contract jobs during construction of the mine and approximately 877 permanent jobs during operation. This is a significantly positive impact and can be enhanced provided labour should, as far as possible, be sourced locally during the construction and operation of the project.

b) Feelings in relation to this project

The issue was highlighted during interviews with landowners along the route of the line was that they do not have electricity. Electricity supply to farms and the surrounding community should be a priority given the fact that these people are directly impacted on without receiving any benefits.

c) Security, personal safety and risk exposure

A negative impact on the personal safety of landowners during the construction phase, this will be due to an influx of strangers entering local communities. This impact can be mitigated from medium significance by following protocol for gaining access to farms should be established and distributed to all parties involved. Construction teams should be clearly identified by wearing uniforms or identification cards that should be exhibited in a visible place on their body.

ALTERNATIVES

The EIA procedure requires that an environmental investigation needs to consider a number of feasible alternatives for any proposed development. The various alternatives were assessed in terms of both environmental acceptability and economic feasibility. The following alternatives were identified during the scoping phase and are discussed in detail in this EIA report:

- Three Route alignment alternatives;
- Power source alternative (generation instead of distribution through Eskom) and
- No-go alternatives.

Route alternative 3(preferred alternative)

The environmental and visual impacts of placing the route along side the road may potentially be less than the impacts of Route1 (which runs through vacant land) as well as Route2 (runs parallel other transmission lines). Locating construction activities themselves along or as near to the roadside as possible may further reduce the impact of the development. This is the preferred route for the construction of the line based on the following:

- From a visual perspective R3 will have lesser impacts on the landscape characteristics of the area. This also reduces the cumulative visual impacts of too many power lines adjacent to me another.
- Placement of the proposed electrical servitude as close to the road as possible will negate the need for use of existing private farm roads.
- Technically this Route 3 has the shortest in length and it is adjacent to an existing servitude to the road.
- From an ecological, heritage and a social perspective this route is as feasible as R2 and there would be no adverse impacts should this route be constructed.
- A workshop was held with all the specialists on 09 April 2009 in order to discuss the preferred route alternative. The specialist all came to an agreement that R2 and R3 where similar in terms of impact in respect of the studies

CONCLUSION AND RECOMMENDATIONS

The construction and operation of the proposed sub-transmission line has the potential to have some negative impacts on the environment. This new sub-transmission line will run through a variety of properties and their associated land uses. However, the nature and scale of the negative impacts are relatively small in comparison to the scale of the entire project, and the benefits to be delivered by the project. Provided that the route alternatives as recommended in this report are implemented, the project will result in an environmental impact on the environment that is acceptable to society as a whole. The draft Environmental Management Plan (EMP) should be implemented during the construction and operation stage of this new development (Appendix 7). Although there are certain individual landowners that may be significantly affected, their loss must be appropriately mitigated by Eskom through compensation. From the EAP's persperctive the proposed project is feasible and can go ahead taking into consideration the following recommendation:

- The recommended route alternative for the sub-transmission line is alternative route 3, because it runs along side the main road R380 for most of its length and this will minimise the need to construct access roads clearly reducing impact from such activities.
- It is recommended that a walk down assessment of the route, particularly the sensitive portions, should be undertaken prior to construction in order to

ensure that the placement of the pylons causes the least possible negative impact.

- A detailed and comprehensive site specific design phase, construction phase and operational phase EMP must be developed in order to effectively manage the development of the sub-transmission line and substation.

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LIST OF ABBREVIATIONS

BGIS	**-**	Biodiversity Geographical Information Systems
DEAT	-	Department of Environmental Affairs and Tourism
DS	-	Distribution Substation
DTEC	-	Department of Tourism, Environment and Conservation
DWAF	-	Department of Water Affairs and Forestry
DWEA	-	Department of Water and Environmental Affairs (Former DWAF)
EAP	-	Environmental Assessment Practitioner
ECA	-	Environment Conservation Act, 1989 (Act No. 73 of 1989)
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
GIS	-	Geographical Information Systems

HIA	-	Heritage Impact Assessment
I&APs	-	Interested and Affected Parties
IEM	-	Integrated Environmental Management
KM	-	Kalagadi Manganese (Pty) Ltd
kV	-	Kilo Volt
MTS	-	Main Transmission Substation
MVA	-	Mega Volt Ampere
NEMA	-	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NSBA	-	National Spatial Biodiversity Assessment
OHS	-	Occupational Health and Safety Act, 1993 (Act No, 85 of 1993)
POS	-	Plan of Study for the EIA
SAHRA	-	South African Heritage Resources Agency
SANBI	-	South African National Biodiversity Institute
SANS	-	South African National Standards
SEF	-	Strategic Environmental Focus (Pty) Ltd
SIA	-	Social Impact Assessment
VIA	-	Visual Impact Assessment

GLOSSARY OF TERMS

Alien species
A plant or animal species introduced from elsewhere: neither endemic nor indigenous.

Anthropogenic
Change induced by human intervention.

Applicant
Any person who applies for an authorisation to undertake an activity or to cause such activity to be undertaken as contemplated in the National Environmental Management Act, 1998 (Act No. 107 of 1998).

Arable potential
Land with soil, slope and climate components where the production of cultivated crops is economical and practical.

Ecology
The study of the inter relationships between organisms and their environments.

Environment
All physical, chemical and biological factors and conditions that influence an object and / or organism.

Environmental Impact Assessment
The assessment of the effects of a development on the environment.

Environmental Management Plan
A legally binding working document, which stipulates environmental and socio-economic mitigation measures that must be implemented by several responsible parties throughout the duration of the proposed project.

Local relief
The difference between the highest and lowest points in a landscape. For the purposes of this study, the local relief is based on a scale of 1:50 000.

Study area
Refers to the entire study area encompassing the total area as indicated on the study area map.

Mega Watts
A megawatt is a unit for measuring power that is equivalent to one million watts (equivalent to one joule per second).

Kilo Watts

A kilowatt is a unit for measuring power that is equivalent to 1000 watts.

Electromagnetic Fields

The electromagnetic field is a physical field produced by electrically charged objects. It affects the behaviour of charged objects in the vicinity of the field

1. INTRODUCTION

Kalahari Resources (Pty) Ltd (Kalagadi Manganese) made an application to Eskom Distribution for the provision of a new substation at the Kalahari Resources Umtu site in order to supply the power required for a new Manganese mine and sinter plant situated in close proximity to Hotazel, on the Farm Umtu No. 281, in the Northern Cape. Eskom has identified the Kalahari Resources application as an opportunity to strengthen the Hotazel Distribution network by building a new 132kV line from the proposed substation at the Umtu site through to the existing Hotazel Distribution Substation (DS).

The proposal to construct a new substation and install new overhead power lines triggers activities listed under the regulations in terms the National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]. Environmental authorisation is therefore required from the relevant competent authority, which in this case is the national Department of Environmental Affairs and Tourism (DEAT). The provincial authority in this case is the Northern Cape Department of Tourism Environment and Conservation and their role is to comment and participate as stakeholders in the project.

Eskom Distribution has thus appointed Strategic Environmental Focus (Pty) Ltd (SEF) as independent environmental consultants to conduct the relevant Environmental Impact Assessment (EIA) process required for application for environmental authorisation. The listed activities applicable to the proposed development fall under Government Notices No R 386 and 387 (see Section 1.2) and a Scoping and EIA process has therefore been conducted.

1.1. DESCRIPTION OF THE ACTIVITY

The proposed development involves two components: the provision of power supply to Kalahari Resources (Kalagadi Manganese) at the Kalahari Resources (Umtu) site to cater for new Manganese mine and sinter plant, and the strengthening of the Hotazel Distribution Network.

1.1.1. Provision of power to Kalahari Resources (Kalagadi Manganese)

The provision of power for the new mining activities (manganese mine and sinter plant) that will soon be commissioned the Kalahari Resourses (Umtu) site will require the construction of a new substation and associated infrastructure at the Kalahari Resources (Umtu) site. In order to supply power for the new Umtu Substation a 132kV sub-transmission line will be installed between the new Umtu Substation and the existing Ferrum Main Transmission Substation (MTS).

1.1.1.1. Location of substation and sub-transmission line

The site of the proposed new Umtu Substation lies within the Gamagara Local Municipality (Kgalagadi District Municipality) in the Northern Cape. The site lies approximately 7.33 km to the west of the town of Hotazel. The existing Ferrum MTS is located approximately 3.6 km to the south of the town of Kathu. Three alternative sub-transmission line routes have been proposed between the proposed Umtu Substation and the existing Ferrum MTS. The study area for this component therefore includes the substation site, as well as the ± 70 km long alternative routes between the new Umtu Substation site and the Ferrum MTS (Figure 1: Locality Map on page 3).

1.1.2. Strengthening of the Hotazel Distribution Network

The application for provision of power by Kalahari Resources at the Umtu site presented an opportunity for Eskom to strengthen the Hotazel Distribution Network. This will achieved by constructing a new sub-transmission line between the new Umtu substation and the existing Hotazel substation, creating a ring network between Ferrum MTS, Hotazel Substation and Umtu Substation.

1.1.2.1. Location of the 132 Kv line

The affected area for this component will include the site of the new Umtu Substation and the approximated 7.33 km sub-transmission line route between the new Umtu Substation and Hotazel distribution network. Both components and their respective locations are assessed as one study area and are within the EIA process.

1.1.3. Access

An access road of approximately 2.5 km will be provided between the new Umtu Substation and the nearest main road (R31). The access road forms part of an EIA (Umtu Manganese Mine EIA) that was conducted for mining activities proposed on the farm Umtu 281 as well as the farms Olivepan 252 and Gama 283, which lie to the south of Umtu 281 along the western side of the R31. Mining rights and an environmental authorisation has been issued for the Umtu Manganese Mine. This access road therefore does not form part of this current EIA process. Further access to the servitudes established for the power lines will be attained from existing farm access roads.

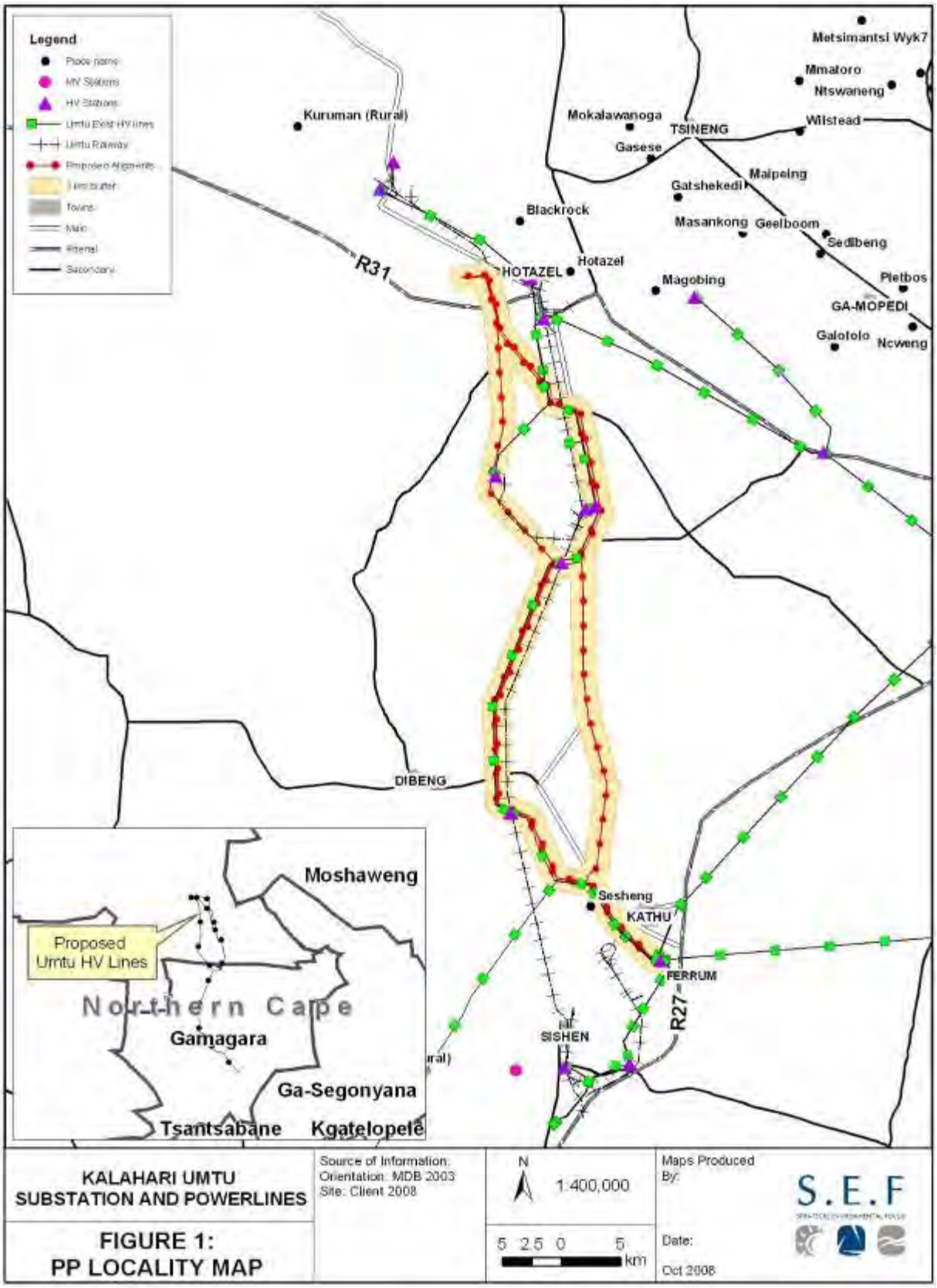


Figure 1: Locality Map of the study area for the proposed substation and power lines

1.2. LEGAL REQUIREMENTS

The aim of this section of the report is to provide a brief overview of the pertinent policies as well as legal and administrative requirements applicable to the proposed development.

1.2.1. Environmental Impact Assessment Requirements

The Environmental Impact Assessment (EIA) process followed is in compliance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA], and the Environmental Impact Assessment Regulations of 2006 (Government Notice No's R385, 386 and 387 of 2006) Gazetted in the Government Gazette No 28753 on 21 April 2006. The proposed development involves 'listed activities', as defined by the above mentioned regulations. Listed activities are activities that may have potentially detrimental impacts on the environment and therefore require environmental authorisation from the relevant authorising body. The proposed development occurs in the Northern Cape and thus the commenting authority is the Northern Cape Department of Tourism, Environment and Conservation (DTEC). However, the approving authority in this case is the Department of Environmental Affairs and Tourism (DEAT) due to the scale and magnitude of the proposed development and Eskom's mandate as a sole provider of electricity.

Government Notice No. R386

The proposed development also involves the following listed activities as stipulated in Government Notice R. 386 (Basic Assessment process) of the EIA Regulations of 2006:

1. (m) The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including:

(i) *canals;*
(ii) *channels;*
(iii) *bridges;*
(iv) *dams; and*
(v) *weirs.*

12. The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

15. The construction of a road that is wider than four (4) metres or that has a reserve wider than six (6) metres excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.

Government Notice No. R387

The proposed development may also involve the following listed activities as stipulated in Government Notice R. 387 (Scoping / EIA process) of the EIA Regulations of 2006:

1. (l) The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more.

In view of the fact that the proposed development includes activities falling within the ambit of both Basic Assessment and Scoping and EIA processes, this application is required to be conducted as a **Scoping and EIA** application as per the listed activities of the Government Notice Regulation No. 387 of 2006.

1.2.2. Other Legal Requirements

The following list of legislation may also apply to the proposed development activities

National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed.

National Spatial Biodiversity Assessment

The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)

The purpose of this Act is to provide for the protection, conservation and management of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes.

National Water Act, 1998 (Act No. 36 of 1998)

The National Water Act, 1998 (Act No. 36 of 1998) aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in responsible ways. The Act aims to regulate the use of water and activities, which may impact on water resources through the categorisation of 'listed water uses' encompassing water extraction, flow attenuation within

catchments as well as the potential contamination of water resources, where DWAF is the administering body in this regard.

National Heritage Resources Act, 1999 (Act No. 25 of 1999)

The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 hectares (ha) and where linear developments (including power lines) exceed 300 metres in length. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures administered by the South African Heritage Resources Agency (SAHRA).

Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

The Occupational Health and Safety Act (OHS) aims to ensure the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery. The Act includes the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work. The Act includes regulations pertaining to construction methods (Government Notice No. 25207 of 2003).

1.2.3. Provincial Policies/Guidelines

Protected species – Provincial Ordinances

Provincial ordinances were developed to protect particular plant species within specific provinces. The protection of these species is enforced through permitting requirements associated with provincial lists of protected species. Permits are administered by the provincial departments responsible for environmental affairs.

1.3. DETAILS OF THE APPLICANT

Eskom Holdings Limited comprises the following operating divisions:

- Eskom Generation;
- Eskom Transmission; and
- Eskom Distribution.

Eskom Generation is typified by the Power Stations as this division is involved with the generation of electricity. Eskom Transmission is involved with the transmission of electricity from the Power Stations to Main Transmission Substations. Eskom Distribution is responsible for distribution of electricity to clients such as local municipalities and other such customers. The applicant in this case is Eskom Distribution. The details of the project applicant are indicated as follows:

Name of Applicant	Contact Details	
Eskom Holdings Limited – Eskom Distribution Contact Person: Miss Andrea van Gensen	P. O. Box 345 Bloemfontein 9300	Tel: 051 404 2040 Fax: 051 404 2972 Cell: 082 482 7579 Email: andrea.vangensen@eskom.co.za

1.4. PROJECT DESCRIPTION

1.4.1. Provision of power to Kalahari Resources (Kalagadi Manganese)

The provision of power for the new mining activities (manganese mine and sinter plant) that are soon to commence around the Kalahari Recourse (Umtu) site will require the construction of a new substation and associated infrastructure at the Kalahari Resources (Umtu) site. In order to supply power to the new Umtu Substation, a sub-transmission line will be installed between the new Umtu Substation and the existing Ferrum Main Transmission Substation (MTS).

1.4.1.1. Construction of Umtu Substation

A new 2x20 MVA, 132/22 kV substation (Umtu Substation) will be constructed on the Farm Umtu No. 281.The site of the substation is located at 27º 13' 23.8'' S and 22º 54' 12.5'' E. The substation will be equipped with two 132kv feeder bays, a 132 kV bus bar and two 22kV feeder bays. The necessary control technologies (such as telecoms and metering) will be installed at the new substation.

The size of the proposed substation building will be 0.29ha (62.5m x 47.0m) in extent (Appendix 1: Substation Layout Plan). The substation footprint will however have an extent of approximately 1ha (100m x 100m) due to associated infrastructure (such as building foundations), construction activities and the clearing of vegetation around the site to provide a fire break around the substation building.

1.4.1.2. Construction of the Umtu-Ferrum sub-transmission line

A new ± 70 km 132kV sub-transmission line will be required between Ferrum MTS and the new substation, for which three alternatives have been proposed. At the Ferrum MTS, a new 132kV feeder bay will be installed to accommodate the new sub-transmission line.

Various types of supporting structures (poles) for sub-transmission lines have been designed by Eskom over time, in order to deal with the various landscapes that sub-transmission lines transverse. Due to the heterogeneity in landscapes along linear activities it is likely that various combinations of pole types will be required for the proposed Umtu-Ferrum sub-transmission line. Thus, the following pole/support structure types have been proposed all of which are "Raptor Friendly":

a. *Mono-pole self-supporting intermediate suspension structure* – A single steel pole with an alternating cross-arm arrangement for the suspension of three electrical cables and an earth wire (Figure 2, Appendix 4a and Appendix 4b). The depth at which the pole is buried ranges between 2.6 m and 3.0 m. The height of the pole above ground level (AGL) will range between 18.2 - 24.2 m. This is the preferred pole structure as it has the smallest physical footprint.

b. *Mono-pole guyed intermediate suspension structure* – A single steel pole with an alternating cross-arm arrangement for the suspension of three electrical cables and an earth wire (Figures 3 to 6). The pole will be supported by a single stay structure, with two guy cables, mid-way up the pole. The height of the pole above ground level will range between 18.2 - 24.2m. This pole type is used on rocky terrain, where foundations can become costly.

c. *Mono-pole strain structure* – A single steel pole with a cross-arm arrangement for the suspension of three electrical cables and an earth wire (Figures 7 to 9, Appendix 4c). Three stay structures (with two guy cables each) will be connected on the reverse side of each of the three electrical cables. The height of the pole above ground level will range between 18 - 24.0m. Poles will be buried at a depth of 2.0 m and a concrete cap and earthing will be installed at the base of the pole.

This pole type can be used as a 0 º in-line strainer, with the diagonal stays at any angle between 1 º and 100 º. A variety of stay arrangements are possible and will depend on the specific application / environment.

d. *H-Pole Series* – This series of pole types is a double steel pole structure with a cross pole in an H-configuration (Figures 10 to 18). The height of the structure above ground level will range between 15.1 - 20.1 m and will be buried at a depth of 2.0 m. The distance between the two vertical poles is 4.0 m.

The H-pole used for horizontal application, where existing transmission lines need to be crossed. The poles can be used to suspend electrical cables either over or under the existing transmission lines (Figures 10 to 15). They are also used as terminal structures with an in-line approach to the substation (Figures 16 to 18).

e. *Mono-pole intermediate angle suspension structure* – A single steel pole with a cross-arm arrangement for the suspension of three electrical cables and an earth wire (Figures 19 and 20, Appendix 4d). Three stay structures (with two guy cables each) will be connected on the reverse side of each of the three electrical cables. The height of the pole above ground level will range between 17.4 - 21.0 m. Poles will be buried at a depth between 2.6 and 3.0 m and a concrete cap and earthing will be installed at the base of the pole This pole type is used on slight angles of up to 23º.

f. *Three-pole strain structure* – This structure involves three steel poles aligned along side each other perpendicular to the direction of the sub-transmission lines (Figure 21). Each pole has attachment for one electrical cable (Type A) and one of the outer poles will be extended for the attachment of an earth wire (Type B). The height above ground level of the Type A pole ranges between 6.2 - 16.1 m and the Type B pole (with the earth wire attachment) ranges between 8.4 m - 18.3. Both pole types are buried at a depth between 1.6 - 2.7 m. Depending on the application, this

pole type can be used as either a freestanding or guyed structure. This pole type is very costly and is therefore normally used for very long spans, such as where transmission lines cross river, valleys and other unsuitable landscapes.

1.4.1.3. Creation of an electrical servitude

The 132kV sub-transmission line will require a servitude width of 9 m on either side of the sub-transmission line in the first section of the line from Ferrum substation. The servitude will then be 15.5 m on either side of line until it reaches Hotazel. At points where the line bends, a circular servitude with radius of 25.0 m will be required, which will accommodate stay configurations of guyed support structures. Spacing (span) between the structures is usually 275 m on flat terrain. The span can be increased to 600 m through the use of specifically designed supporting structures (such as the three-pole strain structure) where required, for example when crossing rivers and valleys.

Where any proposed power line runs adjacent to an existing power line with a voltage equal to or less than 132kV, a distance of 21.0 m will be required between the servitudes of each respective power line. Regular bush clearing is conducted by Eskom as required within the power line servitude.

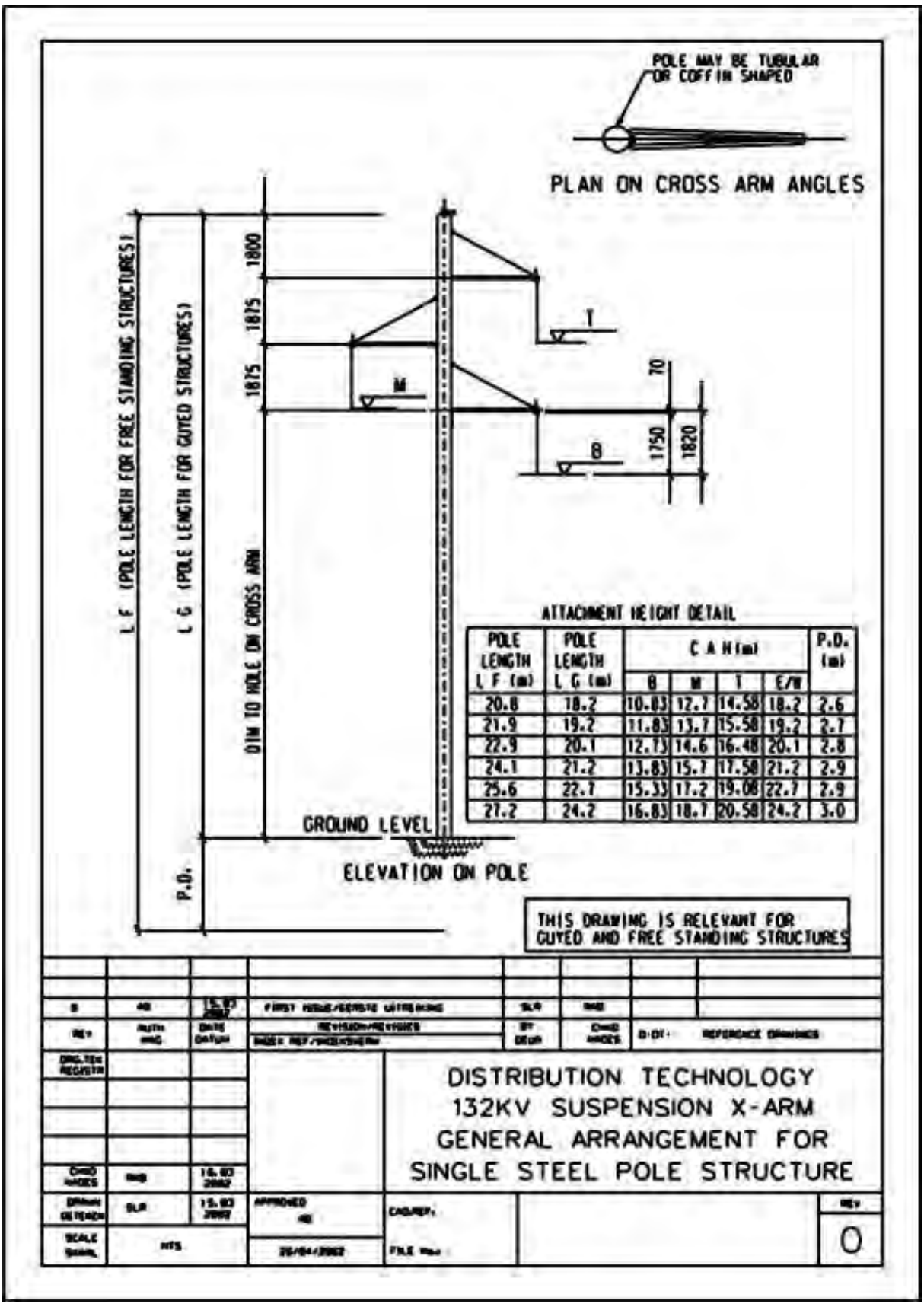


Figure 2: Mono-pole self-supporting intermediate suspension structure

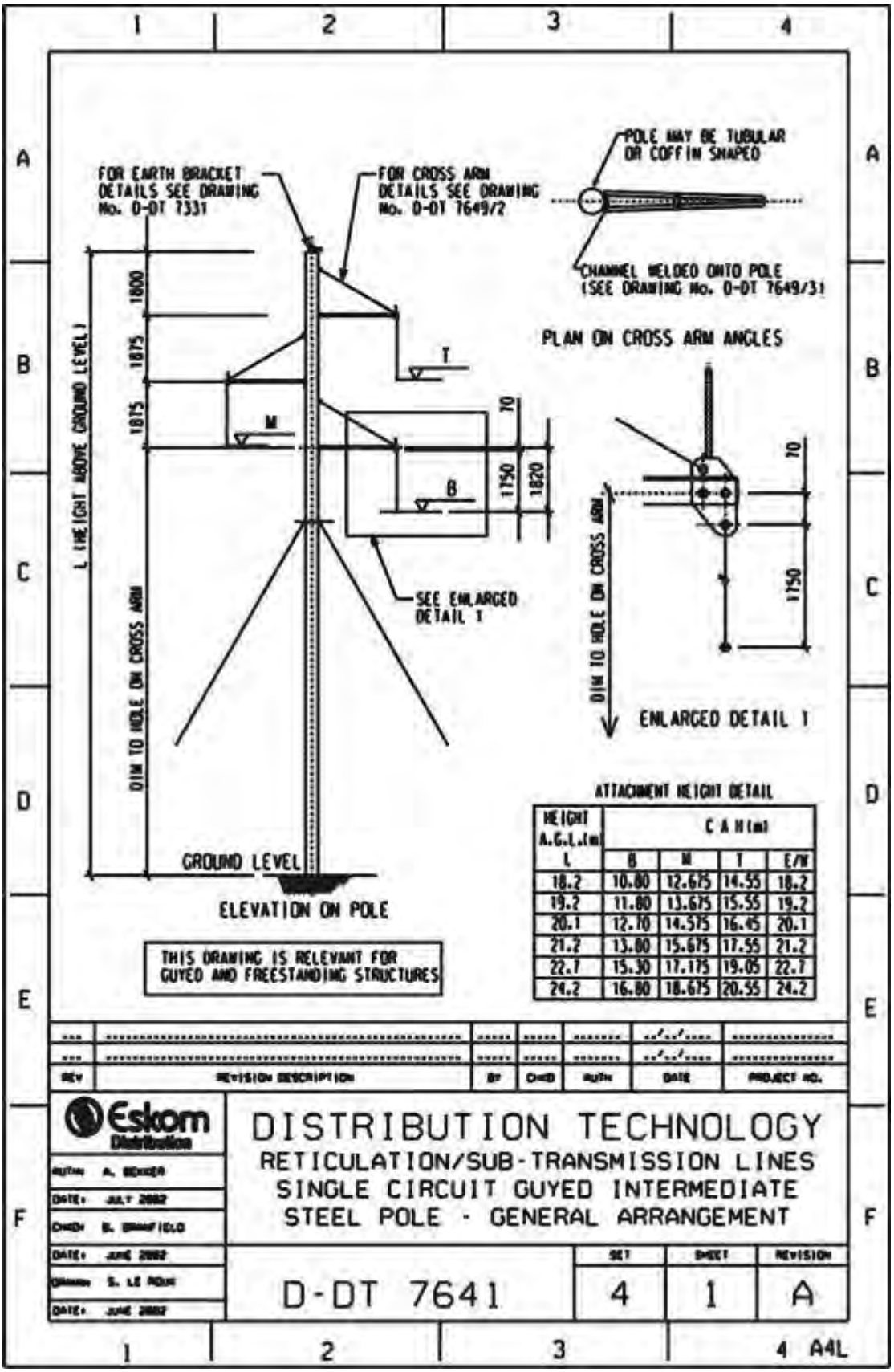


Figure 3: Mono-pole guyed intermediate suspension structure

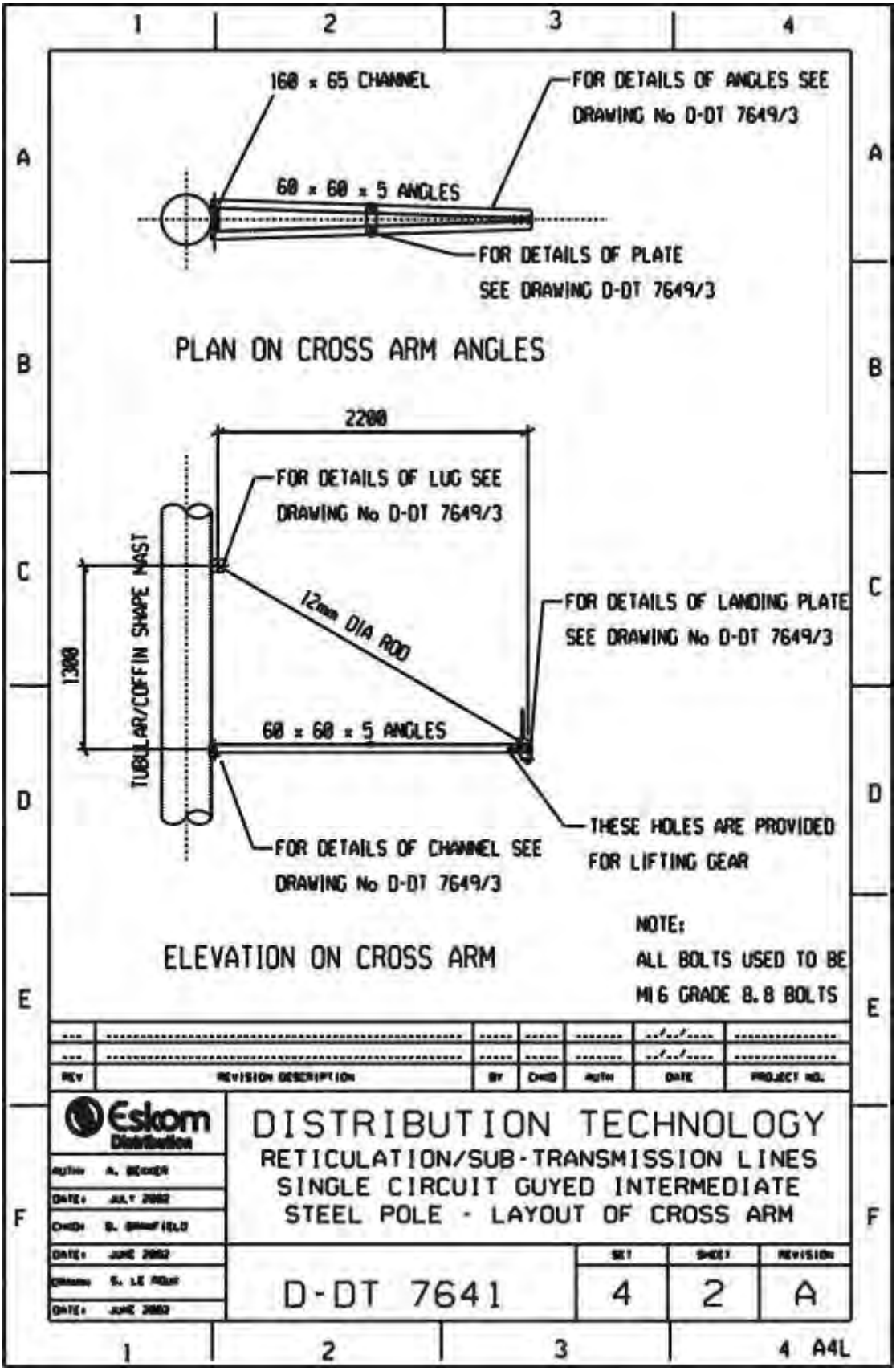


Figure 4: Mono-pole guyed intermediate suspension structure (cross-arm arrangement)

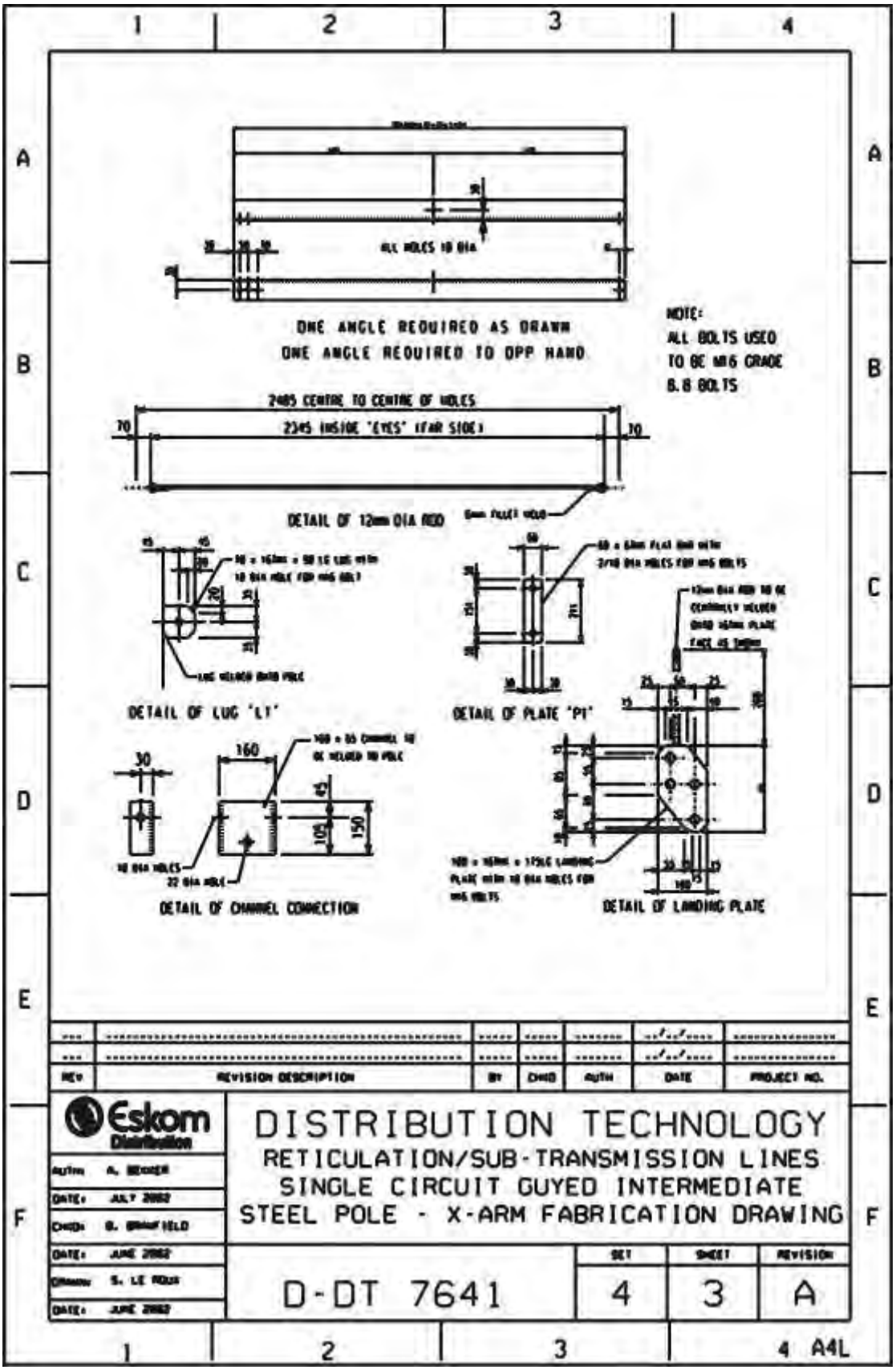


Figure 5: Mono-pole guyed intermediate suspension structure (cross-arm fabrication drawing)

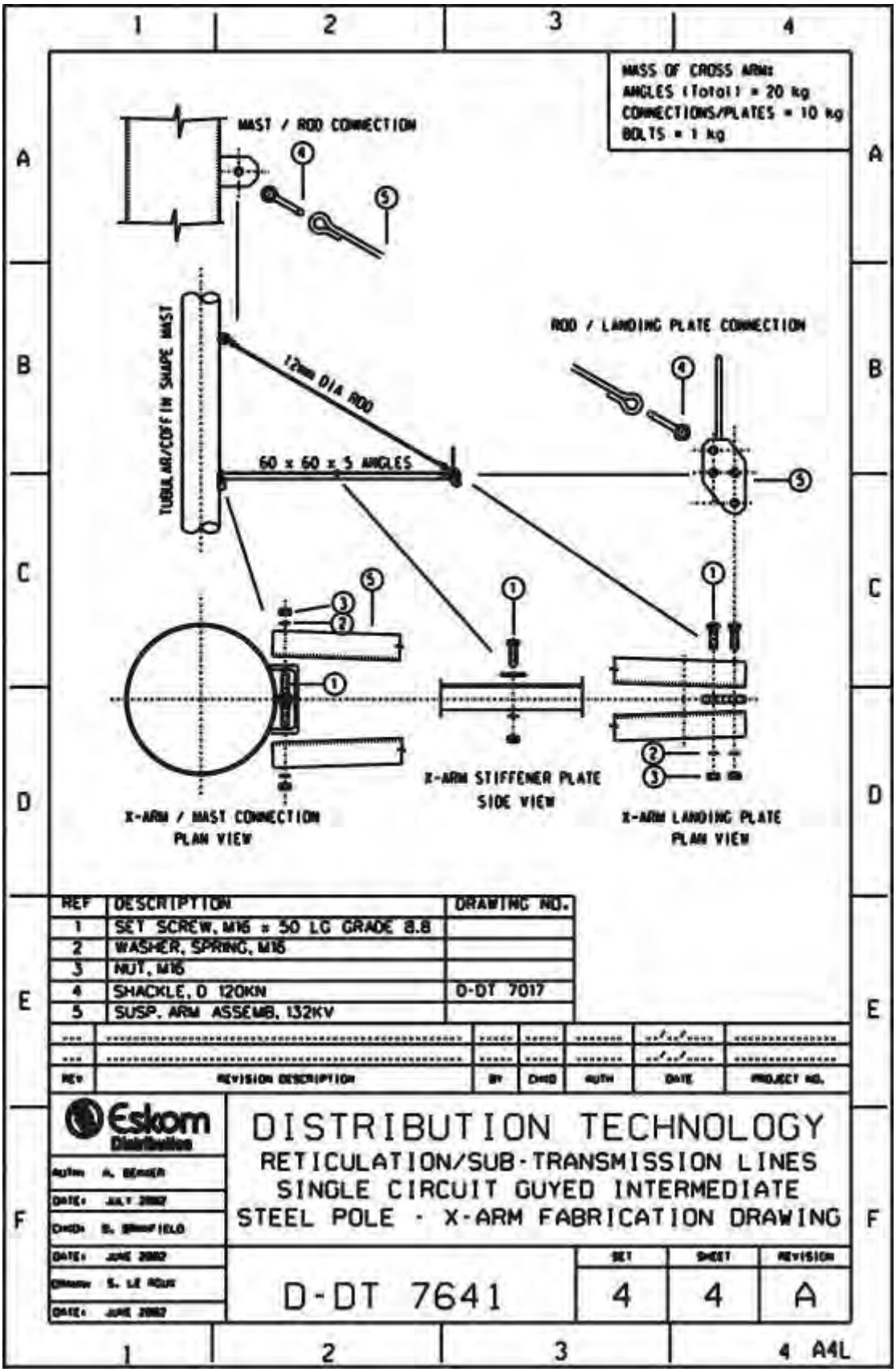


Figure 6: Mono-pole guyed intermediate suspension structure (cross-arm fabrication drawing)

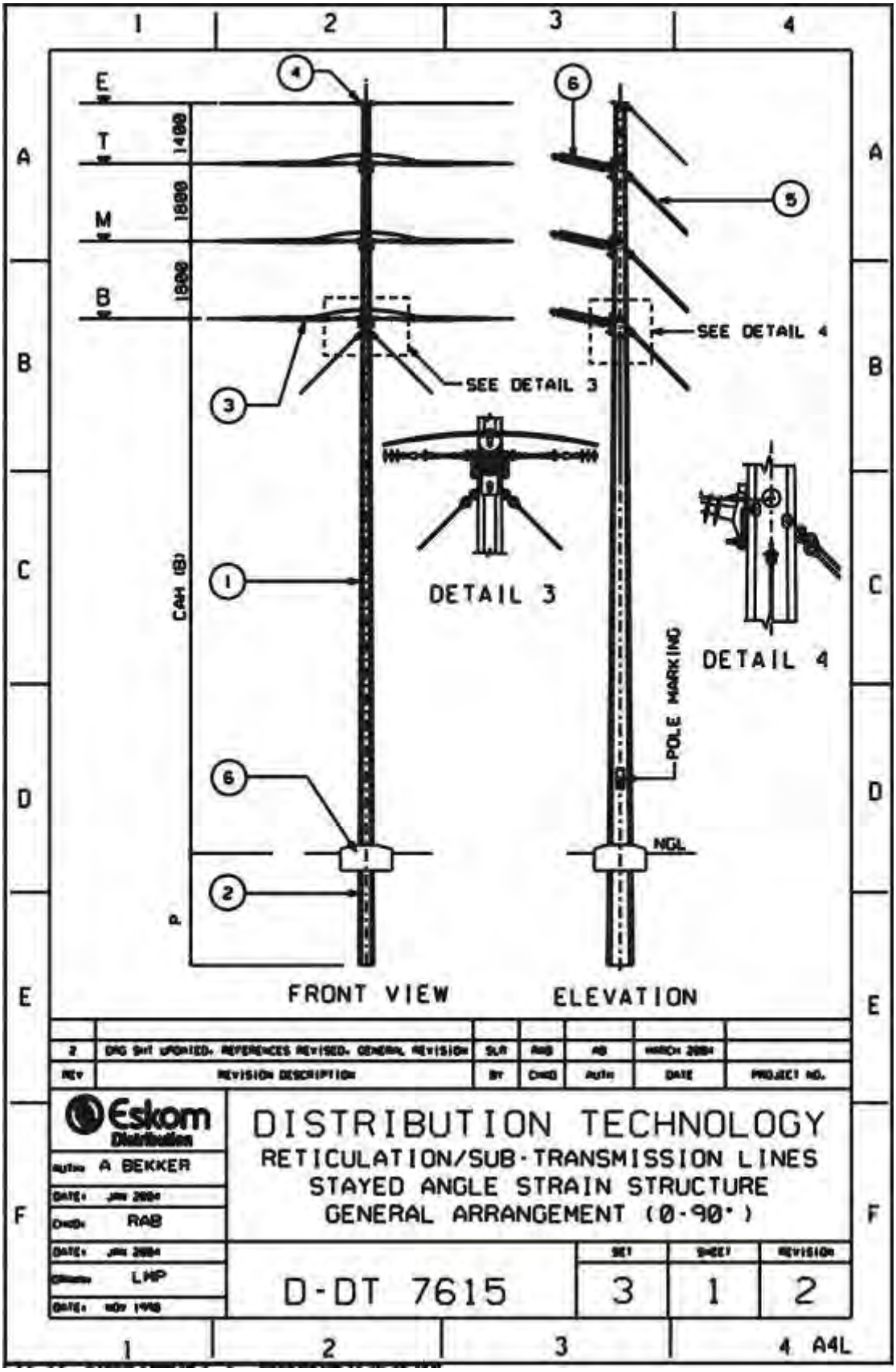
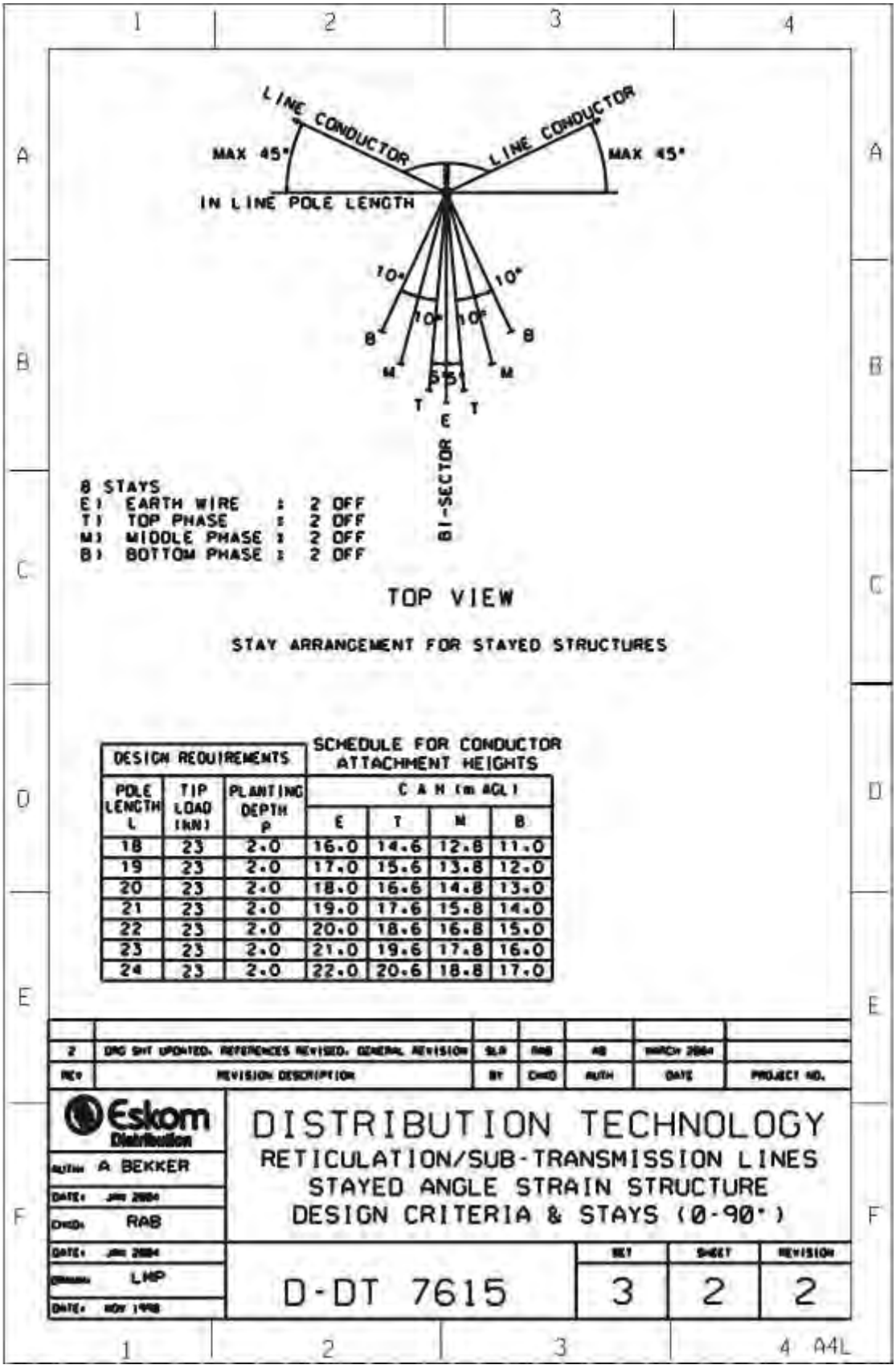


Figure 7: Mono-pole strain structure



SCHEDULE FOR CONDUCTOR ATTACHMENT HEIGHTS

DESIGN REQUIREMENTS			C A H (m AGL)			
POLE LENGTH L	TIP LOAD (kN)	PLANTING DEPTH P	E	T	M	B
18	23	2.0	16.0	14.6	12.8	11.0
19	23	2.0	17.0	15.6	13.8	12.0
20	23	2.0	18.0	16.6	14.8	13.0
21	23	2.0	19.0	17.6	15.8	14.0
22	23	2.0	20.0	18.6	16.8	15.0
23	23	2.0	21.0	19.6	17.8	16.0
24	23	2.0	22.0	20.6	18.8	17.0

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
2	DRG SHT UPDATED. REFERENCES REVISED. GENERAL REVISION	SLP	RAB	AB	MARCH 2004	

Eskom Distribution

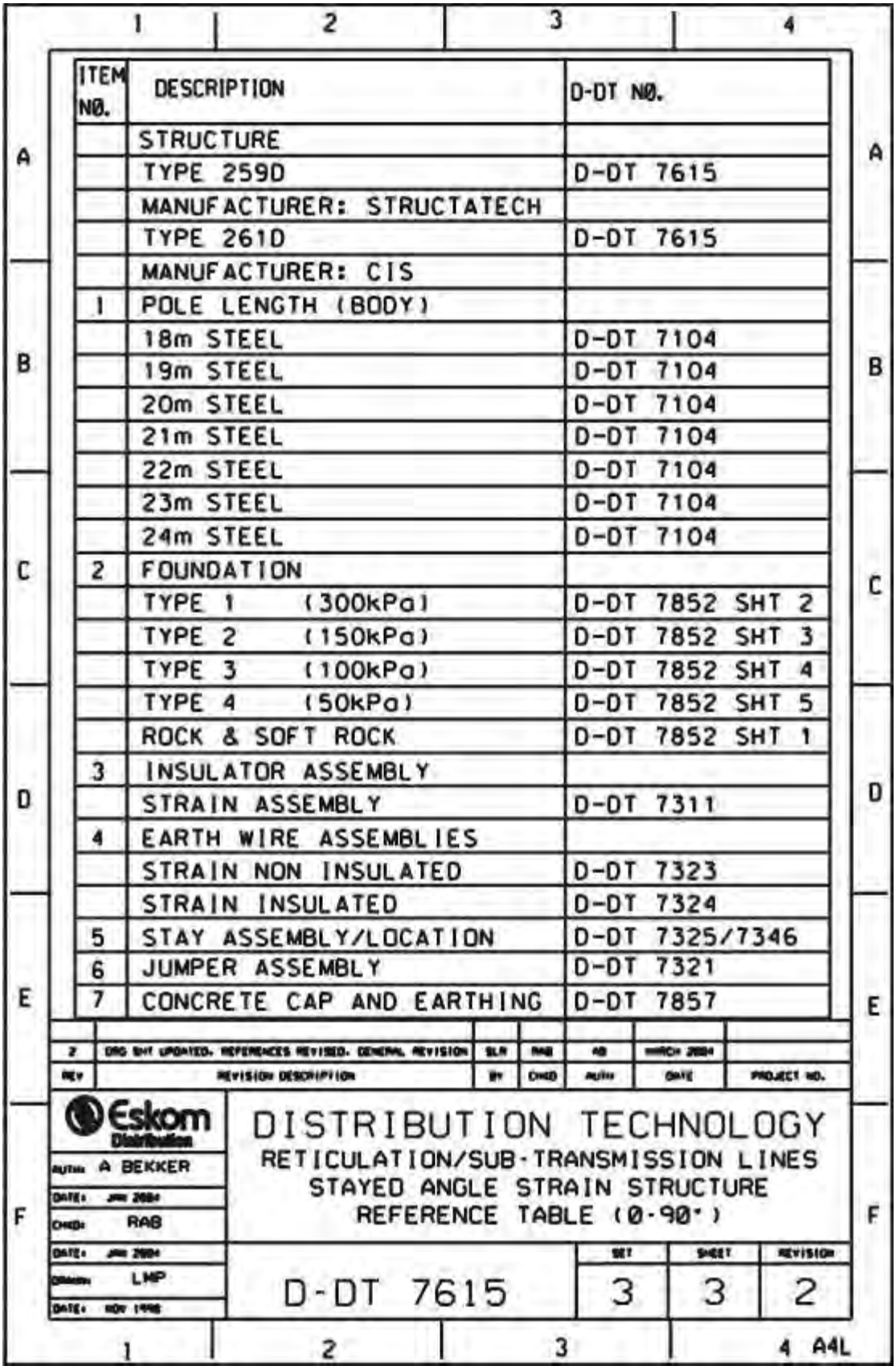
AUTH: A BEKKER
DATE: JAN 2004
CHKD: RAB
DATE: JAN 2004
DRAWN: LMP
DATE: NOV 1998

DISTRIBUTION TECHNOLOGY
RETICULATION/SUB-TRANSMISSION LINES
STAYED ANGLE STRAIN STRUCTURE
DESIGN CRITERIA & STAYS (0-90°)

	SET	SHEET	REVISION
D-DT 7615	3	2	2

A4L

Figure 8: Mono-pole strain structure (stay arrangement)



ITEM NØ.	DESCRIPTION	D-DT NØ.
	STRUCTURE	
	TYPE 259D	D-DT 7615
	MANUFACTURER: STRUCTATECH	
	TYPE 261D	D-DT 7615
	MANUFACTURER: CIS	
1	POLE LENGTH (BODY)	
	18m STEEL	D-DT 7104
	19m STEEL	D-DT 7104
	20m STEEL	D-DT 7104
	21m STEEL	D-DT 7104
	22m STEEL	D-DT 7104
	23m STEEL	D-DT 7104
	24m STEEL	D-DT 7104
2	FOUNDATION	
	TYPE 1 (300kPa)	D-DT 7852 SHT 2
	TYPE 2 (150kPa)	D-DT 7852 SHT 3
	TYPE 3 (100kPa)	D-DT 7852 SHT 4
	TYPE 4 (50kPa)	D-DT 7852 SHT 5
	ROCK & SOFT ROCK	D-DT 7852 SHT 1
3	INSULATOR ASSEMBLY	
	STRAIN ASSEMBLY	D-DT 7311
4	EARTH WIRE ASSEMBLIES	
	STRAIN NON INSULATED	D-DT 7323
	STRAIN INSULATED	D-DT 7324
5	STAY ASSEMBLY/LOCATION	D-DT 7325/7346
6	JUMPER ASSEMBLY	D-DT 7321
7	CONCRETE CAP AND EARTHING	D-DT 7857

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
2	DRG SHT UPDATED. REFERENCES REVISED. GENERAL REVISION	SLR	RAB	AB	MARCH 2004	

Eskom Distribution

AUTH: A BEKKER
DATE: JAN 2004
CHKD: RAB
DATE: JAN 2004
DRAWN: LMP
DATE: NOV 1998

DISTRIBUTION TECHNOLOGY
RETICULATION/SUB-TRANSMISSION LINES
STAYED ANGLE STRAIN STRUCTURE
REFERENCE TABLE (0-90°)

	SET	SHEET	REVISION
D-DT 7615	3	3	2

A4L

Figure 9: Mono-pole strain structure (reference table)

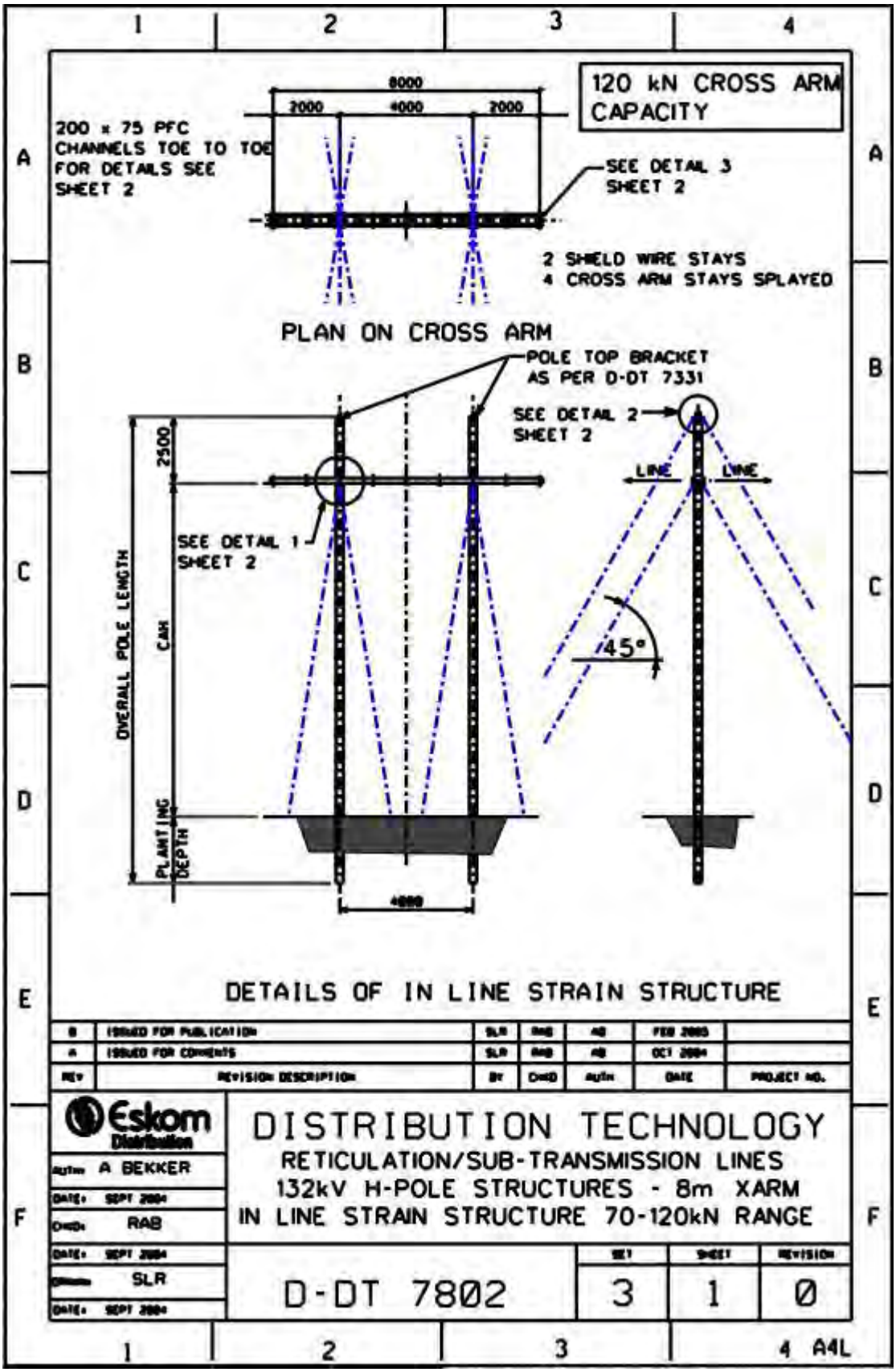


Figure 10: H-Pole Series – In-line strain structure

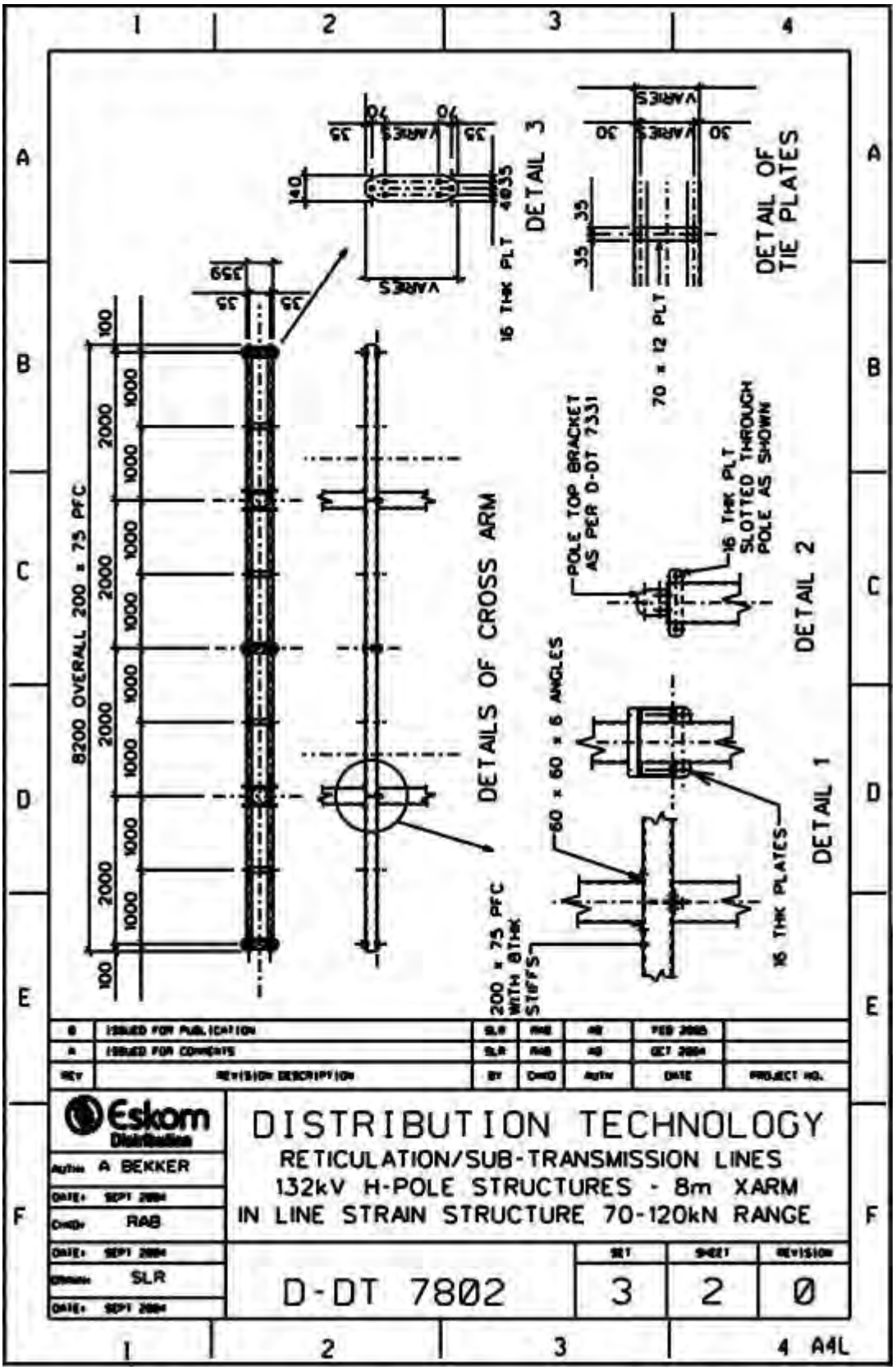


Figure 11: H-Pole Series – In-line strain structure (cross-arm arrangement)

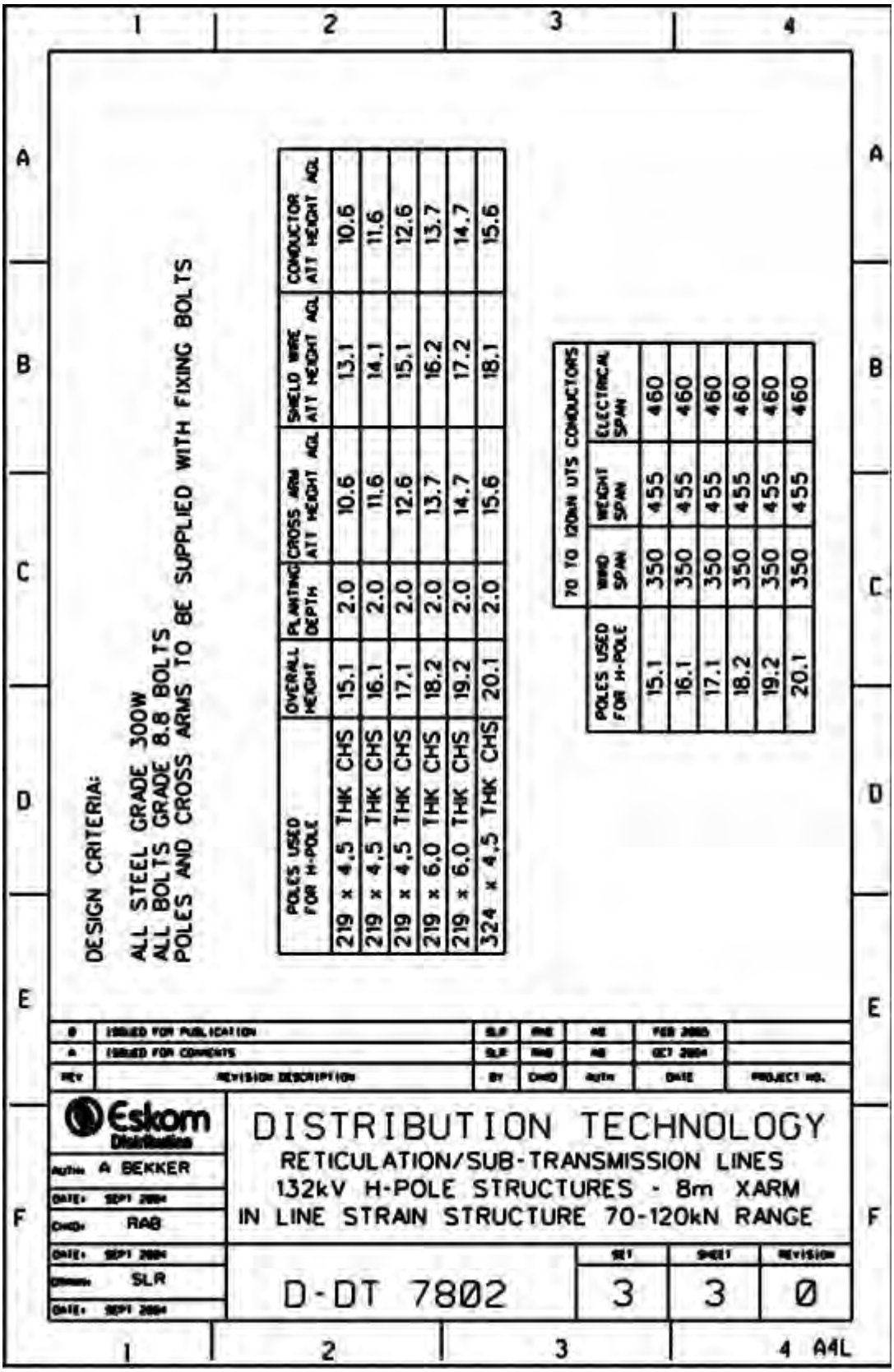


Figure 12: H-Pole Series – In-line strain structure (reference table)

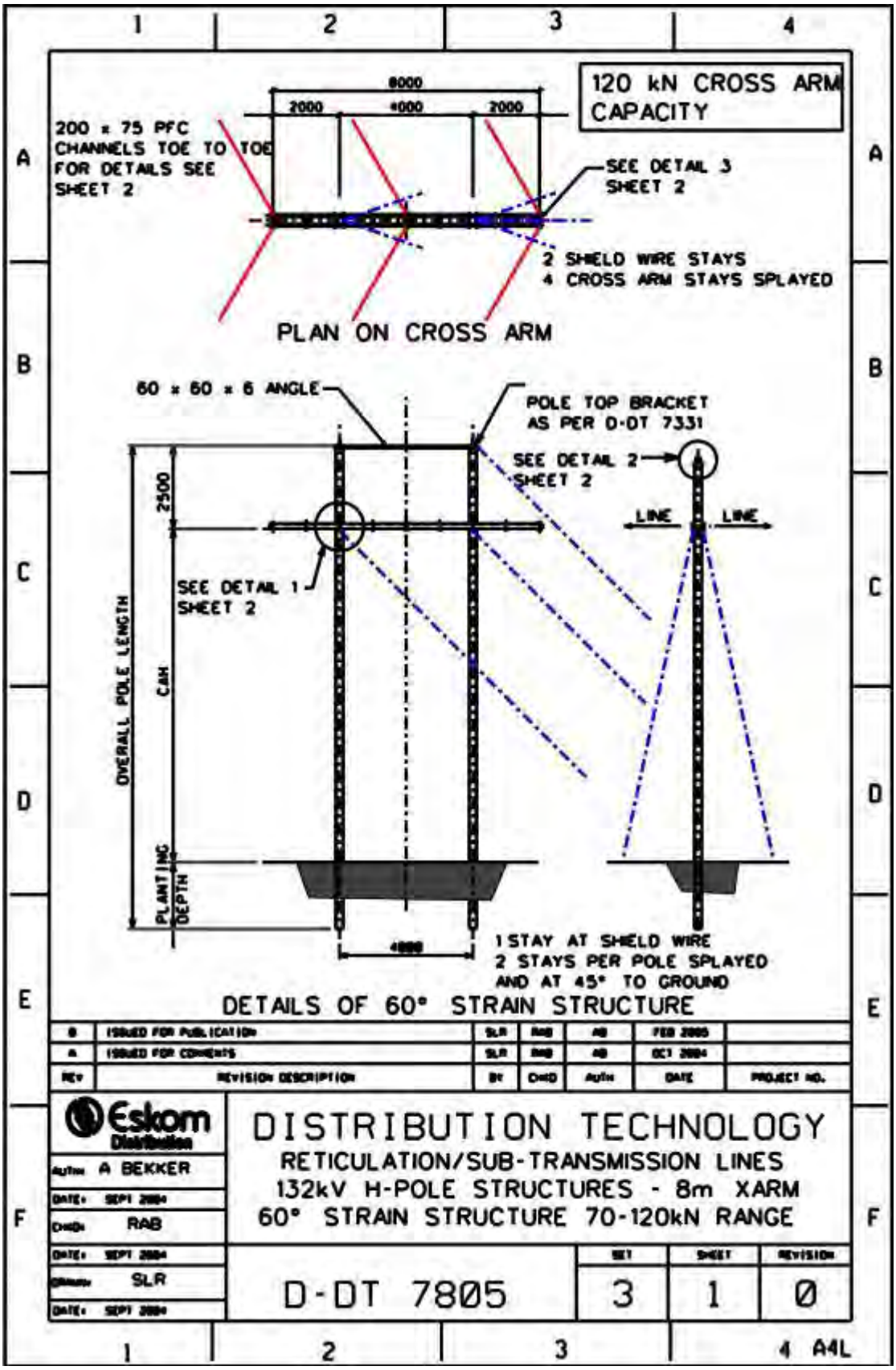


Figure 13: H-Pole Series – 60º strain structure

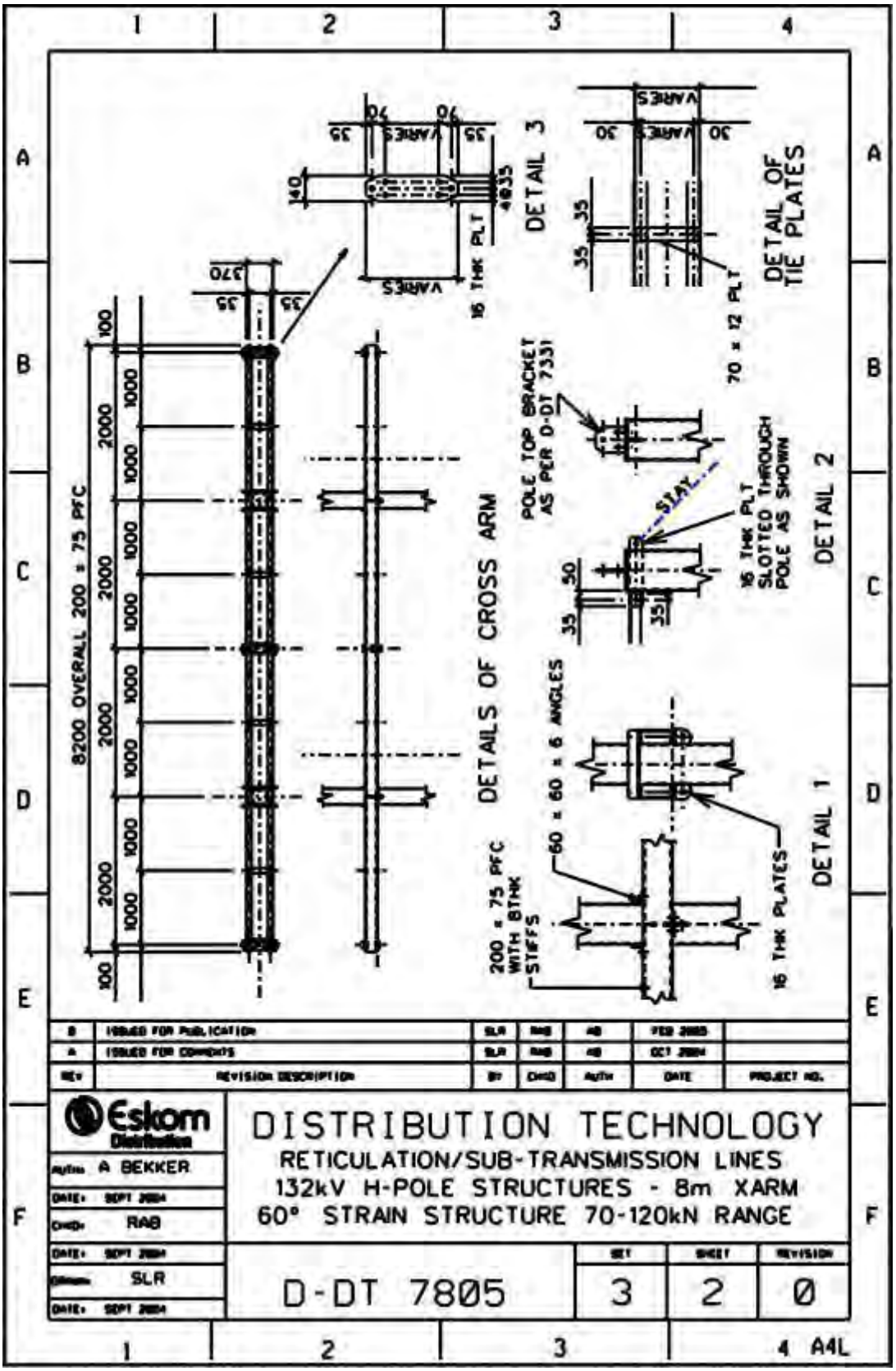


Figure 14: H-Pole Series – 60° strain structure (cross-arm arrangement)

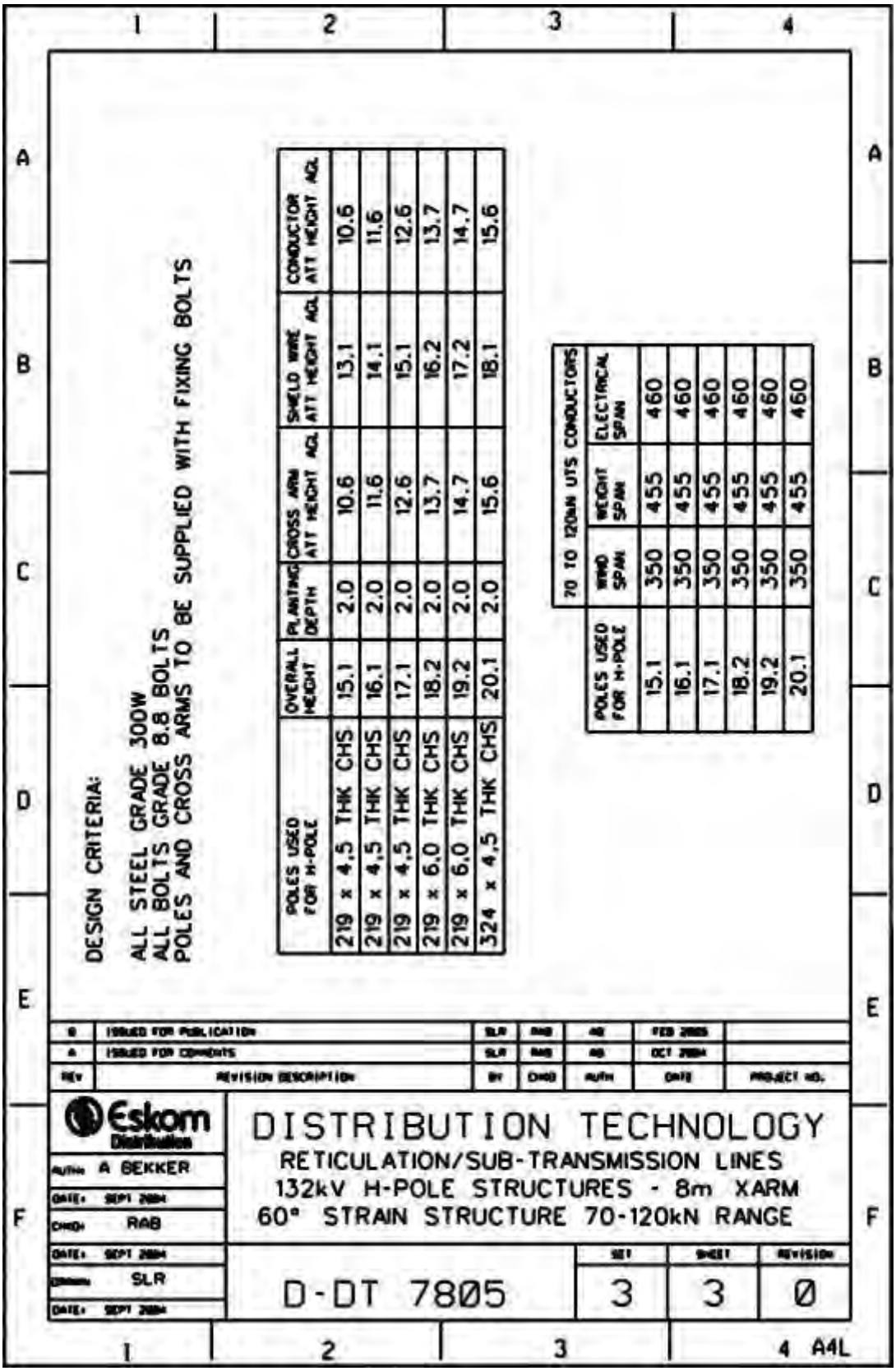


Figure 15: H-Pole Series – 60º strain structure (reference table)

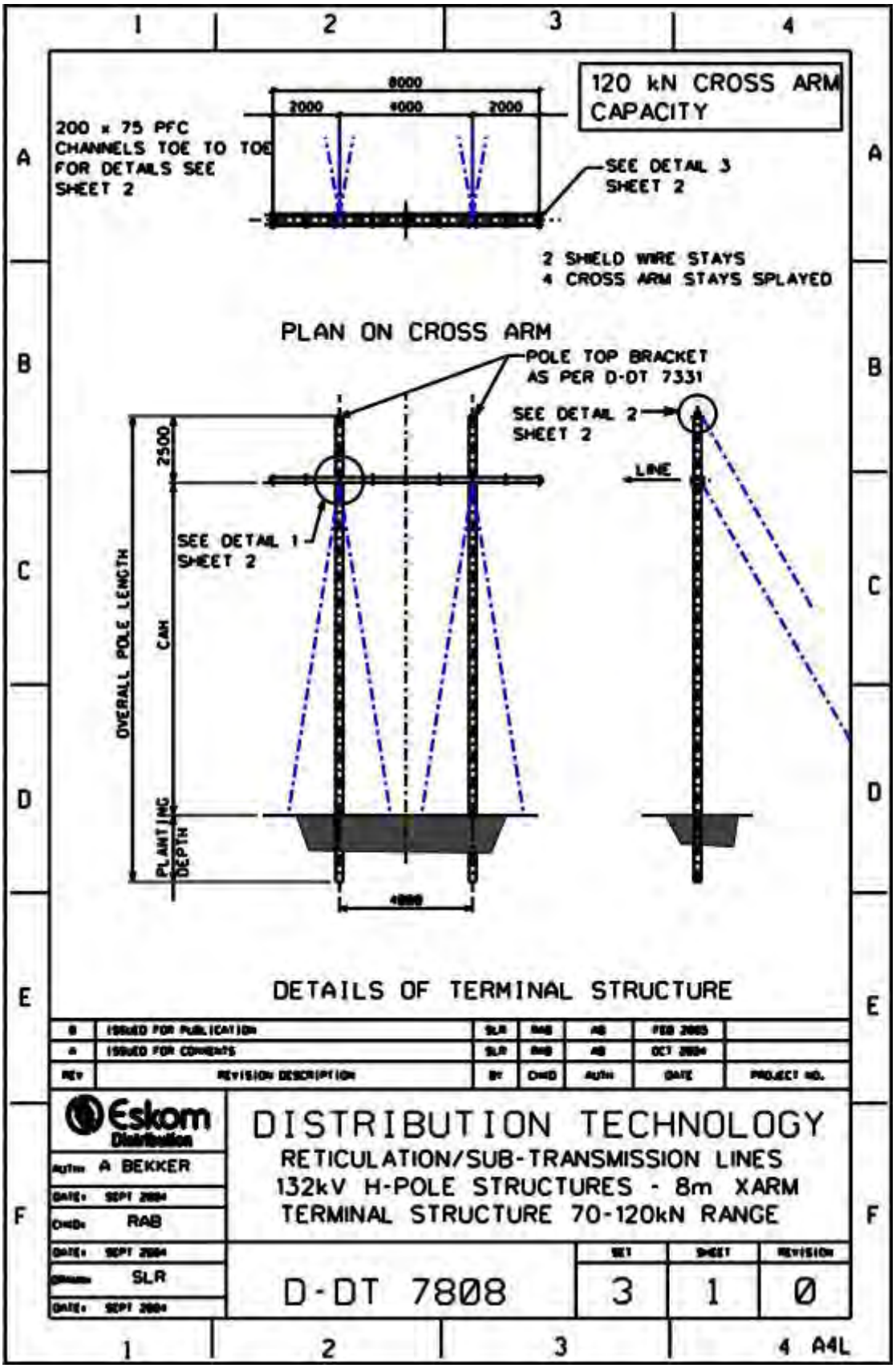


Figure 16: H-Pole Series – Terminal structure

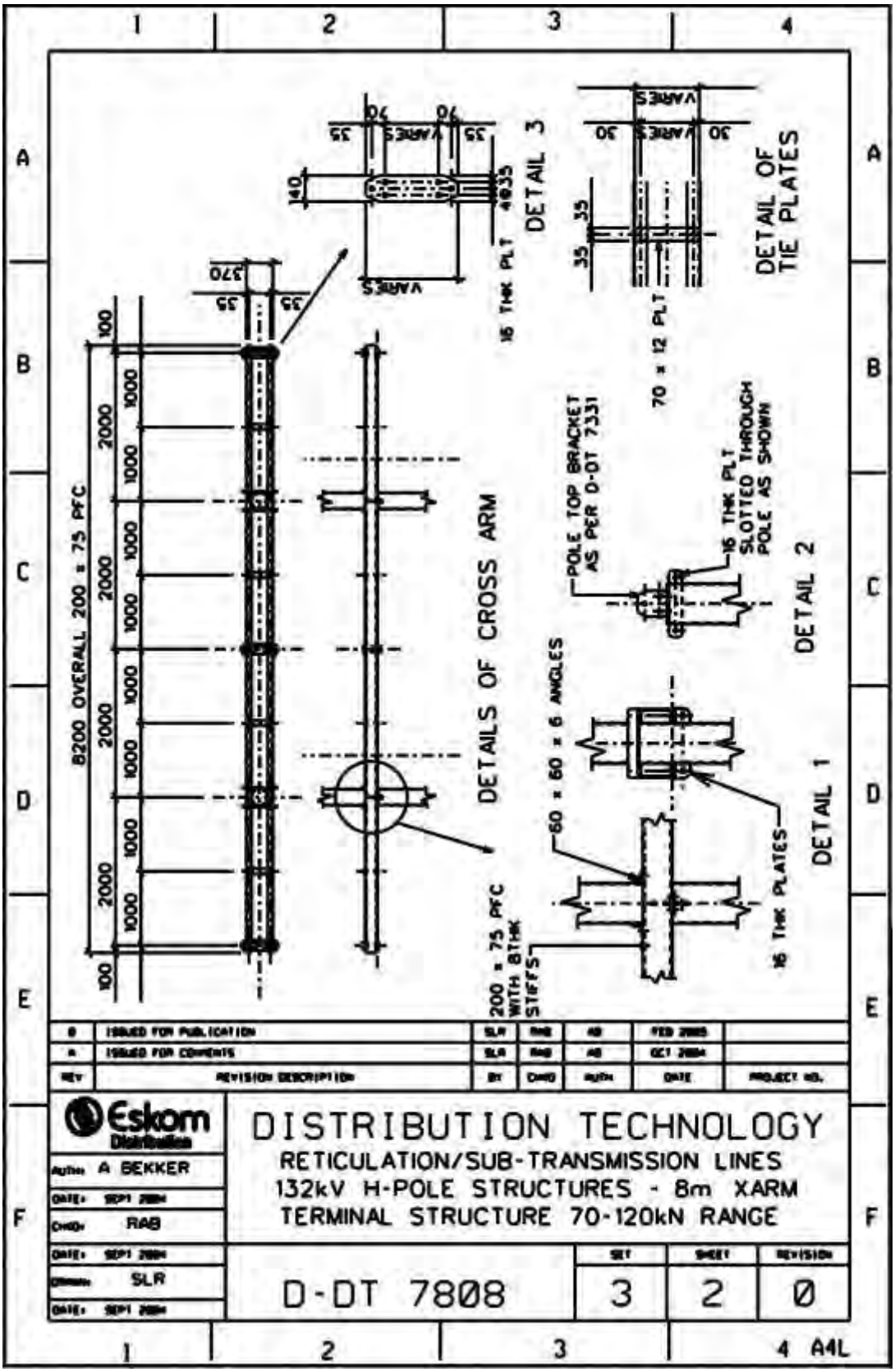


Figure 17: H-Pole Series – Terminal structure (cross-arm arrangement)

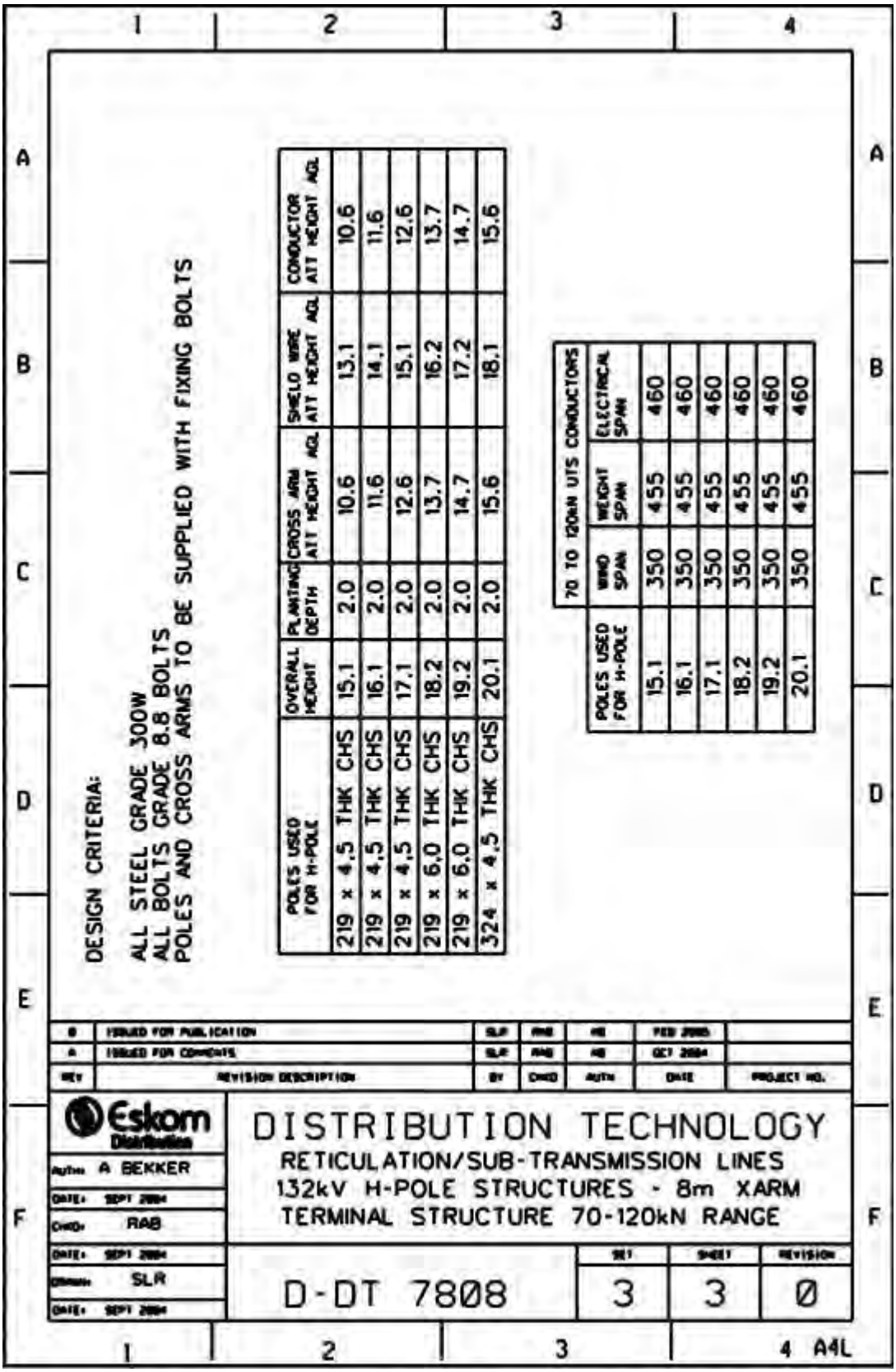


Figure 18: H-Pole Series – Terminal structure (reference table)

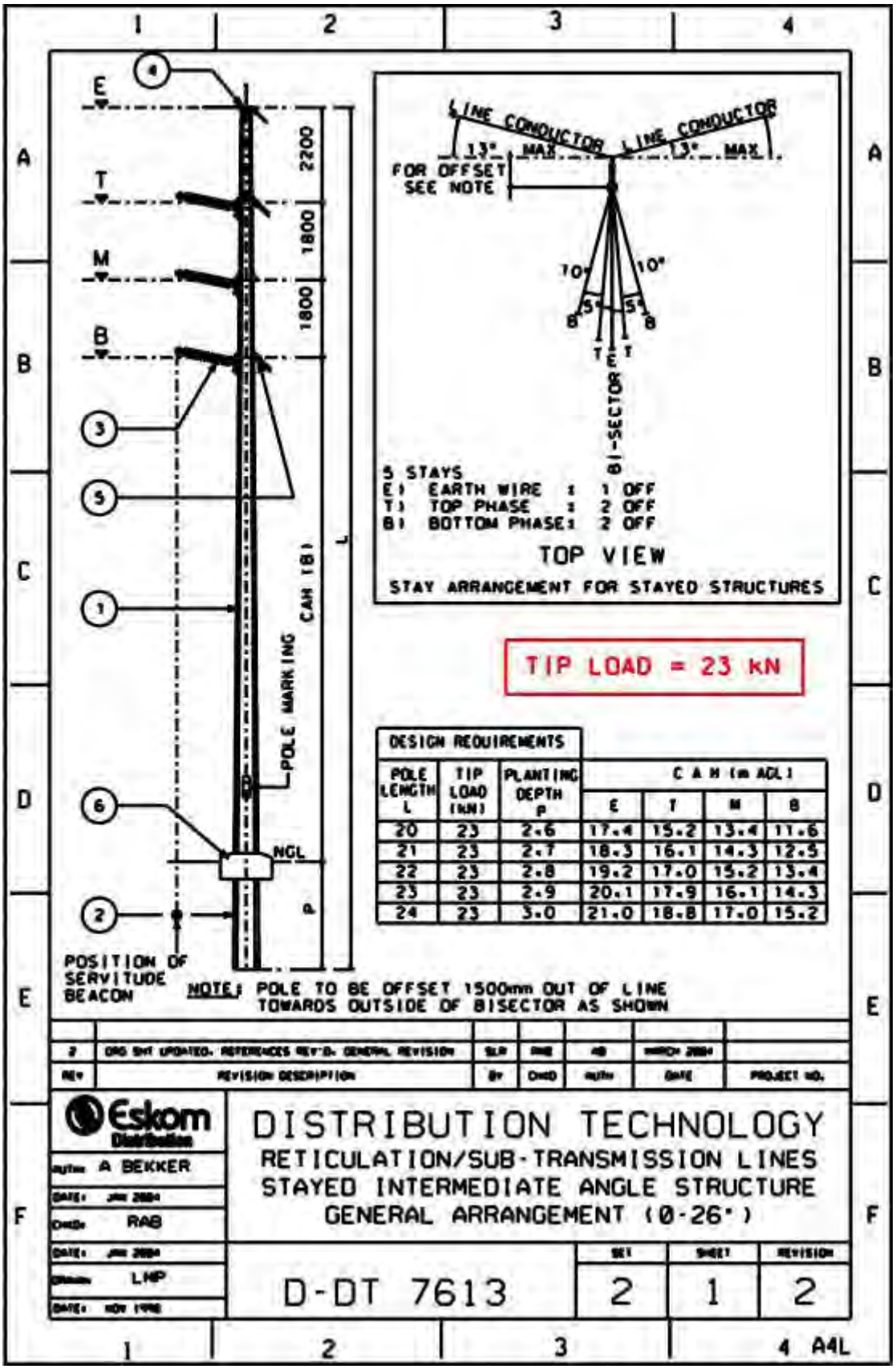
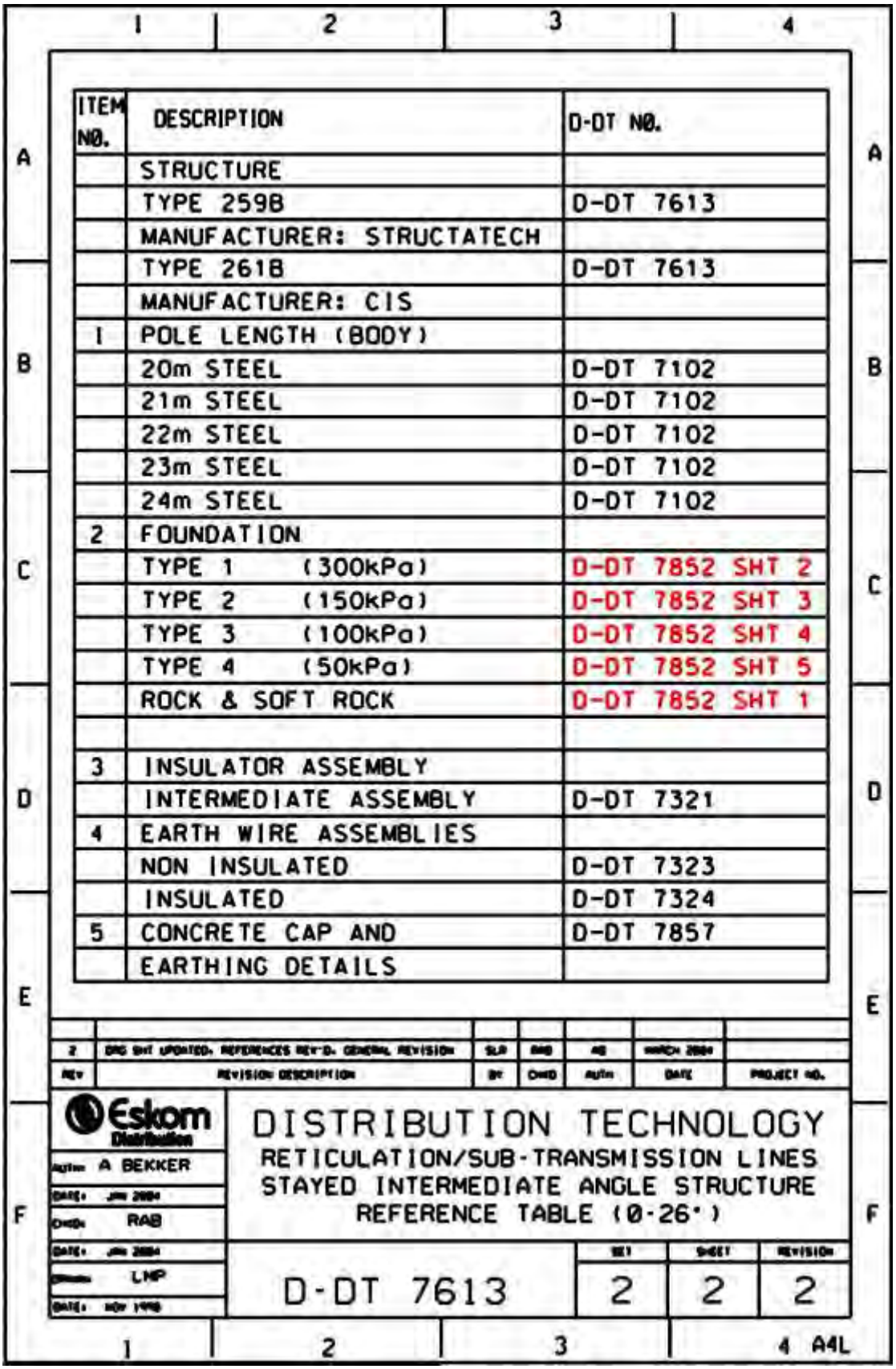


Figure 19: Mono-pole intermediate angle suspension structure



ITEM NØ.	DESCRIPTION	D-DT NØ.
	STRUCTURE	
	TYPE 259B	D-DT 7613
	MANUFACTURER: STRUCTATECH	
	TYPE 261B	D-DT 7613
	MANUFACTURER: CIS	
1	POLE LENGTH (BODY)	
	20m STEEL	D-DT 7102
	21m STEEL	D-DT 7102
	22m STEEL	D-DT 7102
	23m STEEL	D-DT 7102
	24m STEEL	D-DT 7102
2	FOUNDATION	
	TYPE 1 (300kPa)	D-DT 7852 SHT 2
	TYPE 2 (150kPa)	D-DT 7852 SHT 3
	TYPE 3 (100kPa)	D-DT 7852 SHT 4
	TYPE 4 (50kPa)	D-DT 7852 SHT 5
	ROCK & SOFT ROCK	D-DT 7852 SHT 1
3	INSULATOR ASSEMBLY	
	INTERMEDIATE ASSEMBLY	D-DT 7321
4	EARTH WIRE ASSEMBLIES	
	NON INSULATED	D-DT 7323
	INSULATED	D-DT 7324
5	CONCRETE CAP AND	D-DT 7857
	EARTHING DETAILS	

REV	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE	PROJECT NO.
2	DRG SHT UPDATED. REFERENCES REV-D. GENERAL REVISION	SLP	RAB	AB	MARCH 2004	

Eskom Distribution

AUTH: A BEKKER

DATE: JAN 2004

CHKD: RAB

DATE: JAN 2004

DRAWN: LMP

DATE: NOV 1998

DISTRIBUTION TECHNOLOGY
RETICULATION/SUB-TRANSMISSION LINES
STAYED INTERMEDIATE ANGLE STRUCTURE
REFERENCE TABLE (0-26°)

	SET	SHEET	REVISION
D-DT 7613	2	2	2

A4L

Figure 20: Mono-pole intermediate angle suspension structure (reference table)

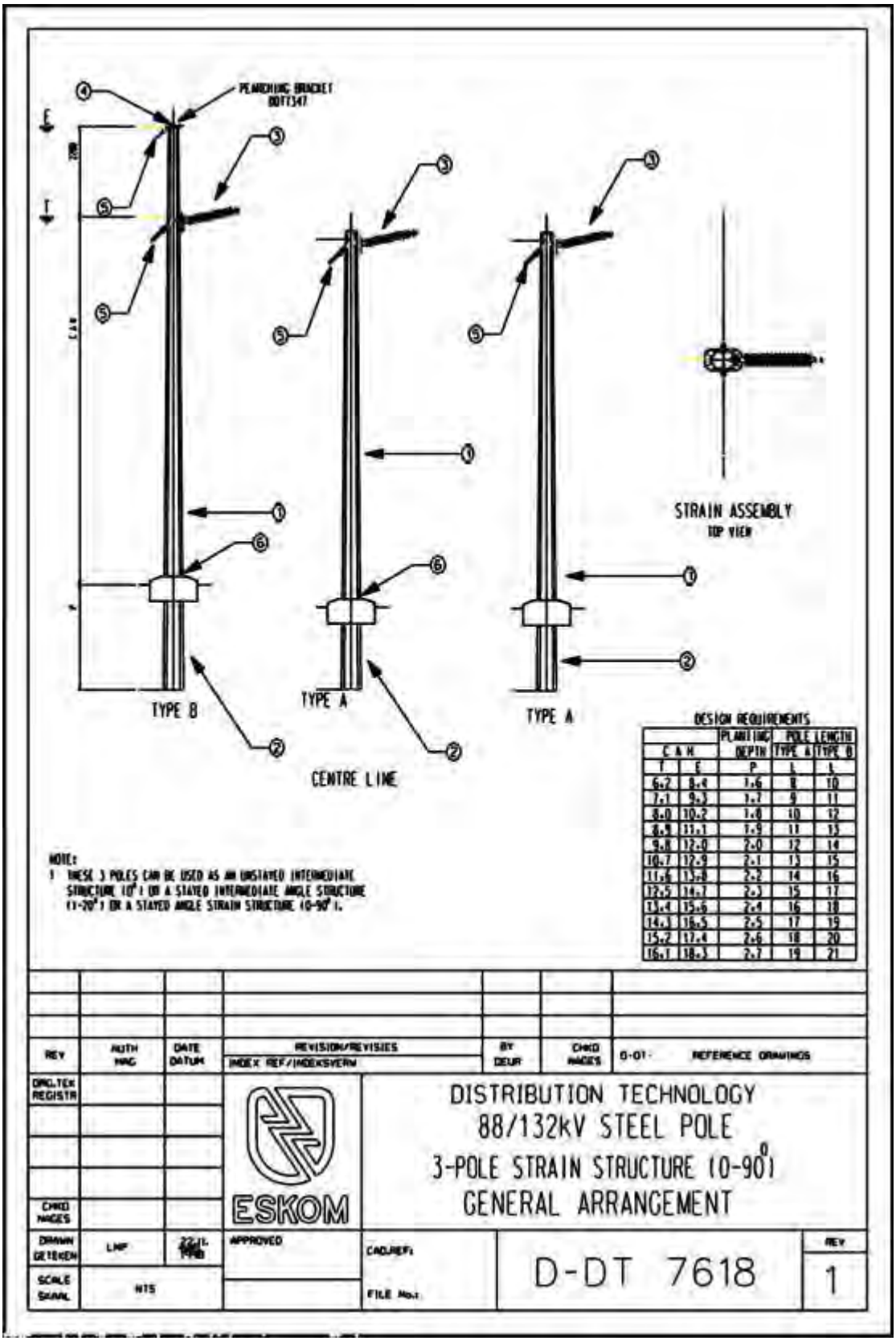


Figure 21: Three-pole strain structure

1.4.2. Strengthening of the Hotazel Distribution Network

Once the new Umtu Substation and new Umtu-Ferrum sub-transmission line have been completed Eskom intends to link the new Umtu Substation to the Hotazel Distribution Network, via a connection to the existing Hotazel DS, in order to create a ring network. This will increase the strength and reliability of the network as well as create a contingency or backup supply of power in the case of failures or maintenance occurring on the lines within the ring network.

One of the 132kV feeder bays that will be installed at the new Umtu Substation will be used to accommodate the new 7.33 km 132kV sub-transmission line required between the new Umtu Substation and the existing Hotazel DS. A new 132kV feeder bay will also be installed at Hotazel DS for this purpose.

The support structures and servitudes for the Umtu-Ferrum sub-transmission line described above will also apply to the new 7.33 km 132kV Umtu-Hotazel sub-transmission line.

1.4.3. Construction process for sub-transmission lines

The establishment of the proposed Sub-transmission Lines will entail four phases:

- Design;
- Pre-Construction;
- Construction; and
- Operational phase.

1.4.3.1. Design

Design alternatives for the proposed project relate mainly to the selection of the appropriate support structures in relation to the topography. The structures to be considered for this project are discussed in Section 1.4.1. Route planning is also an integral part of the design phase as it will determine exact locations for each of the pylon structures as well as what type of structures need to be used in what area along the route. These exact locations will sections determine where pegging and marking is required.

1.4.3.2. Pre-Construction Phase

This phase refers to all construction and construction related activities that will occur, within the servitude area, until the project is completed.

The pre-construction activities include the following:

- Negotiations for access via existing roads along the servitude;
- Erection of construction crew camps, site office cement batching and mixing plants and fuel depot;
- Servitude gate installation, to facilitate access to the servitude where fences with no existing gates are to be crossed;

- Transportation of equipment, materials and personnel
- Vegetation clearance to facilitate access, construction and the safe operation of the line; and
- The pegging and marking of all intermediate suspension, angle strain and terminal structure positions along the preferred sub-transmission line route, including the marking-out of temporary and permanent stay (guy) structures.

It should be noted that some of the proposed Sub-transmission Line route alignment alternatives occur adjacent to existing power lines with existing access routes. New access routes will therefore not be required.

1.4.3.3. Construction Phase

The construction activities include the following:

- Investigation of sub-soil conditions at marked structure positions;
- Drilling/excavation of holes for structure poles;
- Drilling/excavation of holes for permanent stay structures;
- Installation of stay structures;
- Installation of pre-cast concrete manhole rings and cement cap (foundation) structures for structure poles (Appendix 4e);
- Installation of temporary stay structures used to support structure poles during the construction process;
- Structure pole assembly and erection (Appendix 4a);
- Installation of standard electrical earthing systems;
- Stringing of conductor and earth wires; and
- Final inspection of the sub-transmission line and clearing of the construction site.

1.4.3.4. Operational Phase

The sub-transmission lines will be in operation immediately after completion of the project and will stay operational for the lifetime of the sub-transmission power line. Subsequent maintenance and refurbishment would normally occur during the operational lifetime of the power line, however the steel mono-pole sub-transmission line has an expected 25 year maintenance free period. Maintenance due to damage or fatigue caused by factors such as severe weather conditions will occur as and when required.

1.5. TECHNICAL SPECIFICATIONS OF THE SUB-TRANSMISSION LINE

This part of the specifications deals with information and criteria for design, engineering, supply, fabrication, construction, testing and commissioning of civil and structural work.

1.5.1. Standards

The design, manufacture, fabrication, galvanizing, testing, construction, materials used for manufacture, erection of structures, design & construction of foundations and shall conform to following South African National Standards (SANS) / international specifications. These include, but are not be limited to the following:

SANS 121 of 2000 and ISO 1461
Hot dipped galvanized coatings on fabricated iron and steel articles – Specification and test methods.

SANS EN 10240 of 1997
Internal and external protective coatings for steel tubes – Specification for hot dip coatings applied in automatic plants.

SANS 1200 GA of 1982
Standardised specification for civil engineering construction Section GA: Concrete (small works).

SANS 1200 DA of 1988
Standardised specification for civil engineering construction Section DA: Earthworks (small works).

SANS 10280
Code of practice for overhead power lines for conditions prevailing in South Africa.

DISPVABF3 – OHS Act
Requirements to be met by Principal Contractors employed by Eskom Distribution.

TRMSCAAC1
Sub-Transmission line towers line construction.

DISASADC1
Distribution Standards Part 6: Sub-Transmission lines. Section 11: Steel guyed mono-pole suspension structure (suspension arm).

SCSASABK0
Distribution Standards Part 6: Sub-Transmission lines. Section 11: Steel guyed mono-pole (132kV) compact line towers intermediate structure.

SCSSCABG2
Distribution specification for steel mono-pole compact line towers for Sub-Transmission lines.

1.6. PROJECT MOTIVATION

1.6.1. Provision of power to Kalahari Resources (Kalagadi Manganese)

According to the EIA conducted for the Manganese mine, for which Environmental Authorisation has been attained, forecast levels of growth in the steel industry for the medium term future predicted that there will be a need for increased manganese production capacity. Since South Africa, with more than 80% of the World's high grade manganese ore reserves, produces about 20% of the worlds manganese ore per year, with a production of 3.635 million tons in 2000, the Kalagadi Manganese mine near Hotazel presents the opportunity for a well-situated, modern plant with low operating costs and access to their own ore deposits.

The Kalagadi Manganese mine requires 4.5 Mega Watts (MW) of power during the construction phase and construction of the surface plant requires 1.5 MW. The entire operation will require 15 MW during production.

Kalahari Resources (Pty) Ltd (Kalagadi Manganese) made an application to Eskom Distribution for the provision of a new substation at the Kalahari Resources Umtu site in order to supply the power required for a new Manganese mine and sinter plant situated in close proximity to Hotazel, on the Farm Umtu No. 281, in the Northern Cape.

1.6.2. Strengthening of the Hotazel Distribution Network

Eskom has identified the Kalahari Resources application as an opportunity to strengthen the Hotazel Distribution network by building a new 132kV line from the new substation at the Umtu site through to Hotazel DS, thereby creating a ring network between Ferrum MTS, Hotazel Substation and Umtu Substation. This will increase the strength and reliability of the network as well as create a contingency or backup supply of power in the case of failures or maintenance occurring on the lines within the ring network.

2. APPROACH TO THE PROJECT

2.1. ENVIRONMENTAL ASSESSMENT PROCESS

2.1.1. Authority Consultation

Authority consultation plays an integral role in any EIA process. The authorities guide the process through highlighting the necessary legislative requirements and key areas of concerns. Both the national and local authorities were consulted during the Scoping and EIA process.

2.1.2. Application for Environmental Authorisation

The application for environmental authorisation (Appendix 2a) for the substations was submitted to the DEAT on 1 August 2008. Permission to undertake the scoping process required in terms of the EIA Regulations of 2006 was granted on 19 August 2008 (refer to Appendix 2b).

2.1.3. Environmental Assessment Process

The Scoping Report represented the initial identification of key issues or concerns as highlighted by the relevant authorities, interested and / or affected parties (I&APs) and professional judgment by the Environmental Assessment Practitioner (EAP).

In addition, the Scoping component of the EIA process allowed for the identification of the anticipated impacts, particularly those that required specialist investigations. The results of the specialist studies are included in this EIA Report and the specialist studies form an appendix to this report (Appendix 6). A full assessment of the impacts and proposed alternatives also form part of this EIA Report.

2.1.4. Description of the Baseline Environment

The baseline environment (or prevalent environmental status) of the project is the current status of the environmental conditions and environmental resources and existing levels of pollution or degradation prior to the proposed development. Baseline information was determined from a site visit on 25 and 26 August 2008, secondary sources and specialist findings.

2.2. METHODOLOGY

2.2.1. Site Visit

A site visit was undertaken on 25 and 26 August 2008. The site of the proposed new Umtu Substation was inspected. The area through which the route alternatives are proposed was viewed as far as possible from the nearest roads to the alternatives (R31 and R380 motorways). Each route has been fully surveyed and assessed by the specialist studies.

2.2.2. Specialist Studies

The EIA process requires the identification and the undertaking of specialist studies to inform the Scoping Report and the EIA Report. Table 1 shows the specialist studies that have been identified and undertaken for the proposed development.

Table 1: Specialist studies completed

Name	Organization	Specialist assessment
Antoinette Eyssell	Strategic Environmental Focus (Pty) Ltd.	Terrestrial Ecology Impact Assessment.
Frans Prins	Strategic Environmental Focus (Pty) Ltd.	Heritage Impact Assessment.
Ilse Mathys	Strategic Environmental Focus (Pty) Ltd.	Agricultural Potential Soils Assessment.
Kingstone Matanda & Christa de Waal	Strategic Environmental Focus (Pty) Ltd.	Visual Impact Assessment.
Hilda Bezuidenhout	Strategic Environmental Focus (Pty) Ltd.	Social Impact Assessment.
John Smallie	Endangered Wildlife Trust.	Avifauna Impact Assessment.

The specialist recommendations are incorporated in the Environmental Management Plan (EMP). The activities as described in the project description were assessed on both an individual as well as a cumulative level with respect to the project in its entirety. Table 2 contains the anticipated time frames for the way forward. The EIA process has specific time frames which are illustrated in a Figure 22.

Table 2: Anticipated time frames with respect to the completion of the EIA process

Activity	Date	
	Start	End
SCOPING PHASE		
Public Review of Draft Scoping Report	14 October 2008	12 November 2008
Submission of Final Scoping Report and Plan of Study for EIA to the Authorities	20 November 2008	20 November 2008
Authority Review of Final Scoping Report and Plan of Study for EIA	November 2008	February 2009
EIA PHASE		
All specialist studies	November 2008	February 2009
Public Review of Draft EIA Report	12 May 2009	11 June 2009
Submission of Final EIA and EMP to the Authorities	22 July 2009	22 July 2009
Authority Review of Final EIA and EMP	23 July 2009	23 October 2009

These time frames are in line with prescribed EIA time frames.

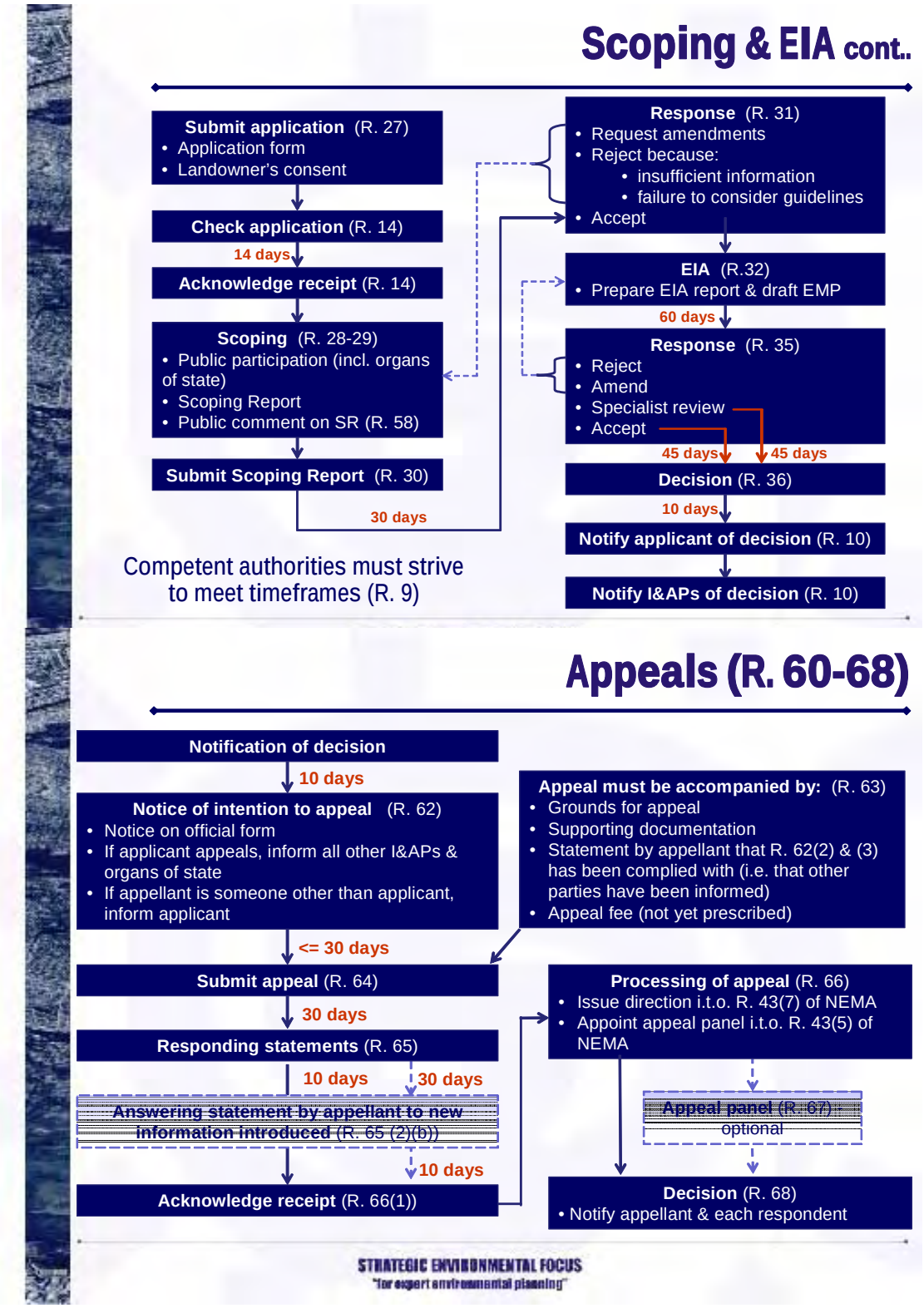


Figure 22:EIA Prescribed Scoping EIA Timeframe

2.3. ASSUMPTIONS AND LIMITATIONS

2.3.1. Public Participation

There are no serious assumptions or limitations that would affect the outcome of the EIA Process. Sufficient resources were available for the proper undertaking of the EIA Process. All possible measures were employed in order to notify landowners and other affected parties of the EIA Process, including deeds searches, local and regional press advertising, site notices, "knock and drop" notifications and direct notification of directly affected landowners and adjacent landowners. A public meeting was conducted during the authority review of the Final Scoping Report that ensured that all interested and affected parties were given the opportunity to express their concerns regarding the EIA process and the proposed development. Their comments are included in the Comments and Response Report Appendix 3(f).

2.3.2. Terrestrial Ecology Impact Assessment

In order to obtain a comprehensive understanding of the dynamics of communities and the status of endemic, rare or threatened species in an area, vegetation and faunal studies should ideally be replicated over several seasons and over a number of years. However, due to time constraints such long-term studies were not feasible. Consequently, the results are based on data and observation collected during a single five day field survey and a comprehensive literature review.

While the site visit was undertaken from 13 to17 October 2008, no sufficient summer rainfall was yet recorded for the region. Many of the herbaceous plant species within the Kalahari only appear after rainfall events, thus the present five day survey cannot be considered to be comprehensive. However, some previous rains did allow for several plant species to be identified.

Furthermore, access to farms and in specific farm portions intersected by the proposed power lines, was not generally attainable.

2.3.3. Heritage Impact Assessment

Limitation: A walk down assessment was not conducted.

2.3.4. Agricultural Potential Soils Assessment

The information base used, namely land type memoirs, is of a reconnaissance nature (1:250 000 scale) and only represents the dominant soils, climate, terrain and geology within a specific land type. The information can thus only to be used to outline areas of soils suitable for more intensive use (Ellis & Lambrechts, 2003). This methodology used for assessing the agricultural potential of soil has previously been used by the Agricultural Research Council for similar assessments (Paterson, 2007) with respect to dryland crop production potential and not other agricultural

enterprises. Therefore recommendations can only be made based on impact on dryland crop production.

2.3.5. Visual Impact Assessment

The assessment was undertaken during the conceptual stage of the project and is based on information available at the time.

Assumptions

- An exact commencement date for the construction phase is unknown. Construction is expected to commence as soon as public participation is complete and approval is received from the relevant authority;
- The exact location, size and number of construction camps material lay-down yards are not yet specified at this stage of the project. It is anticipated that construction camps will be set up on farms at central locations along the preferred alignment. The construction camps will consist of temporary structures such as tents or temporary buildings. Ablution facilities will also be associated with construction camps and are expected to be portable toilets and temporary shower facilities;
- The exact alignment of the proposed sub-transmission lines and positions of the pylons are not yet determined and the alternatives only specify proposed corridors. The visibility results have been generated from three anticipated alignments;
- The study area is an exceptionally large area and an in depth site investigation is unfeasible, considering the timeframes and budget allocated for the assessment. The assessment is based on information gathered from desktop studies and confirmed during the site investigation. The route of travel was considered to be representative of the majority of the study area and provided enough detail to complete the assessment with reasonable accuracy; and
- This level of assessment excludes surveys to establish viewer preference and thereby their sensitivity. Viewer sensitivity is determined by means of a commonly used rating system.

2.3.6. Social Impact Assessment

It is essential that the SIA should be based on current and accurate project information. Similarly the geographic extent of the SIA is influenced by project design and overall planning processes. As this process is on-going, the SIA report is based on information received during the Environmental Process. This report takes into consideration project information relating to planning and design, implementation and infrastructure placement available to the SIA team during the compilation of this report.

The following assumptions are pertinent:

- It is assumed that local employment will be a priority for all operations;
- It is assumed that the 2001 Census data is not entirely accurate, but it provides a broad reflection of the social environment; and

- It is assumed that the information obtained during the Public Participation Process was accurate and also informed the study.

2.3.7. Avifauna Impact Assessment

This study made the assumption that the background information used in the study is reliable.

- The SABAP data covers the 1986-1997. Bird distribution patterns fluctuate continuously according to availability of food and nesting substrate. (For full discussion of potential inaccuracies in ASAB data, see Harrison, Allan, Underhill *et el* 1997).
- Difficult road access in some sections of the study area made examination of the study area from the ground difficult.

General comment: Predictions in this study are based on experience as well as the knowledge of similar species found in different parts of South Africa. Bird behaviour can not be reduced to formulas that will hold true under all circumstances. However, power line impacts can be predicted with a fair amount of certainty, based on experience gained by the authors through investigation of hundreds of localities in Southern Africa where birds have interacted with power lines since 1996.

2.4. IMPACT ASSESSMENT METHODOLOGY

In order to provide a detailed assessment of environmental impacts in accordance with the requirements of the EIA regulations (2006), a quantified assessment methodology was used. In order to establish a coherent framework within which all impacts could be objectively assessed, a rating system was used. This has been applied consistently throughout all criteria and to all environmental impacts. Each aspect was assigned a value ranging from one to five, depending on its definition (Figure 23).

This rating system provides an appraisal of the type of effect the proposed activities can impose on the affected environmental component. The description will include what is affected and how it is affected. An explanation of the impact assessment criteria follows.

2.4.1 Extent

The physical and spatial scale of the impact is classified as:

Table 3: Extent of development

Description	Explanation	Numerical value
Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.	1
Site	The impact could affect the whole, or a significant portion of the site.	2
Regional	The impact could affect the area around the site including neighbouring farms, transport routes and adjoining towns.	3
National	The impact could have an effect that expands throughout the country (South Africa).	4
International	The impact has international ramifications that go beyond the boundaries of South Africa	5

2.4.2 Duration

The lifetime of the impact, that is measured in relation to the lifetime of the proposed development.

Table 4: Duration of development

Description	Explanation	Numerical value
Short-term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than any of the development phases.	1
Short to medium-term	The impact will be relevant through to the end of the construction phase	2
Medium-term	The impact will last up to the end of the phases, where after it will be entirely negated.	3
Long-term	The impact will continue or last for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter.	4
Permanent	This is the only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	5

2.4.3 Intensity

The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. These are rated as:

Table 5: Intensity of the impact

Description	Explanation	Numerical value
Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.	1
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.	2
High	Function or process of the affected environment is disturbed to the extent where the function or process temporarily or permanently ceases.	3

This will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

2.4.4 Probability

This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the lifecycle of the activity, and not at any given time. The classes are rated as follows:

Table 6: Probability of impact occurring

Description	Explanation	Numerical value
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is thus zero (0%).	1
Possible	The possibility of the impact occurring is very low, either due to the circumstances, design or experience. The chances of this impact occurring is defined as 25%.	2
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50%.	3
Highly likely	It is most likely that the impacts will occur at some stage of the Development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75%.	4

Description	Explanation	Numerical value
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied upon. The chance of this impact occurring is defined as 100%.	5

2.4.5 Mitigation

The impacts that are generated by the development can be minimised if measures are put in place to reduce them. These measures are mitigation measures to ensure that the development takes into consideration the environment and the impacts that are predicted so that development can co-exist with the environment as a basis for planning.

Determination of Significance – Without Mitigation

Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as "positive". Significance is rated on the following scale:

Table 7: Mitigation of impact

Description	Explanation
Low	The impact is not substantial and does not require any mitigation.
Low to medium	The impact is of little importance, but may require limited mitigation.
Medium	The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
Medium to high	The impact is of great importance. Mitigation of the impact is essential.
High	The impact is of major importance and should mitigation not be applied, it is considered to be a fatal flaw in the project proposal. This could render the entire development option or entire project proposal unacceptable.

Determination of Significance – With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

Table 8: Significance of impact

Description	Explanation
Low	The impact will be mitigated to the point where it is of limited importance.
Low to medium	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.
Medium	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
Medium to high	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.
High	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact continues to be of major importance, and, taken within the overall context of the project, is considered to be a fatal flaw in the project proposal. This could render the entire development option or entire project proposal unacceptable.

2.4.6 Assessment of significance

Each aspect within an impact description was assigned a series of quantitative values. Such criteria are likely to differ during the different stages of the project's life cycle.

Extent	Duration	Intensity	Probability	Significance Rating (SR)	Mitigation Efficiency (ME)	Significance Following Mitigation (SFM)
Footprint 1	Short term 1	Low 1	Probable 1	Low 0-4	High 0,2	Low 0-4
Site 2	Short to medium 2		Possible 2	Low to medium 5-8	Medium to high 0,4	Low to medium 5-8
Regional 3	Medium term 3	Medium 3	Likely 3	Medium 9-12	Medium 0,6	Medium 9-12
National 4	Long term 4		Highly Likely 4	Medium to high 13-16	Low to medium 0,8	Medium to high 13-16
International 5	Permanent 5	High 5	Definite 5	High 17-20	Low 1,0	High 17-20

Figure 23: Description of assessment parameters

Calculating Significance Without Mitigation Measures (WOM)

The values assigned to all criteria are totalled, resulting in a value for each impact.

Equation 1:

Significance Rating (WOM) = Extent + Intensity + Duration + Probability

Calculating significance With Mitigation Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, it was necessary to quantify the impact upon the implementation of the necessary mitigation measures.

The most effective means of deriving a quantitative value of mitigated impacts is to assign each WOM value a mitigation effectiveness (ME) rating (refer to Figure 23). The allocation of such a rating is a result of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will reduce the significance of the impact.

Thus, the lower the assigned value the greater the effectiveness of proposed mitigation measures and subsequently, the lower the significance of impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency

or WM = WOM x ME

The efficiency of the mitigation measure determines the eventual significance of the impact. The level of impact is therefore seen holistically with all considerations taken into account.

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1. BIOPHYSICAL ENVIRONMENT

3.1.1. Climate

3.1.1.1. Temperature

The area experiences a relatively extreme climate, characterised by hot days and cold nights. Temperatures vary between - 9˚C and 42˚C, with an average of 18˚C (Low and Rebelo, 1996). The average maximum temperature for January, the warmest month, is 32.9 °C, and the average minimum for July, the coldest month, is 3.1 °C.

3.1.1.2. Rainfall

The monthly rainfall from the closest weather station is 379 mm (Figure 23). The majority of rain falls in the late summer months of January, February and March, whilst the lowest rainfall records are recorded for the months of June, July and August.

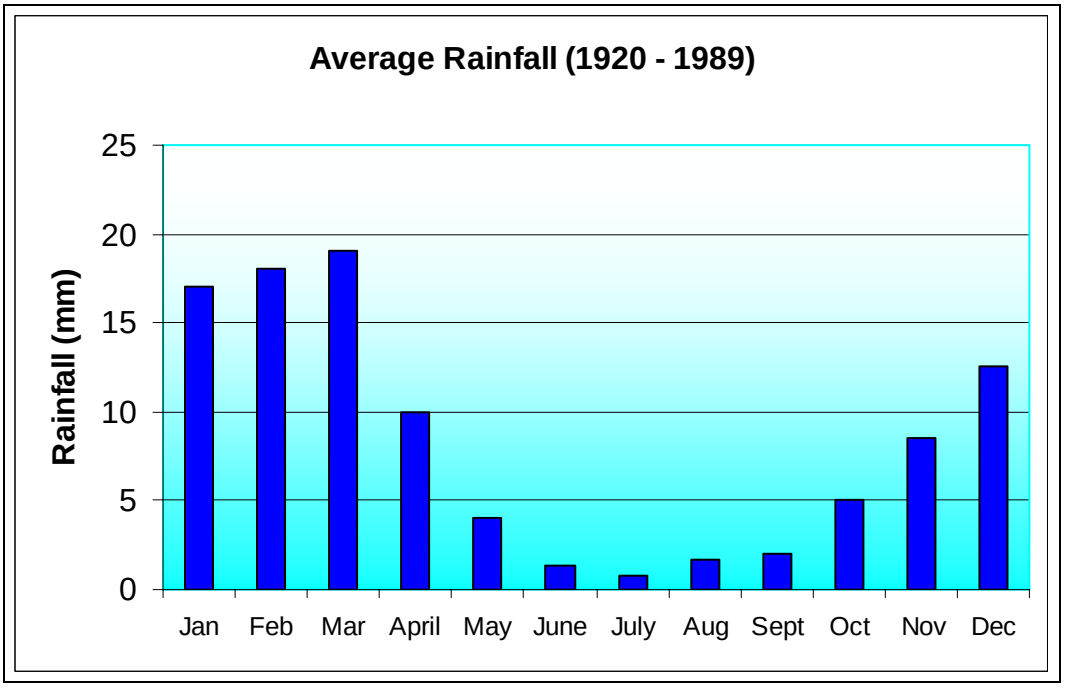


Figure 24: Long term average monthly rainfall for Kuruman, a town near the site

3.1.1.3. Evaporation

The average annual evaporation rate in the region is 2070 mm a year, which is more than four (4) times greater than the Mean Annual Precipitation of 478 mm/year (Figure 23).

3.1.1.4. Wind

The predominant wind direction is south easterly (12% to 17% of the time) with frequent winds also occurring from the northwest (8%). Less frequent winds (± 6%)

are from the north easterly and south westerly sectors. Calm conditions (wind speeds < 1 m/s) occur for approximately 12% of the time.

3.1.2. Topography and Hydrology

The area is characterised by a typical Kalahari landscape of flat plains to undulating terrain. Apart from the distant Kuruman Hills east of the study area and the Koranna Mountains west of the site, the study area has a relatively flat and monotonous topography (Figure 24).

Figure 25: Flat Kalahari landscapes characteristic of the study area

The Ga-Mogara River runs on the eastern side of the Farm Umtu 281, on which the new Umtu Substation is proposed. The northern portions of the power line route alternatives cross the Witleegte and Vlermiusleegte Rivers. All three rivers are non-perennial and classified by the National Spatial Biodiversity Assessment (NSBA) as Least Threatened (Figure 25) and it is known that the Ga-mogara River flows only every 20 years. The three rivers are tributaries of the Kuruman River which, according to DWAF, has low/marginal sensitivity. The study area falls within the Quaternary Sub-catchment D41K and D41J of drainage region D within the Kuruman River catchment.

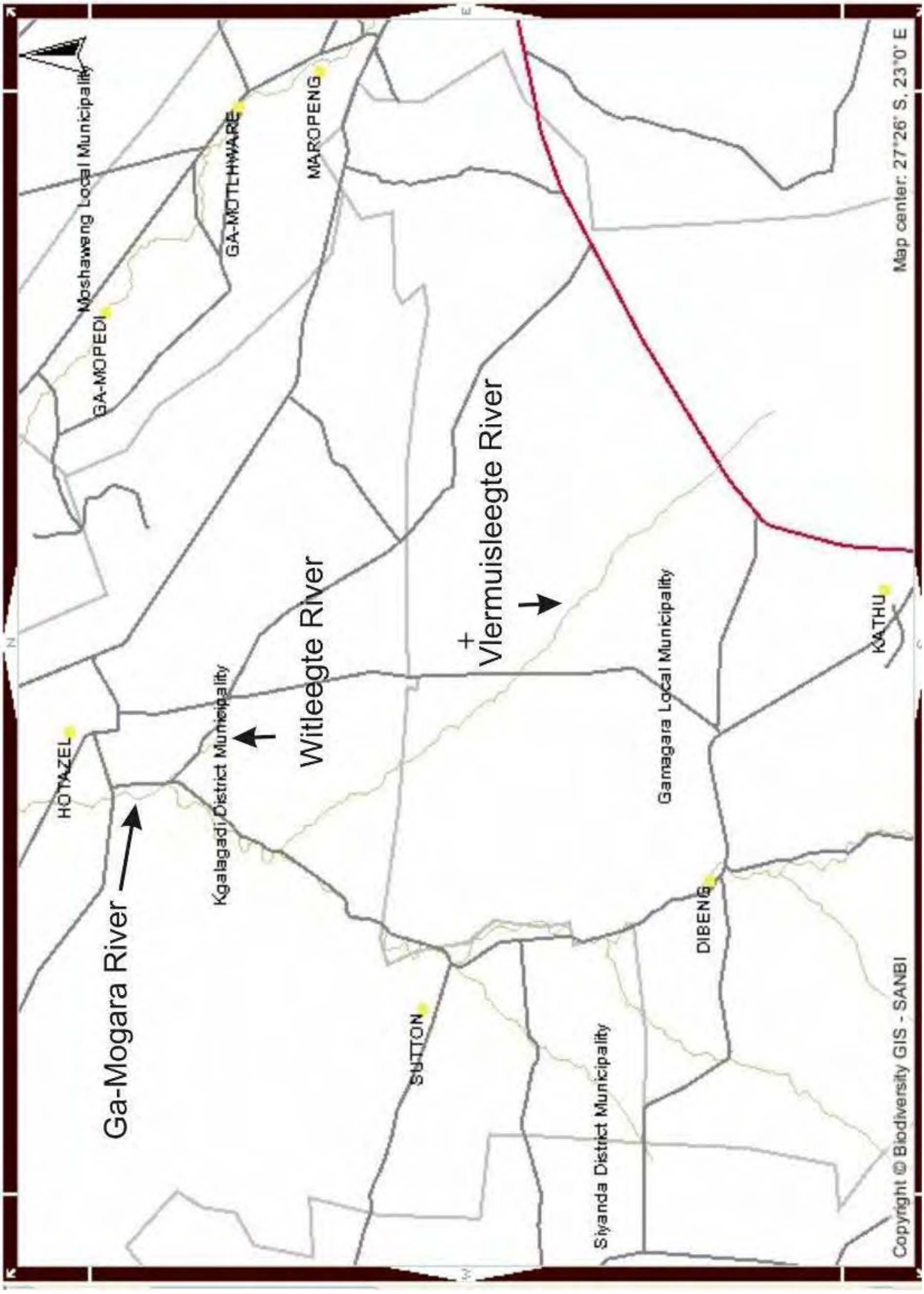


Figure 26: NSBA Rivers (SANBI BGIS, 2008)

3.1.3. Geology and Geotechnical Suitability

The Farm Umtu 281 falls within the giant Kalahari manganese field (KMF) located 60km northwest of Kuruman in the Northern Cape Province of South Africa (Cairncross et al., 1997). The study area, including the Umtu Substation site as well as the power line route alternatives, fall within the Griqualand West Basin; which is underlain by the manganese and iron bearing Hotazel Formation of the Paleoproterozoic Transvaal Supergroup.

3.1.4. Soils and Agricultural Potential

Soils

The dominant soil component of the study area consists of fine sand with soil colours varying from red to yellowish red to yellowish (Figure 26). Soil depth is > 300 mm deep, with a single-grained structure that is freely drained.

In the northern section of the study area, soils are of poor suitability for agriculture and arable agriculture is only be possible where climatic conditions permit. In the southern section of the study area, soils are not suitable for arable agriculture. Forestry and grazing are possible in the areas where climatic conditions permit. Thus, the land capability of the study area as a whole is classified as grazing and forestry land (Classes V, VI and VII).

The southern point of the study area close to Postmasburg is characterised by surface limestone, alluvium and red-windblown sand (figure 27) of Tertiary to Recent age with a few occurrences of amygdaloidal andesitic lava which is part of the Ongeluk formation (Land Survey Staff, 1986). The Ongeluk Formation comprises andesitic lava with a few zones of red jaspilite and agglomerate and indicates submarine extrusion. The Matsap Formation consist of red to flesh-coloured aeolian sand dunes of Recent to Tertiary age with a some outcrops of coarse grained brown quartzite and subgreywacke and interlayered conglomerate that becomes more prevalent towards Kuruman in the northern part of the study area (Council for Geosciences, 2006). The land types found along the route are reflected in Figure 26 below.

The sensitivity of the site was determined from the impact the construction of the sub-transmission lines would have on the agricultural potential within the study area.

High: These areas are often under cultivation and/or have previously been used for agriculture. These would be high potential soil with respect to the above mentioned criteria. These soils have a great resistance to stress and are very resilient. These are no-go areas for development, or severely prohibited development; they are protected by legislation.

Medium: Areas where soil potential is medium are usually less sensitive and have a medium resilience to any environmental change. Where land use change is intended, a degree of erosion control is still required to prevent soil degradation.

Low: This category includes low potential soil. These soils are least stable under a given stress or land use change and do not recover when the stress is removed or reduced (or which recover slowly) are most sensitive to stress, whether the origin of the stress is natural or anthropogenic. Land use change could result in soil degradation especially where vegetation is removed and thus would require erosion prevention measures.

As none of the soil within the study area is considered to have high agricultural potential, the sensitivity to loss of agricultural potential is considered to be low with respect to dryland crop production. The site sensitivity is illustrated in Figure 27.

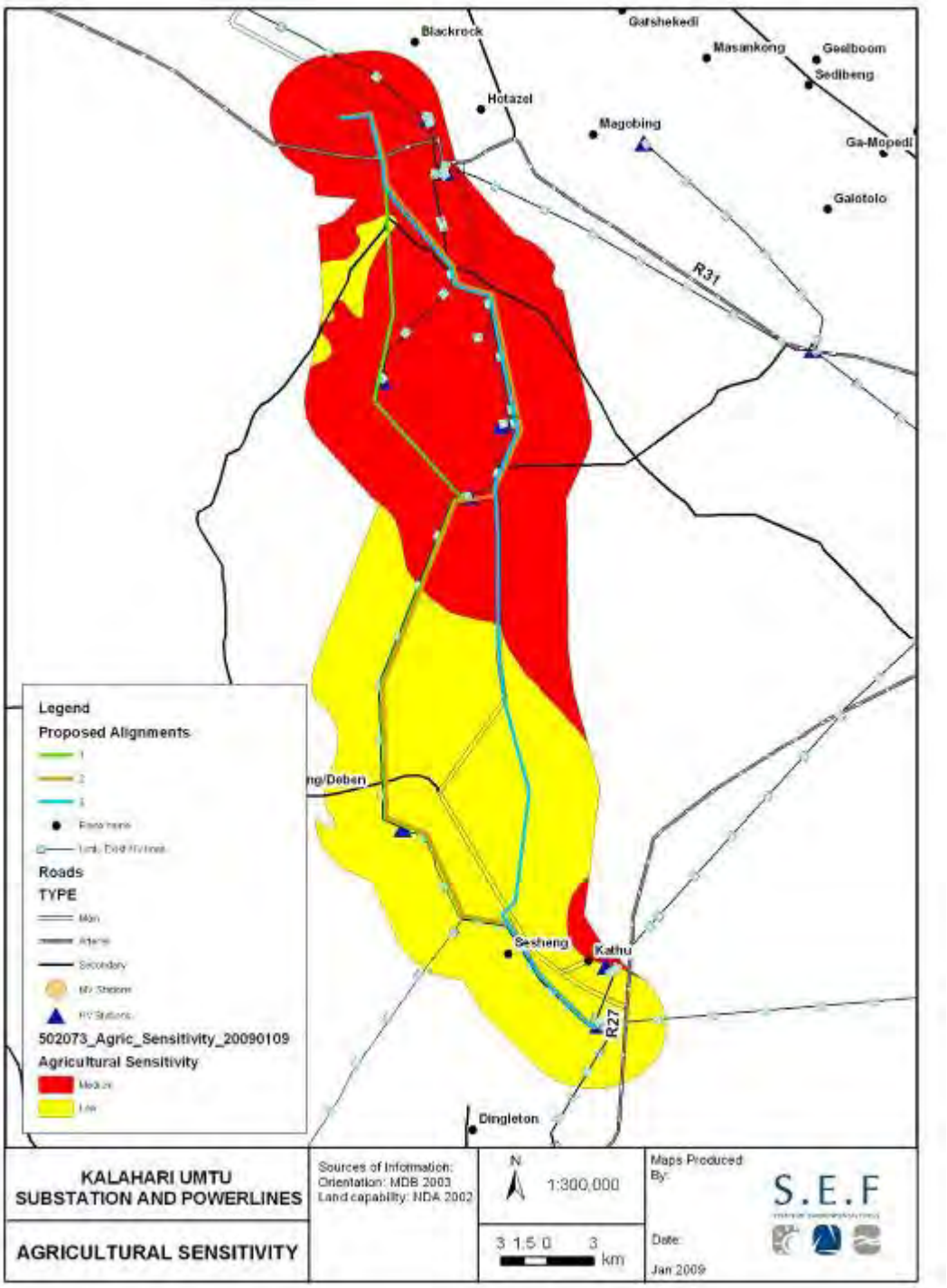


Figure 27: Agricultural sensitivity map


Figure 28: Typical yellowish-red soils found in the study area

Agricultural Potential

Agricultural land is considered to be of high potential if it may be cultivated in terms of Part 1 of the regulations of Conservation of Agricultural Resources Act 43 of 1983, and is:

(a) under permanent irrigation, or
(b) can be classified into one of the soil forms listed in the National Department of Agriculture's draft criteria for high potential agricultural land in South Africa;
(c) the effective soil depth is equal to or greater than the required minimum;
(d) the average topsoil clay content falls within the required limits.

The soil forms, effective soil depth and average topsoil clay content of high agricultural potential have been identified for each province. In the Northern Cape Province, agricultural land is considered to be of high potential if it may be cultivated in terms of Part 1 of the regulations of Conservation of Agricultural Resources Act 43 of 1983, and is under permanent irrigation (Schoeman, 2004).

The agricultural potential was rated based largely on the soil properties and with respect to dryland crop production. Due to the climatic constraints of the area, none of the soil forms qualifies as high potential soil in the Northern Cape.

The Ferrum MTS-Hotazel corridor mainly crosses farmland with soils of a medium to low potential which is used for small stock grazing.

3.1.5. Terrestrial Ecology

Flora (Regional)

The study site falls within the Savannah Biome. The vegetation is classified as Kalahari Plains Thorn Bushveld by Low & Rebelo (1996) and as Kalahari Thornveld and Shrub Bushveld by Acocks (1988). The Kalahari is inherently poor from a floristic diversity point of view with a low number of endemic species, creating a homogenous floral landscape (Figure 30). There are, however, many different growth

forms, with differing life spans, methods of obtaining and storing moisture from the soil, reproduction and defence mechanisms. The fact that there is not a great variety of growth niches for plants in the Kalahari, has promoted the dominance of a few species. Plant diversity is established vertically rather then horizontally due to specialisation of root systems (van der Walt and le Richie, 1999).

Figure 29: Heterogenic floral landscapes of thorn and shrub bushveld

Flora (Site)

The three alignments cross three broad vegetation communities (Figure 30):

- Mixed Thornveld;
- *Tarchonanthus camphorates-Gymnosporia buxifolia* veld; and
- Riverbed associated vegetation.

Mixed Thornveld

This vegetation community comprises mainly of the following trees or a combination thereof *Acacia erioloba* (Camel Thorn), *Acacia mellifera* (Black Thorn), *Acacia haematoxylon* (Grey Camel Thorn) and to a lesser degree the *Tarchonanthus camphorates* (Camphor Tree). Much of the area is used for grazing and in the absence of summer rain, the basel cover was low. The grass and forb layer included *Schmidtia kalihariensis* (Sour Grass), *Eragrostis lehmanniana* (Lehmann's Love Grass), *Polygala leptophylla* (Skaap-ertjie), *Senna italica* (Eland's Pea) and *Asparagus retrofractus*

The Umtu sample area was the most pristine area with little disturbance other than grazing. While vegetation communities in this sample area are not rare or threatened *Acacia erioloba* (Camel Thorn Tree) and *Acacia haematoxylon* (Grey Camel Thorn) are protected trees in South Africa (National Forest Act, 1998). The sample area with the most evident disturbances (overgrazing) was around the Mamatwan Tracking Station.

Tarchonanthus camphorates-Gymnosporia buxifolia veld

Towards Kathu, the sample areas included less tall trees and more shrubs such as *Grewia flava* (Velvet Raisin), stands of *Tarchonanthus camphorates* (Camphor Tree) and *Gymnosporia buxifolia* (Common Spike Thorn). The close proximity of some of these sample areas to settlements and increased human traffic resulted in more disturbed vegetation.

Some portions such as the area around Ferrum were dominated by the shrub *Tarchonanthus camphorates* (Camphor Tree). This shrub is known to form stands in disturbed areas and is listed as an indicator plant of bush encroachment (Conservation of Agricultural Resource Act, 1983).

Where the three route alignments run parallel, an abundance of *Gymnosporia buxifolia* (Common Spike Thorn) and *Acacia melifera* (Black Thorn) were observed. As with *Tarchonanthus camphorates*, *Acacia mellifera* (Black Thorn) occurs naturally within the area, large stands could be indicative of bush encroachment (Conservation of Agricultural Resource Act, 1983). The grass and forb layer included *Scmidtia pappophoroides* (Sand Quick Grass), *Cenchus ciliaris* (Foxtail Buffalo Grass), *Senna ilalica* (Eland's Pea), *Zygophyllum incrustatum* (Skeleton Bush) and *Hermannia cococarpa* (Moederkappie).

Riverbed-associated vegetation

The Ga-mogara River is a non-perennial river that last flowed approximately 20 years ago. This deep dry riverbed contains areas that have silty, alluvial soils and areas with hard calcrete surfaces. This variety of soil forms and the actual physical action of the river (when it flows), creates a variety of habitats. For example, there are the flat areas in the middle of the river channel, the steep slopes of the bank and the gently undulating landscape above the river channel (SEF, 2006).

The lower lying areas are all characterised by tall *Acacia erioloba* and short shrub-like *Acacia hebeclada* (Trassi Doring) trees, with little grass evident. The riverbanks include a grass layer and species such as *Grewia flava* and *Acacia mellifera* become more prominent. The grass species expected to occur within this ecological zone include *Aristida adscensionis* (Annual Three-awn)*, Cynodon dactylon* (Couch Grass)*, Stipagrostis amabilis* (River Bushman Grass) and *Eragrostis lehmanniana* (Lehmann's Love Grass). Many prostrate creepers and herbs, such as *Tribulus zeyheri, Helichrysum argyrosphaerum, Phyllanthus maderaspatensis* and *Neuradopsis austro-africana* form the forb layer. It should also be noted that, *N. austro-africana* is one of the few endemic species to the southern Kalahari (SEF, 2006).

Fauna

The farm Umtu, where the substation is to be built, used to be a game farm stocked with many large mammal species, the majority of which would have historically occurred in the area. Mammals found on the Umtu site are shown in the Ecological Assessment.

Numerous burrows were recorded during the Ecological study which may have been occupied by various species of Insectivora (e.g. shrews), Rodentia (e.g. mice) and Carnivora (e.g. mongoose). A number of molehills were observed indicating the presence of mole rats.

A previous faunal study identified many *Pedetes capensis* (Springhare) during nocturnal hours (SEF, 2006). Although the Kalahari is recognised for its high small mammal diversity, only one rodent (*Tatera* sp.) was caught during the 2006 study, and none during this study. Small mammal population numbers are very erratic and often closely related to rainfall events. The rainfall events spark plant growth which provides food and cover for small mammals, thus during the times of plenty their population numbers explode. The majority of these species belong to the orders Rodentia and Carnivora.

While no Red Data mammals were observed, it was expected that the area may be marginally suitable for three (3) Red Data mammal species *Manis temminkii (*Ground Pangolin)*, Miniopterus schreibersii* (Long fingered bat) and *Rhinolophus denti* (Dent's horseshoe bat).

Additionally a colony of bats utilise the Mamatwan Tracking Station during the day (Alfred Vogt: personnel communication, 2008). These bats could not be identified, and are not believed to be any of the Red Data bat species that could occur in the area.

Birds

The thornveld of the study area is characterised by occasional woody trees, scattered through the grassland. In terms of Avifauna, this vegetation type could attract both woodland (such as the Martial and Tawny Eagles) and grassland bird species (such as the Lesser Kestrel and Ludwig's Bustard), as the tiered vegetation provides for both. Table 2 below shows the microhabitats that each Red Data species typically frequents the study area. It must be stressed that birds can and will, by virtue of their mobility, utilise almost any areas in a landscape from time to time. However the table below represents each species most preferred or normal habitat.

Table 9: Abundance of Red data species in the study area and their preferred microhabitat

Species	Conservation status	2722 BB	2722 BD	2722 DB	2723 AC	2723 CA	Preferred micro habitat in this study area
Total # species		118	118	120	74	211	
Total # cards submitted		19	19	8	10	51	
Martial Eagle	V	5	11	-	10	24	Bushveld
Lesser Kestrel	V	5	-	-	-	2	Bushveld
Black Harrier	V	-	11	-	-	14	Bushveld- open
Ludwig's Bustard	V	-	11	-	-	10	Bushveld- open
African White backed Vulture	V	-	-	-	-	14	Bushveld
Bateleur	V	-	-	-	-	2	Bushveld
Kori Bustard	V					6	Bushveld- open
Lanner Falcon	NT	-	-	-	-	4	Bushveld- open
Secretary bird	NT	-	-	-	-	2	Bushveld
Black Stork	NT	5	-	-	-	2	Rivers, drainage lines, dams
Abdims Stork	Bonn	-	-	-	-	10	Rivers, drainage lines, dams

V= Vulnerable; NT= Near-threatened; Bonn= Protected Internationally under the Bonn Convention on Migratory Species

Herpetofauna

There is no natural permanent water situated along the extent of the alternative power line routes, which makes the area unsuitable for colonisation of the most of the amphibian species. According to Minter (2004), 10 species have been recorded in the area. However, due to the lack of permanent water, it is likely that only *Tomopterna cryptotis* (Sand Frog) and possibly *Breviceps adspersus* (Bushveld Rain Frog) may occur along the power line routes. No amphibians were observed during the site visit and no Red Data amphibians are expected to occur on site.

3.1.6. Air Pollution

Existing sources of emissions in the vicinity of the study area include:

- Manganese mining near Hotazel and Mamatwan (approximately 30 km south of Hotazel).

- Dust emissions due to vehicle entrainment of dust from local paved and unpaved roads, wind erosion from open areas and dust generated by agricultural activities.
- Vehicle tailpipe emissions from public roads. Given the relatively low traffic volumes in the region, atmospheric emissions from vehicle activity are anticipated to be a relatively minor source of air pollution.
- Combustion of fuels, primarily wood and paraffin, by households to meet their energy requirements. Wood was burned by 38% of households for cooking purposes (paraffin by 17% of households) and by 51% of households for heating purposes (paraffin by 10% of households) within the Kgalagadi District Municipality.
- Rail-related emissions with diesel locomotives being used to transport ore from mines in the area.
- General wild fires (veld fires) represent significant sources of combustion-related emissions in many areas of the country. According to local residents and evidence from satellite images showing burn scars veld fires occur relatively infrequently in the region. Local veld burning is therefore classified as being of low significance to air pollutant concentrations, with resultant air pollutant episodes being intermittent and of relatively short duration.
- Regionally-transported, aged aerosols (particulates) have been shown to contribute significantly to background particulate concentrations over much of the country including remote sites.

Existing air quality is anticipated to be good, given the nature, extent and relative location of existing atmospheric sources in the region. Although total particulate concentrations of over 300 µg/m³ have been measured to occur in close proximity to mining operations, average airborne particulate concentrations were measured to be notably lower (20 to 30 µg/m³) at hostels and residential areas located in relative proximity to local mining operations near Hotazel.

3.2. SOCIAL ENVIRONMENT

3.2.1. Visual

The study area has a relatively flat topography with a slight undulation in topography where dry river beds cut through the landscape. The vegetation is generally homogenous in colour and texture due to the dense vegetation cover stretching from horizon to horizon. The vegetation reaches an average height of ± 3 m on the plains, reduces ground level visibility over distances, even down roads or cleared corridors. The slightly undulating landscape creates some high points that raise viewers above the vegetation cover and enable panoramic views of the outstretched plains and distant mountain ranges.

The dense vegetation cover, which is relatively undisturbed, screens most of the developments and disturbances that do occur in the study area. Some visible signs of the open cast mines are present on the plains, Sub-transmission lines, railway lines and tar roads create linear elements in the landscape. On the whole, however, the landscape is generally undisturbed.

The regional land use is generally unspecified and can be regarded as vacant agriculture land.

3.2.2. Heritage Resources

Previous Heritage studies conducted in the Hotazel area generally indicate a low human presence, which is common in dry regions, with a tendency for human settlements in these areas to be located on or near the water courses. Such areas may have a higher archaeological sensitivity as pebble and limestone deposits, which may potentially contain artefacts, become exposed in dry river beds.

Previous reconnaissance of Vlermuisleegte near Hotazel confirmed localised occurrences of low density Stone Age scatters along the exposed lime stone areas. Hand axes, cores and flake tools are representative of the Earlier and Middle Stone Age have also been discovered the broader area. The Heritage impact assessment conducted for the area along the development showed no sign of any heritage artefacts along the route of the line.

3.2.3. Socio-Economic Aspects

The Kgalagadi District Municipality is situated within both the Northern Cape and North West Provinces and is thus, in terms of the joint administration model described by the Municipal Structures Act, 1998 (Act No. 117 of 1998), administered by both provinces. It consists of three Local Municipalities. The geographical area of the Northern Cape Province is 23681.0967 km^2. According to the latest census data, it has a population of ± 181,015 (http://www.demarcation.org.za/). Population consists of ± 163 080 African people with lower numbers of White (± 8757) and Coloured (±13 360) people also living in the area (Figure 29).

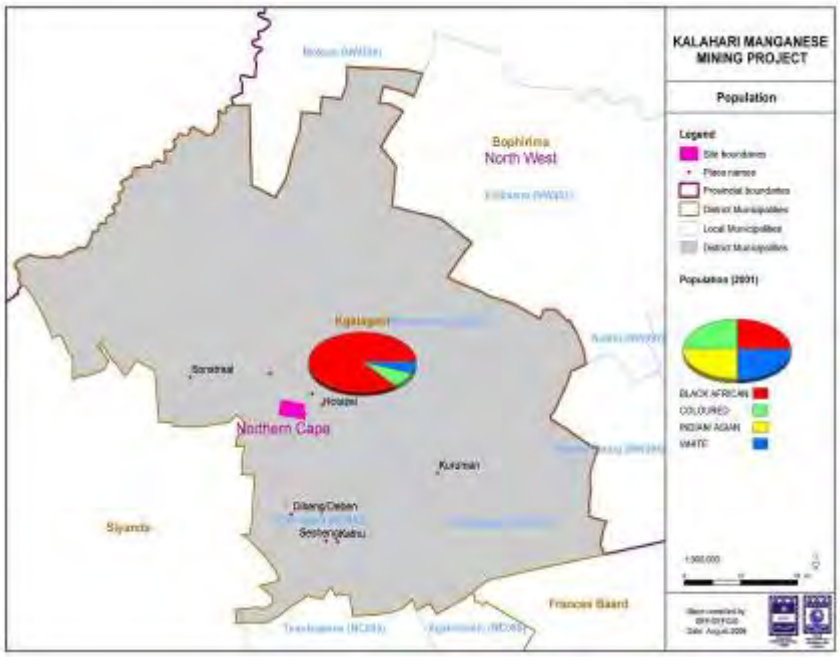


Figure 30: Population of the area in and around the study area

Kuruman is the main town in the Kalahari region. Various minerals are mined in the area, e.g. manganese ore, iron ore, tiger's eye and crocidolite (blue asbestos). The richest deposits of crocidolite in the world are found in the Kuruman district. Kuruman is also establishing itself as one of the major hunting areas in South Africa (http://www.places.co.za/html/kuruman.html).

The town of Kathu was developed as a result of Kumba Resources' iron ore mining activity in the Kalahari. Sishen is one of the world's largest open-cast iron mines.

Hotazel is home to Samancor's Mamatwan open-quarry manganese ore mine and railway terminus (http://mweb.go24.co.za/regions/3/11/931/469). Hotazel was developed to support the open-quarry manganese ore and sinter plant, the underground manganese ore mine and the railway terminus (http://www.northerncape.org.za/regkalahari.html). It is a small mining village, but has amenities such as a school, a post office, a shop and a fuel station.

Prior to 1980 the Kalahari was the strongest mining region of the Northern Cape. However, declining mining employment trends coupled with the near extinction of asbestos mining in the 1980's, has had a strong impact on the socio-economic indicators of the region. A significant proportion of the labour force for the various mines is drawn from the Northwest province, creating a sizeable "migrant" labour force (Kgalagadi IDP, 2005).

Poverty and deprivation are evident in the majority of places and confined almost exclusively to the non-white population. Unemployment is very high and people

survive by pension/welfare payments and labour intensive jobs – the latter are often temporary in nature.

Some of the areas lack basic social services such as basic health care, water and schools. There is also a shortage of basic infrastructure such as transport, housing, water and electricity, which contributes to the lack of economic development in the region (Kgalagadi IDP, 2005). In reaction to the statistics discussed in the previous paragraphs, the Kgalagadi District Municipality listed priority issues for the next 5 years as follows (listed in no particular order):

Basic health services: Lack of proper and sufficient primary health facilities and rendering of related services in the rural areas of the district.

- **Roads and transport:** Lack of sufficient public transport caused by lack of proper access roads in the vast areas of the district.
- **Water, sewerage and sanitation:** Certain communities within the area are exposed to hazardous health conditions due to poor basic services.
- **HIV/AIDS:** HIV/AIDS related diseases are one of the main contributors to mortality in the Kgalagadi area.
- **Local economic development:** A high unemployment rate in the area leads to poverty and crime.
- **Asbestos:** High prevalence of asbestos related diseases in the area.
- **Telecommunication:** Lack of basic communication infrastructure in most of the villages.
- **Safety and security:** High rate of crime and lack of capacity of police services.
- **Human resource development:** Lack in basic skills development.
- **Capacity of Moshaweng Municipality:** Improper financial and administration management in Moshaweng Municipality, due to the lack of capacity (personnel and officials).
- **Education:** Inadequate and poor standard of education in the district.
- **Land reform:** Limited land ownership amongst previously disadvantaged communities.
- **Racism:** Racism incidents regularly occur in the Kgalagadi Area.

Key Economic Activities

Key economic activities in the area include mining and agriculture, especially cattle and game farms. The provincial government is committed to encouraging the expansion of the manufacturing and services sectors. The tourism industry exhibits significant growth potential and is also actively promoted. Figure 30 gives an outline of the main industries in the province.

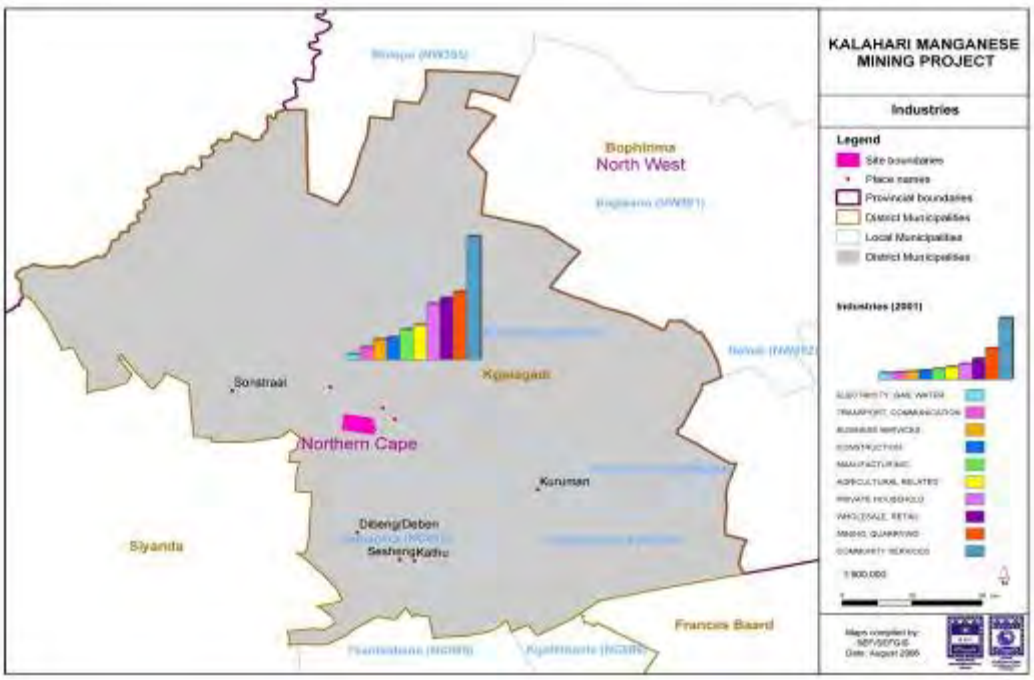


Figure 31: Industries in and around the development area

The exceptional mineral wealth of the Northern Cape has ensured the international importance of its mining industry. Mining has been a mainstream and export-oriented industry for a century and is the current single most active economic sector of the province. Many mining giants like De Beers, Anglo American, Samancor, Kumba Resources and Assmang operate in the Northern Cape (http://www.sehd.org.za/ncape.html). In addition, the province accounts for some 7% of global diamond exports (by carat), 13% of all zinc and lead exports and more than 25% of the world's manganese exports. To a large extent, the processing of these metals and minerals takes place outside the province. Access to raw materials, cheap energy, and upgraded communications infrastructure are necessary for competitive value-added processing in Northern Cape. Another key criterion is labour. Labour in the Northern Cape is among the cheapest in South Africa (http://www.southafrica.info/doing_business/investment/oppurtunities/ncape.htm).

4. PUBLIC PARTICIPATION

4.1. PUBLIC PARTICIPATION PROCESS

The principles of NEMA govern many aspects of EIA processes, including consultation with interested and affected parties (I&APs). These principles include the provision of sufficient and transparent information to I&APs on an ongoing basis, to enable them to comment, and ensuring the participation of historically disadvantaged individuals, including women, the disabled and the youth. A generic description of the public participation process is depicted in Figure 32.

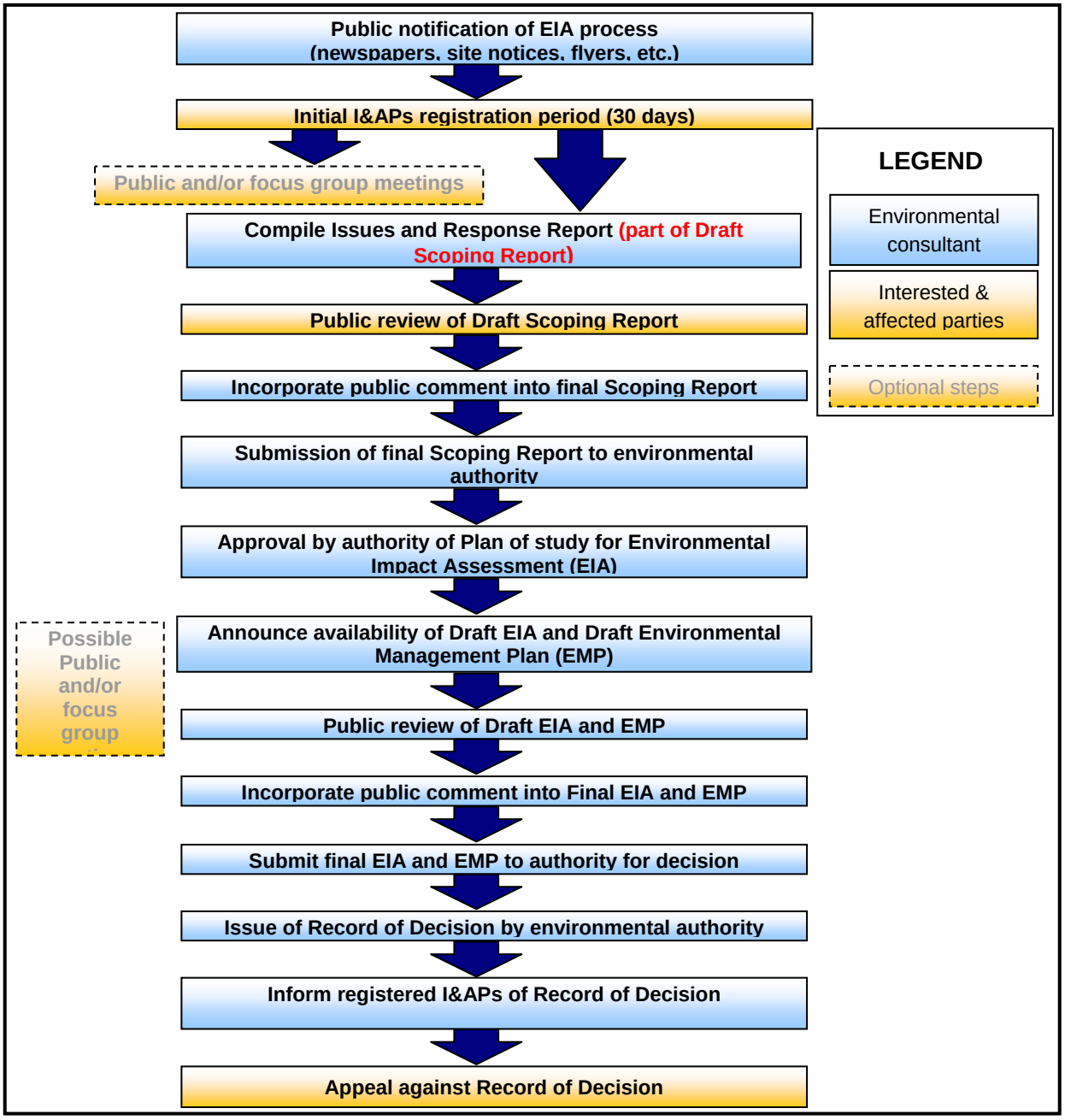


Figure 32: General Public Participation Process showing steps where and how Interested and Affected Parties (I&APs) can be involved

4.2. PROCESS FOLLOWED TO DATE

The following process was undertaken to facilitate public participation for the project. The initial registration period for I&APs commenced on **Tuesday, 26 2008** and closed on **Thursday, 25 September 2008**.

4.2.1. Identification of Interested and Affected Parties (I&APs)

Interested and affected parties (I&APs) representing the following sectors of society have been identified (refer to Appendix 3 (g) for a complete I&AP distribution list):

- National, Provincial and Local Authorities;
- Parastatal / Service Provider;
- Non-Governmental Organisations;
- Farmers Association / Workers Unions;
- Industry and mining;
- Education Institute;
- Hotel, Guest Houses and Game Farms;
- Residential Associations; and
- Landowners and Other.

4.2.2. Public announcement of the project

The project was announced as follows:

- Publication of media advertisements (in English, Afrikaans and Setswana) in the following newspaper (refer to Appendix 3 (c)): Diamond Fields Advertiser (Tuesday, 26 August 2008);

- On-site notices (in English, Afrikaans and Setswana) advertising the EIA process were placed along the main roads (R31 and R380), along the proposed routes of the proposed power lines and at public places accessible to the majority of I&APs, such as Hotazel Town. Site notices were also placed at the entrance to Ferrum Substation, Mangaan Katu, Kumba, cross roads, entrances to existing mines and at residential townships found along the R31 and R380. Notices were erected on **Tuesday, 26 and Wednesday, 27 August 2008**. Please refer to Appendix 3 (a) for photos of the on-site notices.

- Background Information Documents (BIDs) and Registration and Comment Sheets were distributed by fax / post / email to I&APs on **Monday, 25 August 2007** (refer to Appendix 3 (b)).

- Hand-delivery of Background Information Documents (BIDs) to directly affected I&APs and / or landowners (other than the general public) who could not be otherwise reached by fax / post / e-mail took place on **Tuesday, 26 and Wednesday, 27 August 2008** (refer to Appendix 3 (h)).

4.2.3. Draft Scoping Report

The Draft Scoping Report was made available for public review from **21 October to 20 November 2008**.

The Draft Scoping Report was made available for public review at the following venues:

- Kgalagadi District Municipality (Offices);
- Ga-Segonyana Local Municipality (Offices); and
- Gamagara Local Municipality (Library)

The Draft Scoping Report was also distributed as follows:

- Hand-delivered to the relevant authorities; and
- Posted onto SEF's website at http://www.sefsa.co.za.

The comments received were captured and the have been responded to as indicated in the issues and response report appendix 3

4.2.4. Final Scoping Report

The final Scoping report was submitted to the Department of Environmental Affairs and Tourism on **12 December 2008**.

4.2.5. Public Meetings

A public meeting was held on **21 January 2009**. The purpose was to ensure that all concerns of the I&APs are addressed, and to give I&APs another opportunity to raise their issues and concerns.

The main concern raised during the meeting was raised by Mr Attie du Toit of Eskom: He asked if Khumba Resources was involved in the EIA as they are proposing to expand their mine adjacent to Ferrum MTS and may have impact on the proposed line. He requested that Eskom's project team meet with Khumba to discuss a way forward. A meeting was held on 25 February 2009. The outcome of the meeting was that Eskom does not have to change the route of the line completely and just to adjust the servititude for that first part of the route.

A second public meeting was held during public review of the draft EIA Report on **21 May 2009** to address concerns of the farmers and landowners affected by the project. The main concerns raised at this public meeting pertained to communication with Eskom with regards to access to their properties to undertake maintenance work on existing lines, as well as the fact that some of the farmers in the area have existing lines on their land but no electricity for their use. Eskom has started negotiations with the farmers and a committee was formed which included Eskom and Farmers. This committee will facilitate communication between Eskom, farmers and contractors during the construction phase of the project.

4.2.6. Draft EIA Report

The Draft EIA Report was made available for a period of 30 days. The Draft EIA Report was available for public review on **12 May 2009** to **12 June 2009**.
The Draft EIA Report was made available for public review at the following venues:

- Kgalagadi District Municipality (Offices);
- Ga-Segonyana Local Municipality (Offices); and
- Gamagara Local Municipality (Library)

The Draft EIA Report was also distributed as follows:

- Hand-delivered to the relevant authorities; and
- Posted onto SEF's website at http://www.sefsa.co.za.

The comments received were captured and the have been responded to as indicated in the issues and response report appendix 3.

4.2.7. Conclusion

In order to facilitate an open and transparent process, I&APs were identified and notified of the proposed development, in accordance with the legislation. Comments / concerns received are incorporated and addressed in this EIA Report.

Assessing the comments / concerns received during the public participation process, it was evident that the following issues were of concern:

- Impacts on raptors and other birds such as Vultures, Eagles and Kori Bustards to be minimized; and
- Removal of Camel thorn trees should be done on condition that a permit is obtained from the Department of Forestry. If possible these trees should be avoided at all costs

5. IDENTIFICATION OF ANTICIPATED IMPACTS

5.1. IDENTIFICATION OF KEY ENVIRONMENTAL ISSUES

The key environmental issues that are identified have been based on the experience of the EAP from similar developments which entail environmental scoping and public participation processes as well as information obtained from the site visit.

The issues identified include:

- Soil erosion and pollution;
- Soil and water (surface and groundwater) contamination;
- Suitability of geological and soil conditions for construction of the proposed infrastructure;
- Destruction of flora and displacement of fauna;
- Impacts of the infrastructure / equipment on the bird life;
- Loss of soils with high agricultural potential;
- Impacts on features with historical and cultural value;
- Socio-economic and tourism impact;
- Visual impacts of the Sub-transmission Lines;
- Noise impacts during the construction phase; and
- Impacts of electromagnetic fields created by the Sub-transmission Lines.

The manner in which these issues can affect the environment is briefly outlined as follows:

- *Contamination of groundwater* as a result of spillage and deposition of contaminants during the construction phase;

- *Contamination of surface water* as a result of siltation caused by increased erosion, during the construction phase. Increased erosion could be caused by the creation of the construction of servitudes though the clearance of vegetation;

- *Floral destruction* through vegetation clearing and earthworks during the construction phase, and maintenance activities during the operational phase. Illegal removal of protected trees such as Camel thorn;

- *Habitat destruction* as a result of vegetation clearing;

- *Faunal destruction and displacement* as a result of migration and competition from introduced species, the most significant being the impacts on bird life;

- *Loss of high potential arable land* as a result of the construction of the Sub-transmission Lines on farm lands;

- *Impact on safety and security*, as a result of construction activities and operational activities (such as maintenance) of the proposed sub-transmission lines;

- *Visual intrusion* as a result of the construction and operation of the sub-transmission Lines;

- *Noise impacts* from construction vehicles and other heavy-duty equipment used during the construction and operation of the sub-transmission lines;

- *Impact of electromagnetic fields on the surroundings (people) and animals* during the operational phase of the sub-transmission lines;

- *Destruction of heritage / historical sites*, through excavation and the clearing of servitudes; and

- *Impacts related to the social environment and impact on tourism* e.g. damage to land of the farm owners, game reserves and other I&APs.

Chapter 7 of the EIA Report assesses the impacts of construction and operation activities as well as the cumulative impacts of the sub-transmission lines. The EIA report identifies measures to mitigate the significance of the impacts, and delineate sensitive areas. The EIA report also includes an Environmental Management Plan (EMP) which will contain detailed mitigation measures.

Table 10 provides a summary of the impacts and the additional investigations / specialist studies that were required for the proposed development.

5.2. SUMMARY OF ANTICIPATED IMPACTS

Table 10: Summary of anticipated impacts as identified during Scoping

Environmental Aspect	Relevant Area	Environmental Objective	Potential Impacts	Investigations conducted
PHYSICAL				
Geology, Hydrology and soils	Site	To ensure that the foundations for the Sub-transmission Lines are suitable for development and / or the necessary measures are implemented in order to ensure its suitability.	Subsidence, cracking of built structures, unstable foundations.	Soils Investigations
Agricultural Potential	Local	To ensure that soils of high agricultural potential are preserved.	Loss of soil of high agricultural potential.	Agricultural Potential Soils Assessment
Terrestrial Ecology	Regional	To ensure that species of conservation importance are identified and preserved. To ensure that the ecological integrity and functionality of the system is maintained.	Fragmentation of habitat, loss of species of conservation importance, loss of biodiversity, disruption of natural processes and functionality.	Ecological Assessment
Impact on Avifauna	Regional	To ensure that the birds are not negatively affected by bird-power line interactions.	Increased bird fatalities.	Avifaunal Impact Assessment
SOCIAL				
Safety & Security	Site	To assure safety within the site, during the construction and operational phase.	Fire hazard.	Social Impact Assessment
			Access of strangers during maintenance.	
			Threat to safety of residents and tourists.	
Visual aspects	Regional	To minimise visual pollution.	Alteration of Landscape Character; and Other Visual impacts.	Visual Impact Assessment
		To identify the elements of particular visual value and visual quality that could be affected by the proposed Sub-transmission Lines.		
		To maintain an undisrupted skyline.		
Heritage and Culture	Site	To protect all sites, buildings, artefacts and symbols of cultural and heritage significance.	Loss of significant symbols of heritage and culture.	Heritage Impact Assessment

Environmental Aspect	Relevant Area	Environmental Objective	Potential Impacts	Investigations conducted
Socio-economic impacts	Regional	To identify impacts related to the surrounding communities and tourism-related businesses that will be affected by the proposed Sub-transmission Lines.	Loss of safety and security.	Social Impact Assessment
			Loss of livelihoods.	
			Loss of land tenure.	
Tourism impacts	Regional	To minimise the impact of the proposed Sub-transmission Lines on private game reserves and game farms, lodges and ecotourism attractions.	Loss of significant tourism potential in the area.	Social Impact Assessment

The results of the specialist studies have been interpreted in order to assess the potential impacts of the proposed development on the environment, devise potential alternatives with respect to selected activities and develop the necessary mitigation measures in order to minimise negative impacts and optimise positive impacts.

The specialist recommendations are incorporated in the Environmental Management Plan (EMP). The activities as described in the project description were assessed on both an individual as well as a cumulative level with respect to the project in its entirety.

6. ALTERNATIVE ANALYSIS

The EIA regulations require the EIA process to include the consideration of feasible alternatives for any proposed development. Therefore a number of possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. It is noteworthy that DEAT considers the failure to consider alternatives adequately to be "… symptomatic of a biased process that is intent on defending a project proposal" (DEAT, 2004). The following alternatives were assessed in terms of environmental, social and economic sustainability and the preferred option has been highlighted and will be presented to the authorities.

- Route alignment alternatives;
- Power source alternative (generation instead of distribution through Eskom);
- No-go alternatives.

One alternative for the location of the new Kalahari Umtu Substation has been proposed (Figure 33). The site is located along an existing gravel road between the R31 and the substation location. This existing gravel road will be upgraded as an access / service road for the new substation. This access road has already been authorized as part of the EIA conducted for the Manganese mining activities on the Farms Umtu 281, Olivepan 252 and Gama 283.

Figure 33: Photographs of the proposed substation alternative location taken from the existing road in a northerly (top) and southerly (bottom) direction.

Only one route alternative has been proposed for the new 7.33 km 132kV sub-transmission line that will link the Umtu Substation to the Hotazel DS (Umtu-Hotazel line). This route follows an existing electrical servitude along side the existing gravel road from the proposed substation site to the R31. The proposed Umtu Hotazel line will then runs alongside the R31, until the R31 meets the R380. The sub-transmission line route then crosses over the R380 an into the town of Hotazel, where the existing Hotazel DS is located.

6.1. ROUTE ALIGNMENT ALTERNATIVES

Three alternative route alignments have been proposed for the sub-transmission line between the proposed new Umtu Substation and the existing Ferrum MTS. A detailed analysis of the sub-transmission line alignment alternatives is included in this draft EIA Report, and the preferred route for the line has been determined. Aerial photographs of the proposed sub-transmission line routes have been provided as Figures 34 and 35 below and topographical maps of the proposed routes have been provided in Appendix 5

6.1.1. Route Alternative 1 (R1)

All route alternatives start at the proposed new Umtu Substation and follow a southward path, along an existing electrical servitude, for ± 6 km after which Route Alternatives 2 and 3 (R2 and R3) split from Route Alternative 1 (R1) in a south-easterly direction. R1 continues on a southward path for another ± 18 km, after which it bends to the south-east and meets up with R2 and R3 at Mamatwane Traction (mine). South of Mamatwane, the R1 runs along side the R2 and an exiting electrical servitude in southerly direction. All three alternatives meet up again ± 6 km north of the Ferrum MTS.

6.1.2. Route Alternative 2 (R2)

After splitting from R1, R2 and R3 run in a generally south-easterly direction, along an existing electrical servitude for ± 10 km after which the routes meet the R380 and bend to the south. R2 and R3 run along side the R380 on their southerly path towards Mamatwan Traction. At Mamatwan R1, R2 and R3 meet, after which R1 and R2 divert from R3 in a south-westerly direction. The R1 and R2 follow and existing electrical servitude until all three alternatives meet up again ± 6 km north of the Ferrum MTS.

6.1.3. Route Alternative 3 (R3)

After splitting from R2 at Mamatwan Traction, R3 runs south alongside the R380 in a southerly direction. All three alternatives meet up again ± 6 km north of the Ferrum MTS. The R3 runs alongside the R380. Placement of the proposed electrical servitude as close to the road as possible will negate the need for use of existing private farm roads.

6.2. ASSESSMENT OF ALTERNATIVES

6.2.1. Route Alternative 1 (R1)

R1 route passes through farmlands that are far from any existing main roads between the proposed Umtu substation site and Mamatwan traction station. Access via existing farm roads would therefore need to be negotiated for future servitude clearing and line maintenance including the clearance of vegetation to create access roads. Therefore R1 is the least preferred alternative

6.2.2. Route Alternative 2 (R2)

This alternative is more feasible than R1 as the proposed route runs alongside an existing electrical servitude for most of its length. Since sub-transmission lines cannot share a servitude, the creation of a new servitude would still be required; however the use of existing access roads may be possible. The environmental impacts of placing this route along side an existing electrical servitude are less than the impacts of R1 as the route is already transformed to a degree by existing structures. The visual impacts are however higher than route R3 because of too many lines adjacent to one another.

6.2.3. Route Alternative 3 (R3)

The environmental and visual impacts of placing this route along side the R380 may potentially be less than the impacts of R1 as well as R2, as the route is already transformed due to the construction of the road and other existing structures. Locating construction activities themselves along or as near to the roadside as possible may further reduce the impact of the development. This is the preffered route for the construction of the line based on the following:

- From a visual perspective R3 will have lesser impacts on the landscape characteristics of the area. This also reduces the cumulative visual impacts of too many power lines adjacent to me another.
- Placement of the proposed electrical servitude as close to the road as possible will negate the need for use of existing private farm roads.
- Technically this Route 3 has the shortest in length and it is adjacent to an existing servitude to the road.
- From an ecological, heritage and a social perspective this route is as feasible as R2 and there would be no adverse impacts should this route be constructed.
- A workshop was held with all the specialists on 09 April 2009 in order to discuss the preferred route alternative. The specialist all came to an agreement that R2 and R3 where similar in terms of impact in respect of the studies

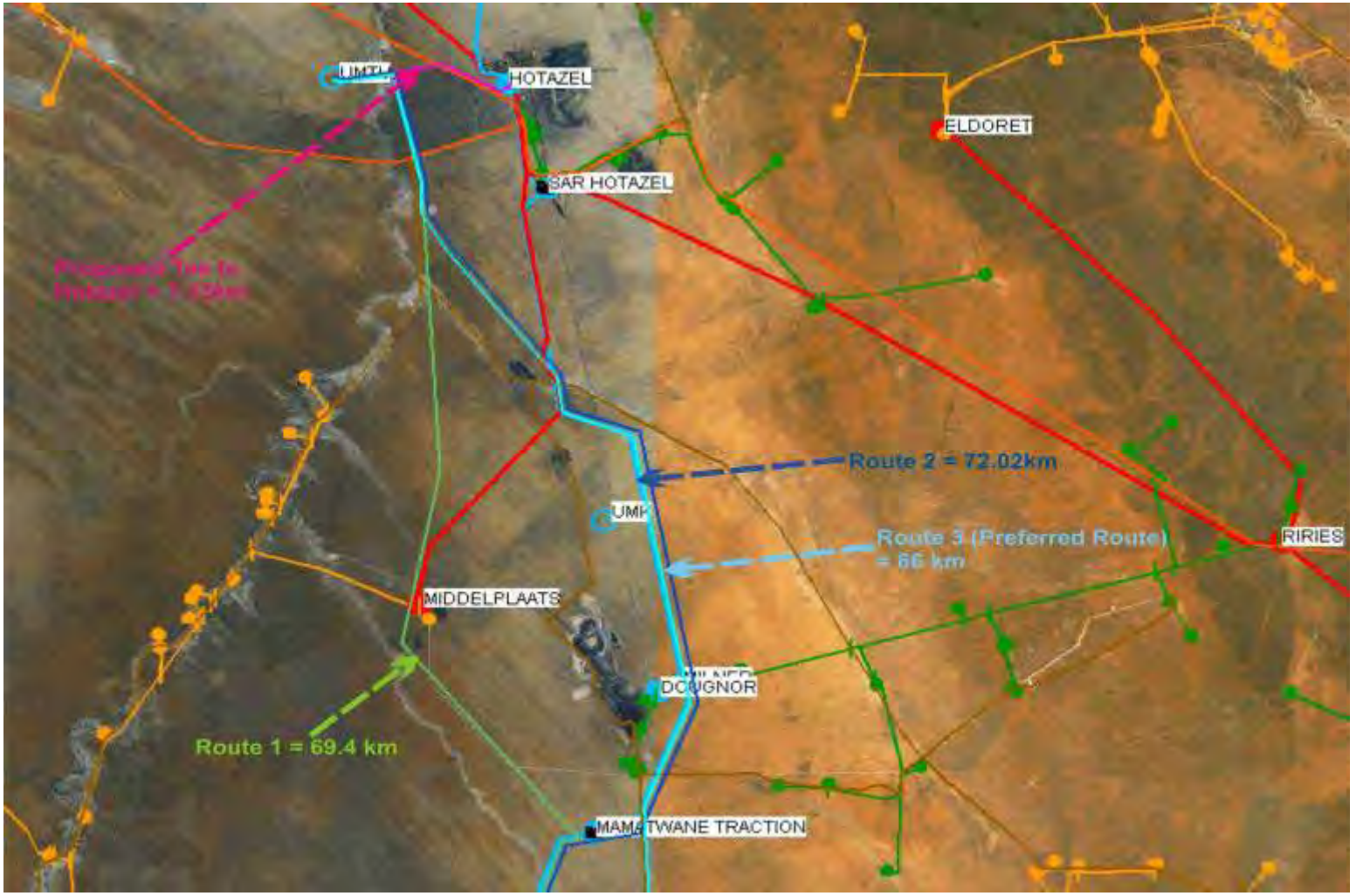


Figure 34: Aerial photograph of the northern portion of the study area for the sub-transmission line route alternatives

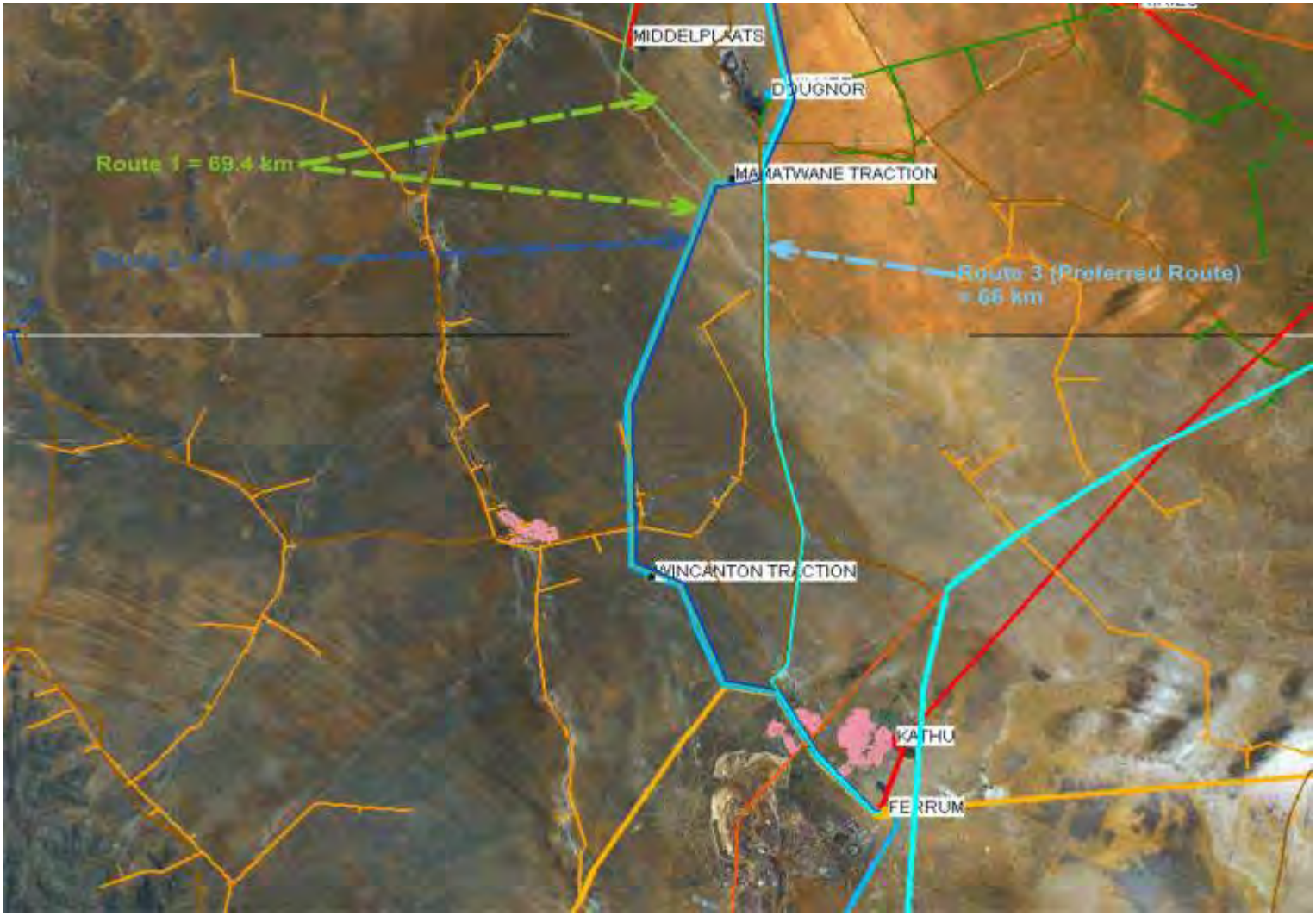


Figure 35: Aerial photograph of the southern portion of the study area for the sub-transmission line route alternatives

Table 11: Specialists evaluation of the three route alternatives

Specialist	Most favoured option	Intermediate	Least favoured option
Impact on soil and agricultural resources	R3 the more feasible than Route 1, but less preferred than R2. As for most of its path, R2 travels alongside an existing power line. Sections of this route travel through farm portions which have not previously been disturbed due to construction, as in the case of Route 2.	R3 alternative is more feasible than R1 as the proposed route runs alongside the R380 for most of its length. A new servitude would still be required; however the use of existing access roads may be possible. Therefore R3 is as feasible as R2	R1 is the least preferred alternative as this route passes through farmlands which are also far from existing roads. Access via existing farm roads would therefore need to be negotiated for future servitude clearing and line maintenance
Impact on terrestrial ecology	R2 is the preferred alternative as for most of its path, the R2 runs alongside an existing line. Placement of the proposed electrical servitude as close to the existing lines will negate the need for the creation of new access roads.	R3 alternative is more feasible than R1 as the proposed route runs alongside the R380 for most of its length. A new servitude would still be required; however the use of existing access roads may be possible. Therefore R3 is as feasible as R2	R1 is the least preferred alternative due to the fact that between the proposed Umtu substation site and Mamatwan the route passes through farmlands, far from any existing access roads. An access road(s) would therefore need to be provided for future servitude clearing and line maintenance.
Impacts on Avifauna	R2 follows n existing line for almost the entire length and which has the following benefits: • Existing line is taller then the proposed line, meaning bird are more likely to get electrocuted by the higher line and not the proposed line. • The addition of a new line will make the existing line more visible and less the risk of collision for birds	R3 follows an existing line for the northern section and the follows a tar road – which is an existing source of disturbance in the landscape. Therefore R3 is as feasible as R2.	R1 passes through an area just north of Mamathwane Mine that is relatively unspoilt and undeveloped by other linear infrastructure; which is relatively sensitive.
Impact on heritage resources	There are no heritage artifices along all the route alternatives thus there is no preferred alternative in this instance. Therefore R3 is as feasible.		

Specialist	Most favoured option	Intermediate	Least favoured option
Visual impact	Alternative route 3, because it has a shorter length and has less visual impact, it runs parallel to existing road	Alternative Route 1, it is similar to Route 3 but it is much longer than 3.	Alternatives Route 2 is much longer in length and impacts on more visual receptors.
Social impact	From a Social Impact Assessment point of view there are no clear preferences in terms of any of the identified route alternatives. Land uses in the areas identified for all three alternatives are similar and there would thus be no need for a change of land use in the case of any of the alternatives. In terms of impacts on the aesthetic value of the area, route 2 is the recommended as it follows and existing power line for most of its length. Therefore R3 is still a feasible option.		
Technical considerations	• Route 3, the shortest in length • Adjacent to an existing servitude • Adjacent to the road	• Route 2 is the longest in length • Adjacent to an existing line	• Route 1 is the longer in length than route 3 • It goes off the road after Mamatwan traction site and this will result in the need for new access roads.

6.3. GENERATION OF POWER / ELECTRICITY

The generation of electricity on site to supply the needs of the manganese mine is an unfeasible option from both a financial and environmental point of view. Establishing a generation plant of 20MVA is expensive to construct. Operation and maintenance of the plant also has high running costs as diesel is a more expensive fuel for electricity generation than coal is and ongoing maintenance will be required.

Electricity generation from diesel will also potentially involve the storage of diesel, under or above ground, which has potentially high environmental and social (safety) impacts. This is not a viable option because manganese mines require a lot of power.

6.4. NO-GO ALTERNATIVE

DEAT (2001) states that the no-go alternative should be considered in cases where the proposed development will have a significant impact; which cannot be effectively or satisfactorily mitigated by the applicant. If the proposed project does not go ahead, the Kalagadi manganese mine will not be able to start construction and will not be able to operate. This will also result in Eskom not being able to strengthen the Hotazel network thus leaving the electricity supply very poor and increasing Eskom's load on the existing Hotzel network.

6.5. CONCLUSION

The generation of electricity on site is an unfeasible option due to high associated costs and the potential for a higher environmental impact. Moreover, the 132kV line from Ferrum MTS to the proposed Umtu Substation will not only supply the new customer (Kalagadi Manganese) but will also be used to strengthen the existing Hotazel network by closing the 132kV ring. The line from Ferrum MTS is the only viable option due to voltage constrains on the existing substations in the Hotazel area.

Based on the assessment of all available alternatives R3 will have lesser negative impacts should it be the authorised. This also reduces overall negative impact of the proposed development of a sub-transmission line. Placing R3 alongside an existing road reduces impacts of creation of access roads for maintenance of the line. From an Avifauna perspective R2 is most preferable; R3 is still a viable option though it might have slightly higher impacts on birds compared to R2. Therefore R3 is a more feasible option to construct the proposed 132 kV line.

7. DETAILED IMPACT ASSESSMENT

7.1. BIOPHYSICAL IMPACTS

7.1.1 SOIL AND AGRICULTURAL POTENTIAL

7.1.1.1 Loss of high agricultural potential soils

Sources of the impact:

- Clearing of land for the construction of the pylon foundations;
- Clearance of vegetation for the establishment of access roads
- Presence of pylons;
- Presence of the sub-transmission lines over bushveld and grazing land.

Description of the impact:

Sub-Transmission lines

The line runs in an area which is dominated by trees and shrubs. Most of the trees will have to be moved especially during the construction phase. The footprint of each is relatively small, which means that there will be fewer disturbances. This area has soils with low agricultural potential and thus the disturbance to vegetation will not cause adverse impacts to the soils.

Substation

This portion of the project is in an area which already belongs to an existing mine, but no clearing of vegetation has occurred as yet in the area. The extent of the substation is about 1 ha which means that a lot of vegetation will have to be cleared and thus topsoils will be exposed.

Significance:

The extent of the impacts will be limited to the site of the substation and transmission line, since the impact would occur only within the servitude. The duration is long term, as the disruption to agriculture would continue to occur throughout the operational life of the transmission line. The intensity is low, since there is mainly grazing occurring and no other agricultural activities in the servitude. The likelihood of the impact occurring is probable. Significance without mitigation is medium to low, the mitigation efficiency is medium to high which results in low significance with mitigation.

Sub-Transmission lines and Substation

Mitigation Measures:

1. New sub-transmission lines must be placed as close as possible to the existing lines.

2. The removal of plant material must be kept to a minimum. A permit must be obtained to remove Camel Thorn trees according to the National Forest Act 1998 (Act No. 30 of 1998).

3. All attempts must be made to avoid exposure of dispersive soils.

4. Re-establishment of plant cover on disturbed areas must take place as soon as possible once construction activities in the area have ceased.

5. Ground exposure should be minimised in terms of the surface area and duration, wherever possible.

6. Construction that requires the clearing of large areas of vegetation and excavation should ideally occur during the dry season only. Construction during the rainy season (November to March) should be closely monitored and controlled by the contractor. A detailed construction EMP must be developed addressing this issue and how it will be carried out.

7. Without compromising the sensitive water balance of the area, dust suppression must take place.

Table 12: Loss of high agricultural potential soils

Impact Source(s)	• Clearing of vegetation for the construction of the pylon foundations; • Presence of guys for pylons; and • Presence of the sub-transmission lines over bushveld and grazing land.	Status	-
Nature of the Impact	**Loss of Agricultural land**		
Receiving Environment	**Farmers and landowners along the servitude**		
Magnitude	Extent (footprint; site; regional; national; international)		**SITE**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**LONG TERM**
	Intensity (low; medium; high)		**LOW**
	Probability (probable; possible; likely; highly likely; definite)		**PROBABLE**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**LOW**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 2 + 4 + 1 + 1 = 8 **LOW TO MEDIUM**	
	With mitigation (WM)	WM = WOM x ME 8 x 0.4 = 3.2 **LOW**	
Confidence	High		

7.1.1.2 Soil Erosion: Construction Phase

Sources of the impact:

- Clearing of land for the construction of the pylon foundations

Description of the impact:

Sub-Transmission lines

In view of the fact that the proposed sub-transmission line route is parallel to existing power line servitude and a road for almost the entire length of the line, there should be a minimal clearance of vegetation for new access roads. However where a need for an access road arises and where the pylons will be erected there will be some level of soil disturbance which may result in soil erosion.

Substation

This section is the same as 7.1.1.1 above.

Significance:

The extent of the impacts will be limited to the site of the substation and sub-transmission line, since the impact would occur only within the servitude as well as the substation site. The duration is medium-term, as the disruption will only be during the construction phase of the transmission line and substation. The intensity is medium, since vegetation around the area will not be disturbed to severely without disturbance. The probability is likely. Significance without mitigation is medium, and with mitigation it would be medium to low. The mitigation efficiency is rated medium - high as the impact can be effectively mitigated especially during construction.

Sub-Transmission lines and Substation

Mitigation Measures:

1. All attempts must be made to avoid exposure of dispersive soils.
2. Mitigation with regards to plant cover as in section 7.1.1.1 above
3. Construction that requires the clearing of large areas of vegetation and excavation should ideally occur during the dry season only.
4. The run-off from the exposed ground should be controlled with the careful placement of flow-retarding barriers.
5. The soil that is excavated during construction should be stock-piled in layers and protected by berms to prevent erosion.
6. Without compromising the sensitive water balance of the area, dust suppression must take place.
7. Areas where erosion occurs as a result of construction activities must be restored.

Table 13: Soil Erosion: Construction Phase

Impact Source(s)	• Clearing of land for the construction of the pylon foundations	Status	-
Nature of the Impact	**Soil erosion: Construction phase**		
Receiving Environment	**Farmers and landowners along the servitude**		
Magnitude	Extent (footprint; site; regional; national; international)	**SITE**	
	Duration (short term; short-medium term; medium term; long-term; permanent)	**MEDIUM-TERM**	
	Intensity (low; medium; high)	**MEDIUM**	
	Probability (probable; possible; likely; highly likely; definite)	**LIKELY**	
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)	**MEDIUM**	
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 2 + 3 + 3 + 3 = 11 **MEDIUM**	
	With mitigation (WM)	WM = WOM x ME 11 x 0.4 = 4.4 **LOW-MEDIUM**	

7.1.2 TERRESTRIAL ECOLOGY

7.1.2.1 Disturbance of Flora (Bushveld and Grasses)

Sources of the impact:

- Clearing of vegetation for the construction of the sub-transmission line and substation; and
- Trampling by construction vehicles and workers.

Description of the impact:

Sub-Transmission lines

Due to the fact that the proposed sub-transmission line route is parallel to existing power line servitude and a road for almost the entire length of the line, there should be minimal clearance of vegetation for new access roads. However where a need for an access road arises, for the erection of pylons there will be clearance of vegetation cover. The area is classified mainly as bushveld with protected trees (Camel Thorn) which will have to be removed in order not to disturb the lines. The grass layer is most likely to be trampled on by the workers and vehicles. Bush encroachment will occur due to vegetation clearance for the sub-transmission line servitudes which will result in disturbance by the cutting down of *Tarchonanthus camphorates* (Camphor Tree and *Acacia meliffera* (Black thorn) in the servitude. This will results in loss of grasslands in the area.

Substation

Vegetation clearance will have to take place in order to construct the substation, and this area also has the protected trees which will have to be removed. Vegetation clearance has already taken place adjacent to the site in order to construct a road.

Significance:

The extent is rated as "site", since the impact would occur only within the servitude as well as the substation site. The duration is permanent. The intensity is medium-high, since vegetation clearance will have to take place in order to develop the power lines and the substation and these include protected trees. The probability is highly-likely. Significance without mitigation is medium-high, and with mitigation it would be medium. The mitigation efficiency is rated medium, even though the impact can be mitigated, the impacts will still occur throughout the life span of the development.

Sub-Transmission lines and Substation

Mitigation Measures:

1. New sub-transmission lines must be placed as close as possible to the existing power lines.

2. The removal of plant material must be kept to a minimum. A permit must be obtained to remover *Acacia erioloba* Camel Thorn trees and other protected species like the *Acacia haematoxylon* and *Boscia albitrunca*.

3. Disturbed areas must be rehabilitated after the construction phase; these include areas where site camps will be placed.

4. Trampling must be avoided where possible, vehicles must use access road

Table 14: Disturbance of Flora (Bushveld and grasses)

Impact Source(s)	• Clearing of vegetation for the construction of the sub-transmission line and substation; and • Trampling by construction vehicles and workers.		Status	-
Nature of the Impact	**Disturbance of flora (Bushveld and grasses)**			
Receiving Environment	**Bushveld along the servitude and substation**			
Magnitude	Extent (footprint; site; regional; national; international)		**SITE**	
	Duration (short term; short-medium term; medium term; long-term; permanent)		**PERMANENT**	
	Intensity (low; medium; high)		**HIGH**	
	Probability (probable; possible; likely; highly likely; definite)		**HIGHLY-LIKELY**	
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**	
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 2 + 5 + 5 + 4= 16 **MEDIUM-HIGH**		
	With mitigation (WM)	WM = WOM x ME 16 x 0.6 = 9.6 **MEDIUM**		

7.1.2.2 Displacement of Fauna

Sources of the impact:

- Clearing of vegetation for the construction of the sub-transmission line and substation.

Description of the impact:

Sub-Transmission lines

The recommended sub-transmission line route is parallel to existing power line servitude and the main road R380 for almost the entire length of the line; this means there should be a minimal clearance of vegetation for new access roads. However where a need for an access road arises, for the erection of pylons there will be clearance of vegetation cover. The grass is most likely to be trampled on by the workers and vehicles. Several mounds and burrows were sited in the area, which is a clear indication that there are small mammals in the area. Loss of ground cover and woody vegetation means loss of habitat for the different rodent species. The area of disturbance will be of a small extent, thus not having a significant impact on their habitat. During the operational phase of a power line, vegetation may be repeatedly cleared in the servitude of the alignment for ease of pylon maintenance. This has the effect of creating unnatural open space through the vegetation and the matrix of the landscape.

Substation

Vegetation clearance will have to take place in order to construct the substation, and this area also has the protected trees which will have to be removed. Vegetation clearance has already taken place adjacent to the site in order to construct a road. Several mounds and burrows were sited in the area, which is a clear sign that there are small mammals in the area. There will be a permanent loss of habitat on the site due to the construction of the substation and this will be a permanent loss.

Significance:

The extent of the impacts will be limited to the site of the substation and sub-transmission line since the impact would occur only within the servitude as well as the substation site. The duration is permanent because it will last for the life time of the development. The intensity is medium-high, since vegetation clearance will have to take place in order to develop the power lines and the substation and these. The probability is likely. Significance without mitigation is medium-high, and with mitigation it would be medium. The mitigation efficiency is rated medium.

Sub-Transmission lines and Substation

Mitigation Measures:

1. Disturbed areas must be rehabilitated after the construction phase; these include areas where site camps will be placed.

2. Trampling must be avoided where possible, vehicles must use access road

3. The grass cover must be rehabilitated following the construction activities, to ensure that the habitat for the small mammals is not lost.

4. Avoid clearing woody vegetation that does not have a predicted impact on the integrity of the power lines intact.

5. Thin out the woody vegetation occurring within the servitude but do not eliminate it completely

6. The conditions in the Environmental Management Plan must be adhered to.

Table 15: Displacement of Fauna (sub-transmission lines)

Impact Source(s)	• Clearing of vegetation for the construction of the sub-transmission line and substation; and	Status	-
Nature of the Impact	**Displacement of fauna due to construction and operation of sub-transmission lines**		
Receiving Environment	**Fauna habitat**		
Magnitude	Extent (footprint; site; regional; national; international)		**SITE**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**SHOT-TERM**
	Intensity (low; medium; high)		**MEDIUM**
	Probability (probable; possible; likely; highly likely; definite)		**LIKELY**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 2 + 2 + 3 + 3= 10 **MEDIUM**	
	With mitigation (WM)	WM = WOM x ME 10 x 0.4 = 4 **LOW-MEDIUM**	

Table 16: Displacement of Fauna (Substation)

Impact Source(s)	• Clearing of vegetation for the construction of the sub-transmission line and substation	Status	-
Nature of the Impact	**Displacement of fauna due to the development of substation**		
Receiving Environment	**Fauna habitat**		
Magnitude	Extent (footprint; site; regional; national; international)		**SITE**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**PERMANENT**
	Intensity (low; medium; high)		**HIGH**
	Probability (probable; possible; likely; highly likely; definite)		**HIGHLY-LIKELY**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 2 + 5 + 5 + 4= 16 **MEDIUM-HIGH**	
	With mitigation (WM)	WM = WOM x ME 16 x 0.6 = 9.6 **MEDIUM**	

7.1.2.3 Habitat destruction (AviFauna)

Sources of the impact:

- Construction activities associated with erection of the pylons, such as the crain vehicle and excavations;
- Movement of noisy construction vehicles and other equipment in the power line servitude; and
- Maintenance of the lines

Description of the impact:

Sub-Transmission lines and substation

Most Bird species especially Red Data bird species could be disturbed by construction activities along the route of the line and therefore move off from their breeding and roosting areas.

Significance:

Extent is rated as “site” since breeding or roosting of birds outside the sub-transmission line servitude may be affected. The duration of disturbance is considered permanent, since it is restricted to construction. Intensity is considered as high, since the movement of contractors and the construction vehicles will have significantly high impact on the habitat. Probability is considered as probable. Mitigation efficiency is considered to be medium although the footprint of the line cannot be mitigated the rest of the construction site can be mitigated. Significance before and after mitigation are therefore calculated to be medium to high and medium respectively.

Sub-Transmission lines and Substation

Mitigation Measures:

1. During construction the contractor must screen the route for any nest which indicate breeding activity of birds in the area and should avoid disturbance to the area around the breeding site during the breeding season. The contractor should contact a bird specialist if any breeding birds are found for advice on an appropriate buffer around the breeding site where construction must be avoided.

2. Ensure that as little vegetation is impacted on as possible.

3. All vehicles and machinery should keep to the site and not creates roads unless it is necessary.

Table 17: Habitat Fragmentation (Avifauna)

Impact Source(s)	• Construction of pylons; • Movement of vehicles and machinery during construction; and • Maintenance of the lines.	Status	-
Nature of the Impact	**Displacement of fauna due to construction and operation of sub-transmission lines**		
Receiving Environment	• **Breeding and roosting of birds**		
Magnitude	Extent (footprint; site; regional; national; international)		**SITE**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**PERMANENT**
	Intensity (low; medium; high)		**HIGH**
	Probability (probable; possible; likely; highly likely; definite)		**LIKELY**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 2 + 5 + 5 + 3= 15 **MEDIUM-HIGH**	
	With mitigation (WM)	WM = WOM x ME 15 x 0.6 = 9 **MEDIUM**	

7.1.2.4 Collision and electrocution of Birds by Sub-Transmission line)

Sources of the impact:

- Operation of sub-transmission lines;

Description of the impact:

Sub-Transmission lines

The two most important impacts that the lines will have on birds are collision and electrocution. The collision will be of high significance and will likely affect species such as Ludwig's Bustard, Kori Bustard, Black Stork, Abdim's Stork, Secretary bird and various non threatened species. Electrocution is likely to affect the large eagles and vultures such as the Martial Eagle and African White-barked Vulture.

Significance:

Extent is rated as national, since the impact will affect bird species that are of conservation importance in the country. The duration of disturbance is considered permanent. Intensity is considered as high, since the presence of the power lines will increase collisions and strikes significantly in the area. Probability is considered as highly likely. Bird collisions can be very effectively mitigated by placing bird deterrent devices on conductors and earth wires to improve their visibility to birds. Mitigation efficiency is therefore considered to be low to medium. Significance before and after mitigation are therefore calculated to be high and medium to high respectively.

Mitigation Measures:

1. New sub-transmission lines must be placed as close as possible to the existing lines to increase the visibility of the lines to the birds.
2. Mark identified high risk section with a suitable anti collision marking device. The sections have been identified generically in Avifauna Assessment (Appendix 6 f) but must be confirmed (see below).
3. Once exact tower positions have been surveyed and pegged, the information must be supplied to Endangered Wildlife Trust (EWT) in order to identify exact spans requiring marking.
4. Annual monitoring of the sub-transmission lines must be conducted for determine where collisions with the pylons or cables is taking place. Additional marking may then be necessary for areas where high collision rates are detected

Table 18: Collision and electrocution of birds by transmission lines

<table>
<tr><td>Impact Source(s)</td><td colspan="2">• Construction of pylons;
• Movement of vehicles and machinery during construction; and
• Presence of transmission lines and earth wires during operation</td><td>Status</td><td>-</td></tr>
<tr><td>Nature of the Impact</td><td colspan="4">Collision and electrocution of different bird species by the new sub-transmission lines</td></tr>
<tr><td>Receiving Environment</td><td colspan="4">• Bird species in the region</td></tr>
<tr><td rowspan="4">Magnitude</td><td colspan="2">Extent (footprint; site; regional; national; international)</td><td colspan="2">NATIONAL</td></tr>
<tr><td colspan="2">Duration (short term; short-medium term; medium term; long-term; permanent)</td><td colspan="2">PERMANENT</td></tr>
<tr><td colspan="2">Intensity (low; medium; high)</td><td colspan="2">HIGH</td></tr>
<tr><td colspan="2">Probability (probable; possible; likely; highly likely; definite)</td><td colspan="2">HIGLY LIKELY</td></tr>
<tr><td>ME</td><td colspan="2">Mitigation Efficiency (high; medium-high; medium; low-medium; low)</td><td colspan="2">MEDIUM</td></tr>
<tr><td rowspan="2">Significance</td><td>Without mitigation (WOM)</td><td colspan="3">Extent + Duration + Intensity + Probability
4 + 5 + 5 + 4= 18
HIGH</td></tr>
<tr><td>With mitigation (WM)</td><td colspan="3">WM = WOM x ME
18 x 0.8 = 14.4
MEDIUM TO HIGH</td></tr>
</table>

7.2. SOCIAL IMPACTS

7.2.1. VISUAL IMPACTS

*7.2.1.1. **Altering the character of the landscape***

Sources of the impact:

- The establishment of construction camps;
- The construction of access road; and
- Construction and presence of sub-transmission lines infrastructure; and
- Operation of the new sub-transmission lines.

Description of the impact:

Sub-Transmission lines

During the construction surface disturbance due to establishment of phase camps , the construction of access roads and the clearance which will have an impact on the vegetation visual characteristics of the area. The complete removal of trees and shrubs will result in disturbed areas of exposed soils and difference in vegetation visual texture. The presence of the power lines will have negative impacts on the landscape character of the area; however since the line will be established an area which already has lines in the landscape the impacts will not be too detrimental. The new sub-transmission line will be adding to the existing impact of a railway line and other lines along the proposed routes.

Substation

Vegetation clearance will take place which will expose top soils. The substation will be visible from the road if not covered by the trees surrounding the area.

Significance:

The landscape character will be altered by the establishment of the sub-transmission lines as the construction will occur in a bushveld environment. However, the impact is mitigated by the fact that the sub-transmission lines are to be established parallel to existing lines of the same size. Therefore, the extent of the impact is rated as within the boundaries of the site during construction and regional operation as the landscape of the area will be altered. The duration is rated as short term for the construction phase and there after the impact will be long term because the impact will last through to the entire operational lifetime of the development. The intensity is rated as high as there will be removal of trees which are currently being conserved (Camel Thorn). The probability of the impact occurring is rated as highly likely. The mitigation efficiency is rated as medium since these are small 132kV lines. Therefore, the significance after mitigation is rated as low to medium during construction and operation.

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Mitigation Measures:

1. Areas are going to be disturbed through the destruction of vegetation, for example the establishment of the construction camps, the vegetation occurring in the area to be disturbed must be salvaged and kept in a controlled environment such as a nursery, for future re-planting in the disturbed areas as a measure of rehabilitation.
2. Rehabilitate disturbed areas as soon as practically possible after disturbance; this should be done to restrict extended periods of exposed soil.
3. Avoid crossing over or through ridges, rivers, pans or any natural features that have prominent visual value.
4. Rehabilitate disturbed areas around pylons as soon as practically possible after construction. This should be done to restrict extended periods of exposed soil.
5. Make use of existing access roads where possible. Locate access routes so as to limit modification to the topography
6. Where new access roads are required, the disturbance area should be kept as small as possible. A two-track dirt road will be the most preferred option.
7. Maintain no or minimum cleared road verges.
8. Locate the alignment and the associated cleared servitude so as to avoid the removal of established vegetation.
9. Avoid a continuous linear path of cleared vegetation that would strongly contrast with the surrounding landscape character. Feather the edges of the cleared corridor to avoid a clearly defined line through the landscape.
10. If practically possible, locate construction camps in areas that are already disturbed or where it isn't necessary to remove established vegetation like for example, naturally bare areas.

Table 19: Altering the character of the landscape (Construction)

<table>
<tr><td>Impact Source(s)</td><td colspan="2">• The establishment of construction camps;
• The construction of access roads; and
• Construction and presence of sub-transmission lines infrastructure</td><td>Status</td><td>-</td></tr>
<tr><td>Nature of the Impact</td><td colspan="4">Altering the character of the landscape</td></tr>
<tr><td>Receiving Environment</td><td colspan="4">• Landowners of servitude area; and
• Surrounding landowners</td></tr>
<tr><td rowspan="4">Magnitude</td><td colspan="2">Extent (footprint; site; regional; national; international)</td><td colspan="2">SITE</td></tr>
<tr><td colspan="2">Duration (short term; short-medium term; medium term; long-term; permanent)</td><td colspan="2">SHORT-TERM</td></tr>
<tr><td colspan="2">Intensity (low; medium; high)</td><td colspan="2">HIGH</td></tr>
<tr><td colspan="2">Probability (probable; possible; likely; highly likely; definite)</td><td colspan="2">HIGHLY LIKEY</td></tr>
<tr><td>ME</td><td colspan="2">Mitigation Efficiency (high; medium-high; medium; low-medium; low)</td><td colspan="2">MEDIUM</td></tr>
<tr><td rowspan="2">Significance</td><td>Without mitigation (WOM)</td><td colspan="3">Extent + Duration + Intensity + Probability
2 + 2 + 3 + 4= 11
MEDIUM</td></tr>
<tr><td>With mitigation (WM)</td><td colspan="3">WM = WOM x ME
11 x 0.6 = 6.6
LOW TO MEDIUM</td></tr>
</table>

Table 20: Altering the character of the landscape (Operational)

Impact Source(s)	• The operation of sub-transmission lines.	Status	**-**
Nature of the Impact	**Altering the character of the landscape**		
Receiving Environment	• **Landowners of servitude area; and** • **Surrounding landowners**		
Magnitude	Extent (footprint; site; regional; national; international)		**REGIONAL**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**LONG-TERM**
	Intensity (low; medium; high)		**HIGH**
	Probability (probable; possible; likely; highly likely; definite)		**HIGHLY LIKELY**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 3 + 4 + 3 + 4= 14 **MEDIUM-HIGH**	
	With mitigation (WM)	WM = WOM x ME 14 x 0.6 = 8.4 **LOW TO MEDIUM**	

*7.2.1.2. **Sensitivity of various visual receptors in area***

Sources of the impact:

- The establishment of construction camps;
- The construction of access road; and
- Construction and presence of sub-transmission lines infrastructure; and
- Operation of the new sub-transmission lines.

Description of the impact:

Sub-Transmission lines

During the construction unsightly views may be created by the presence of construction camps. The main viewers (visual receptors) are residents and motorists. A number of residents in the area will experience intrusion as a result of their views of the presence of the proposed lines. The site is in an area of mining towns, namely Hotazel, Kathu and Dibeng and all these towns will be affected by the proposed line. Route 3 will have more negative impact on motorists as it is along the R380 even as well as the Tee off to Hotazel from the Umtu substation.

Substation

Only one of the towns (Hotazel) will be affected by the substation due to land clearing for the construction phase. The substation will have a further impact during operation as it will add an industrial element in the landscape.

Significance:

Therefore, the extent of these impacts is rated as regional. The duration is rated as short term during construction and during operation as permanent because the impact will last through to the entire operational lifetime of the development. The intensity is rated as medium during both construction and operation. The probability of the impact occurring is rated as probable. The mitigation efficiency is rated as medium. Therefore, the significance after mitigation will be rated as low to medium during construction and operation.

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Sub-Transmission lines and Substation

Mitigation Measures:

1. Avoid crossing over or through ridges, rivers, pans or any natural features that have prominent visual value. This also includes centres of floral endemism area where vegetation is not resilient and takes extended periods to recover.
2. Where practically possible, provide 1km buffer area between the line and sensitive visual receptors.
3. Rehabilitation of disturbed areas around the pylons must be done as soon as construction activities are complete, in order to avid prolonged periods of exposed soils.
4. Make use of existing roads where possible. Where access roads are required, the disturbance area should be kept as small as possible
5. Locate construction camps in areas that are already disturbed or where it is not necessary to remove vegetation.
6. Screen the construction camp and lay down yards by enclosing the entire area with a dark green or black screening cloth where appropriate.
7. Utilise existing screening features such as dense vegetation stands or topographical features to place the construction camps and lay-down yards out of the view of sensitive visual receptors.
8. Keep the construction sites and camps neat, clean and organised in order to portray a tidy appearance.
9. Screen the construction camp and lay-down yards by enclosing the entire area with a dark green or black shade cloth of no less than 2 m height

Table 21: Sensitivity of various visual receptors in area (Construction)

Impact Source(s)	• The establishment of construction camps; • The construction of access roads; and • Construction and presence of sub-transmission lines infrastructure	Status	-
Nature of the Impact	**Sensitivity of various visual receptors in the area**		
Receiving Environment	• **Residents** • **Motorists**		
Magnitude	Extent (footprint; site; regional; national; international)		**REGIONAL**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**SHORT TERM**
	Intensity (low; medium; high)		**MEDIUM**
	Probability (probable; possible; likely; highly likely; definite)		**PROBABLE**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 3 + 1 + 3 + 1= 8 **LOW TO MEDIUM**	
	With mitigation (WM)	WM = WOM x ME 8 x 0.6 = 4.8 **LOW**	

Table 22: Sensitivity of various visual receptors in the area (Operation)

Impact Source(s)	• The operation of the development;	Status	-
Nature of the Impact	**Sensitivity of various visual receptors in the area**		
Receiving Environment	• **Residents** • **Motorists**		
Magnitude	Extent (footprint; site; regional; national; international)		**REGIONAL**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**PERMANENT**
	Intensity (low; medium; high)		**MEDIUM**
	Probability (probable; possible; likely; highly likely; definite)		**PROBABLE**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 3 + 5 + 3 + 1= 12 **MEDIUM**	
	With mitigation (WM)	WM = WOM x ME 12 x 0.6 = 7.2 **LOW TO MEDIUM**	

7.2.2. HERITAGE IMPACTS

7.2.2.1. Damage to heritage sites

Sources of the impact:

- Curious construction workers; and
- Construction activities.

Description of the impact:

Sub-Transmission lines

During the construction phase camps will be established by contractors which will have an impact on surrounding area. There are no heritage artefacts or sites along the route of the line. The is a possibility that there are graves nearby the site, construction activities might have an impact on this aspect

Significance:

The route of the sub-transmission line does not disturb any heritage artefacts but there might be grave sites in the area around the site. The extent of the development will be regional. The duration is rated as short-term because impact is during the construction phase. The intensity is rated as medium, in case any heritage artefacts discovered during construction. The probability of the impact occurring is probable. The mitigation efficiency is rated as medium to high; therefore significance after mitigation is low.

Mitigation Measures:

1. Avoid areas with graves. Should the contractors come across graves they should report this to the South African Heritage Resource Agency (SAHRA).

2. If contractors and workers come across any heritage artefacts they must report them immediately.

Table 23: Impact on heritage site

Impact Source(s)	• Curious construction workers • Construction activities		Status	-
Nature of the Impact	**Damage to heritage sites and artefacts**			
Receiving Environment	• **Landowners of servitude area; and** • **Surrounding landowners**			
Magnitude	Extent (footprint; site; regional; national; international)		**REGIONAL**	
	Duration (short term; short-medium term; medium term; long-term; permanent)		**SHORT-TERM**	
	Intensity (low; medium; high)		**MEDIUM**	
	Probability (probable; possible; likely; highly likely; definite)		**PROBABLE**	
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**	
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 3 + 1 + 3 + 1= 8 **LOW-MEDIUM**		
	With mitigation (WM)	WM = WOM x ME 8 x 0.4 = 3.2 **LOW**		

7.2.3. SOCIO-ECONOMIC IMPACTS

7.2.3.1. Waged labour and employment creation

Sources of the impact:

- Construction of the sub-transmission lines and subsequent operation of Kalagadi Manganese Mine.

Description of the impact:

The construction of the new line and substation will create approximately on average 40 temporary jobs. This number will depend on specifications of the development and the on the local circumstances. Eskom is undertaking the project in order to supply Kalagadi Manganese mine and by enabling the mine to operate will create over 1000 temporary and contract jobs will be created during construction of the mine. An estimated 877 permanent jobs will be created during operation. This is a significantly positive impact in the area as, according to the Kgalagadi District Municipality's IDP, employment creation is a priority in the area.

Significance:

The extent of the development will be regional because people from in and around the area of the route can benefit. The duration is rated as long-term. The intensity is rated as high, due to the lack of jobs in the area. The probability of the impact occurring is likely as the number of jobs are not accurate at this stage. The mitigation efficiency is rated as medium to high, significance without mitigation is medium to high; therefore significance after mitigation is medium to high because it is a positive impact from the development.

Enhancement Measures:

1. All unskilled jobs during construction must be sourced locally. This will reduce the need for accommodation for construction workers.

2. Skills development opportunities should be granted to members from the surrounding local communities.

Table 24: Waged labour and employment creation

Impact Source(s)	• Construction of the sub-transmission lines and operation of Kalagadi Manganese Mine.	Status	+
Nature of the Impact	**Waged labour and employment opportunities**		
Receiving Environment	• **Residents of the surrounding towns**		
Magnitude	Extent (footprint; site; regional; national; international)		**REGIONAL**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**LONG-TERM**
	Intensity (low; medium; high)		**HIGH**
	Probability (probable; possible; likely; highly likely; definite)		**LIKELY**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM TO HIGH**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 3 + 4 + 5 + 3= 15 **MEDIUM TO HIGH**	

	With mitigation (WM)	WM = WOM x ME 15 x 0.8 = 12 **MEDIUM TO HIGH (POSITIVE)**

7.2.3.2. Security, personal safety and risk exposure

Sources of the impact:

- Construction and maintenance of the sub-transmission lines.

Description of the impact:

Personal safety and risk exposure during the construction phase will be due to an influx of strangers entering the local communities, though this is not highly anticipated. Concerns regarding unlawful access to private properties have been raised by landowners. Landowners may be concerned that there will be an increase in petty crimes in the area due to the presence of contractors. The landowners may run a risk of increased livestock theft due to the presence of construction workers and maintenance workers. A town such as Kuruman which is approximately 60 km from Ferrum MTS might experience an increased number of strangers entering their town and this may result in hostility from community members.

Significance:

The extent of the development will be regional because it will affect the surrounding towns. The duration is rated as long-term as this will occur mainly during construction and it will occur every time the lines are maintained. The intensity is rated as medium. The probability of the impact occurring is possible. The significance without mitigation is medium to high and the mitigation efficiency is rated as medium; therefore significance after mitigation is will be low.

Mitigation Measures:

1. Affected landowners and community forums must work with Eskom to negotiate access to farms.
2. A protocol for entering farms should be established and distributed to all parties involved in the construction of the sub-transmission lines and substation.
3. Construction teams should be clearly identified by wearing uniforms with identification cards that should be exhibited in a visible place on their body.
4. Construction workers should conform to a code of conduct, with penalties when transgressed.
5. Existing community policing forums, if any exist, must liaise with stakeholders in order to properly secure and patrol the communities within or close to the area to be developed.
6. The forum formed by Eskom and Landowners must liaise to establish roles and responsibilities within its members. This will assist in ensuring that any unlawful activities occurring on landowners properties is dealt with by the relevant person

Table 25: Security, personal safety and risk exposure

Impact Source(s)	• Construction and maintenance of the transmission lines.	Status	-
Nature of the Impact	**Security, personal safety and risk exposure**		
Receiving Environment	• **Residents of the surrounding farms and towns**		
Magnitude	Extent (footprint; site; regional; national; international)		**REGIONAL**
	Duration (short term; short-medium term; medium term; long-term; permanent)		**LONG-TERM**
	Intensity (low; medium; high)		**MEDIUM**
	Probability (probable; possible; likely; highly likely; definite)		**POSSIBLE**
ME	Mitigation Efficiency (high; medium-high; medium; low-medium; low)		**MEDIUM**
Significance	Without mitigation (WOM)	Extent + Duration + Intensity + Probability 3 + 4 + 3 + 2= 12 **MEDIUM**	
	With mitigation (WM)	WM = WOM x ME 12 x 0.6 = 7.2 **LOW TO MEDIUM**	

7.3. ASSESSMENT OF CUMULATIVE IMPACTS

Cumulative impacts result from actions, which may not be significant on their own, but are significant when added to the impact of other similar actions. In this instance the cumulative impact is related to the development of the transmission lines as well as the new substations.

Visual Cumulative Impacts

Cumulative impacts with respect to other development beyond this project are the impact of this project combined with several other existing power lines in the area, as well as the railway line. The visual receptors will be more affected because the number of power lines is going to increase altering the landscape of the area even further.

Several power lines occur in the area and with an additional line there will be increased impact of collisions and strikes on birds in the area. Areas with increased collisions and strikes should be equipped with bird deterrent devises in order to minimise the impact

Unskilled labour job creation opportunities

There is also a positive cumulative impact with regards to job creation; Eskom is undertaking the project in order to supply Kalagadi Manganese mine and by enabling the mine to operate will create approximately over 1000 temporary and contract jobs will be created during construction of the mine. Unskilled labour should be sourced locally to enhance the livelihood of the surrounding communities

8. CONCLUSION AND RECOMMENDATIONS

The purpose of this report is to provide the relevant authority with sufficient information to make an informed decision regarding the scope of the EIA to follow. Potential impacts were identified primarily through the experience of the EAP and the specialist team, as well as in consultation with I&APs.

8.1. MITIGATION AND ENHANCEMENT

Mitigation measures suggested by I&APs have been taken into consideration in order to avoid or reduce potential negative ecological, socio-economic and visual impacts. The proposed development also has a number of positive impacts for the region, including improved socio-economic conditions for the Northern Cape Province. The situation can be improved if Eskom sources contractors who will be involved in the construction of the line and substation in the Northern Cape Province.

A variety of mitigation measures have been identified that will serve to mitigate the scale, intensity, duration or significance of the impacts that have a medium and high significance rating. These include guidelines to be applied during the construction and operational phases of the project. The Environmental Management Plan (EMP) contains more detailed mitigation measures. The EMP must be supplemented by a more detailed comprehensive site specific construction EMP, to be compiled prior to the construction of the development. This EMP has to effectively manage all construction activities:

8.2. CONCLUSION

The construction and operation of the proposed sub-transmission lines and Umtu substation is a development that has the potential to negatively impact on the environment. However, no critical flaws were identified with respect to any of the environmental parameters that have been assessed, and the impacts can be effectively mitigated to acceptable levels. Sub-Transmission lines do not totally transform the landscape, and the actual physical footprint of the pylons is very small in relation to the area of land left for other uses, thus allowing natural processes to continue in the sub-transmission line servitude. The most significant impacts of the sub-transmission lines are social impacts, and particularly visual impact, since this impact cannot be totally avoided. Visual impacts can, however, be mitigated by using pylons with lower visibility, where technically feasible, and by placing new sub-transmission lines parallel to existing lines, so as to localise the impact along a corridor that has already been affected. For the substation indigenous trees must planted around the substation in order to lower the visibility of the substation.

It can be concluded that the proposed sub-transmission lines will not conflict with the principles of the National Environmental Management Act, 1998 (Act No. 107 of

1998) [NEMA] and should, therefore, be authorised. The requirements of the Public Participation Process (PPP) have been duly undertaken as per the NEMA and the issues of I&APs have been adequately addressed. It is therefore recommended that the proposed development should proceed subject to the implementation and enforcement of the recommendations and mitigation measures contained in this EIA Report and EMP. A construction EMP must be developed should the project be approved to give effect to the recommendations of the EIA Report.

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10 APPENDICES

Appendix 1. :Substation Layout Plan

Appendix 2. :Correspondence to Authority

a) Application Form
b) Acknowledgement of Application form
c) Authority acceptance of Final Scoping Report

Appendix 3. :Public Participation

a) Proof of Site Notices
b) Written Notices Issued to Interested and Affected Parties
c) Proof of Newspaper Advertisements
d) Communications to and from Interested and Affected Parties
e) Minutes of Public and Key Stakeholder Meetings
f) Comment and Response Report
g) Copy of the Register of Interested and Affected Parties
h) Proof of Delivery of hand-delivered information documents

Appendix 4. :Supporting Graphics

Appendix 5. :Topographic Maps of Route Alternatives

Appendix 6. :Specialist Studies

a) Terrestrial Ecology Impact Assessment
b) Heritage Impact Assessment
c) Agricultural Potential Soils Impact Assessment
d) Visual Impact Assessment
e) Social Impact Assessment
f) Avifauna Impact Assessment

Appendix 7. :Sensitivity Map (With Topographical features)

Appendix 8. Environmental Management Plan