ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

FOR THE

PROPOSED ESKOM 400/132KV ASTERIA ESKOM MAIN TRANSMISSION SUBSTATION (PREVIOUSLY KNOWN AS THE HOUHOEK MAIN TRANSMISSION SUBSTATION), INCLUDING THE BACCHUS-PALMIET LOOP-IN AND LOOP-OUT POWER LINES AND ESKOM DISTRIBUTION POWER LINE INTEGRATION, WESTERN CAPE PROVINCE

DEA REFERENCE NUMBER: 14/12/16/3/3/2/401
NEAS REFERENCE NUMBER: DEA/EIA/0001397/2012

FINAL EIA REPORT

November 2014

PREPARED BY:
BKS (Pty) Ltd
Environmental Management Department
PO Box 3173
Pretoria
0001

CONTACT PERSON:
Mr PMFG Teurlings
Tel No: 012 421 3500
Fax No: 086 299 2145
E-mail: J01887-Houhoek@bksemd.co.za

Reference Number: J01887

PREPARED FOR:
Eskom Holdings SOC Limited
Transmission Division: Land and Rights
PO Box 1091
Johannesburg
2001

CONTACT PERSON:
Ms RP Ranwedzi
Tel No: 011 516 7584
Fax No: 086 267 6224

Applicant:
Eskom Holdings SOC Limited

Reference Number: 4501334088

TITLE	:	ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR THE PROPOSED ESKOM 400/132KV ASTERIA ESKOM MAIN TRANSMISSION SUBSTATION (PREVIOUSLY KNOWN AS THE HOUHOEK MAIN TRANSMISSION SUBSTATION), INCLUDING THE BACCHUS-PALMIET LOOP-IN AND LOOP-OUT POWER LINES AND ESKOM DISTRIBUTION POWER LINE INTEGRATION, WESTERN CAPE PROVINCE
Project Team	:	BKS (Pty) Ltd Environmental Management Department Infrastructure and Management Services Sector
Applicant	:	Eskom Holdings SOC Limited Transmission Division: Land and Rights
BKS Project No	:	J01887
Status of Report	:	Final
BKS Report No	:	J01887/04
Key Words	:	Environment, Eskom, Transmission Substation, Transmission power line, Loop-in and Loop-out, Scoping, Environmental Impact Assessment (EIA), Environmental Management Programme (EMPr)
Date of this Issue	:	06 November 2014

For BKS (PTY) LTD

Compiled by	:	BR Gordhan		13 October 2014
		Initials & Surname	Signature	Date
Reviewed & Approved by	:	PMFG Teurlings		16 October 2014
		Initials & Surname	Signature	Date

PURPOSE OF THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Eskom Holdings SOC Limited has commissioned an Environmental Impact Assessment (EIA) process to investigate the potential environmental impacts for the proposed Asteria Eskom Main Transmission Substation project (DEA Reference Number: 14/12/16/3/3/2/401 and NEAS Reference Number: DEA/EIA/0001397/2012). Eskom changed the name of the project from the Houhoek Transmission Substation project to the (herein referred to as) **Asteria Eskom MTS project**.

The EIA process is being undertaken by BKS (Pty) Ltd as an independent Environmental Assessment Practitioner (EAP), and conducted in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), and the EIA Regulations Government Notice Regulation (GNR) 543, 544, 545 and 546, that were promulgated on 18 June 2010 (as amended), but came into effect on 2 August 2010.

Environmental studies are required to identify the potential impacts associated with Asteria Eskom MTS project, and to provide an assessment of the project in terms of the biophysical, social and economic environments. It is this assessment, which aids the environmental authorities (i.e. the national Department of Environmental Affairs (DEA)) and the proponent (i.e. Eskom) in making decisions regarding the future of the project.

The scoping phase has already been undertaken and acceptance of the Final Scoping Report (SR) was received from the DEA on 14 May 2013 (**Appendix A-2**). The SR identified issues and concerns in order to focus the specialist studies during the EIA Phase and provide a framework within which to undertake the assessment. The EIA Report summarises the findings of the specialist studies and provides recommendations on the mitigation measures that should be implemented in order to minimise the negative and maximise the positive impacts. The Site-Specific Draft Environmental Management Programme (EMPr), which forms part of the EIA Report, summarises the assessed impacts and lists the actions required by the Applicant to ensure that the mitigation measures are implemented during the design to decommissioning phases of the proposed development.

In keeping with environmental legislation, it is the responsibility of the EAP to ensure that the public is provided the opportunity to participate meaningfully in the environmental investigation process. This includes identification of issues and review of reports. Accordingly, interested and affected parties (I&APs) ~~are~~ were invited to review and comment on the Draft EIA Report and the Site-Specific Draft EMPr from **03 October 2013** to **11 November 2013**. Issues raised by I&APs ~~to date~~ during the public review of the Draft EIA Report, together with issues identified by the specialists, have been assessed to compile the ~~Draft~~ Final EIA Report and Specialist Studies (including Addendum Reports). A public meeting ~~is scheduled~~ was held on 10 October 2013 where the findings of the Draft EIA Report were presented. The comments received during the Draft EIA Report review period ~~will be~~ were incorporated into the Final EIA Report and submitted to the DEA for review and acceptance. In addition, the Final EIA Report will be made available to the public for a period of 30 days from **11 November 2014** to **10 December 2014**.

EXECUTIVE SUMMARY

Eskom Holdings SOC Limited (herein referred to as Eskom) has applied for environmental authorisation from the National Department of Environmental Affairs (DEA) for the proposed development, the Asteria Eskom Main Transmission Substation (MTS) project. The DEA Reference number provided is 14/12/16/3/3/2/401 and the NEAS Reference Number provided is DEA/EIA/0001397/2012. Eskom changed the name of the project from the Houhoek Transmission Substation project to the (herein referred to as) **Asteria Eskom MTS project**.

BKS (Pty) Ltd (hereafter referred to as BKS) was appointed by Eskom as the Environmental Assessment Practitioner (EAP) to undertake the required Environmental Impact Assessment (EIA) process for the development of the Asteria Eskom MTS project.

OVERVIEW OF PROPOSED ASTERIA ESKOM MTS PROJECT

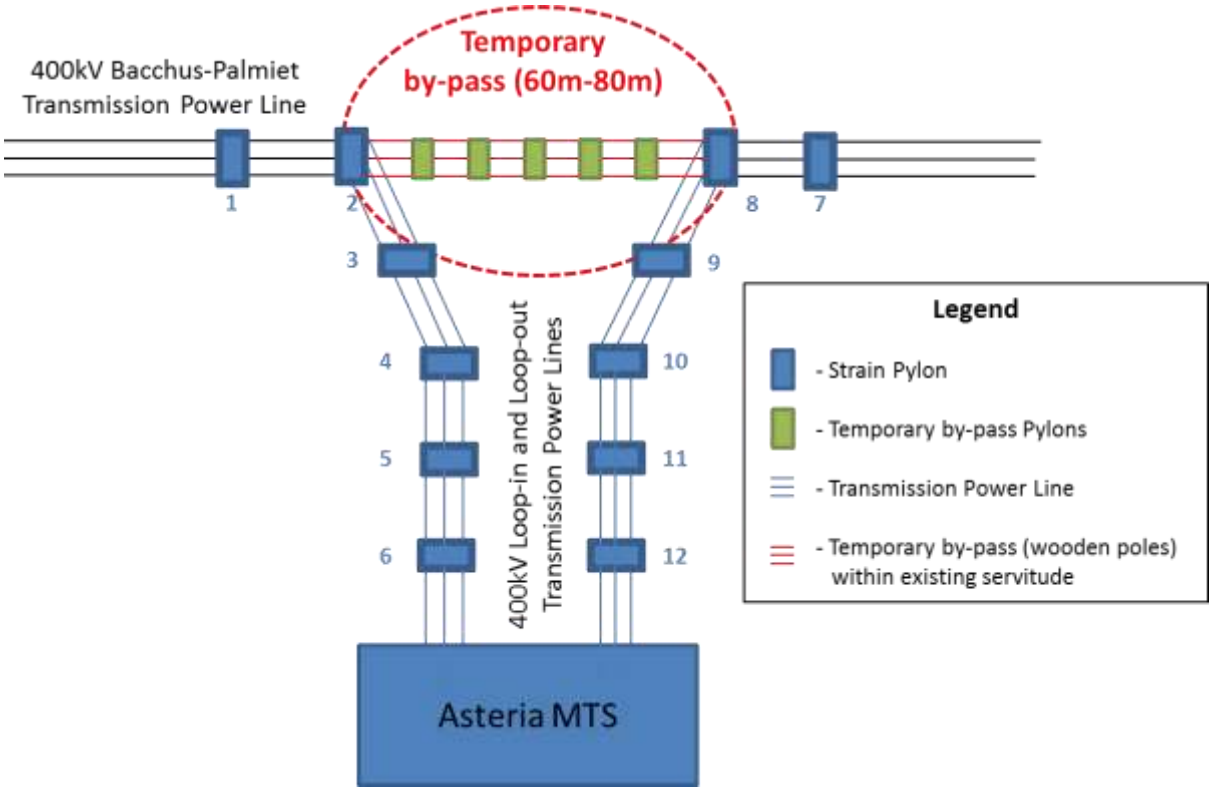
The Southern Cape customer load network accounts for 21% of the entire Western Grid network. As such, the Bacchus Main Transmission Substation (MTS) is nearing 90% of its firm capacity and thus requires further strengthening to the network in order to comply with the N-1 criteria. The proposed Asteria MTS project would be able to relieve the pressure on the Bacchus MTS as more than 90% of the Houhoek Distribution network is fed from the former MTS.

The Asteria Eskom MTS project entails the construction of the 400/132kV Asteria Eskom MTS, integrating the existing 132kV Eskom Distribution network, and, the loop-in and loop-out (LILO) connecting 400kV Transmission power lines from the Asteria Eskom MTS into the existing Bacchus-Palmiet 400kV Transmission power line and back to the Asteria Eskom MTS. The existing 132kV Houhoek Eskom Distribution Substation is 4.5 hectares in area, whereas the proposed 400kV Asteria Eskom MTS is ~~11.2~~ 14.44 hectares in extent. A layout alternative of 320m × 350m (11.2 hectares) was considered for the Draft EIA Report. However, the increase in size of the substation to 380m × 380m (14.4 hectares) is considered for the Final EIA Report due to a change in the substation design philosophy.

The Asteria Eskom MTS project requires the following activities:

- A 2×500MVA Transformers, 400/132kV MTS of ~~11.2~~ 14.44 hectares in area that integrates with the existing 132kV Houhoek Eskom Distribution Substation.
- LILO power lines that connect the existing Bacchus-Palmiet 400kV Transmission power line to the proposed Asteria Eskom MTS. This would entail two adjoining 400kV Transmission power lines. The distance of these power lines is approximately 2km in length. Temporary by-pass wooden poles will be placed within the existing servitude of the Bacchus-Palmiet 400kV Transmission power line to maintain the live connection. Five to six temporary bypass pylons would be placed over approximately 400m between Pylon 2 and Pylon 8 (see figure below).
- A 132kV Distribution power line that connects the proposed Asteria Eskom MTS to the existing Houhoek Eskom Distribution Substation. The distance of the Distribution power line is estimated between 250m to 300m in length.
- An access road would need to be constructed to link the proposed Asteria Eskom MTS to the provincial R43 road. The access road would need to be suitable for the usage of large flatbed trucks and possibly abnormal heavy vehicles, which would deliver the components and the

transformers of the substation. The construction of the LILO 400kV Transmission power lines could require the construction of related access roads.



STUDY AREA

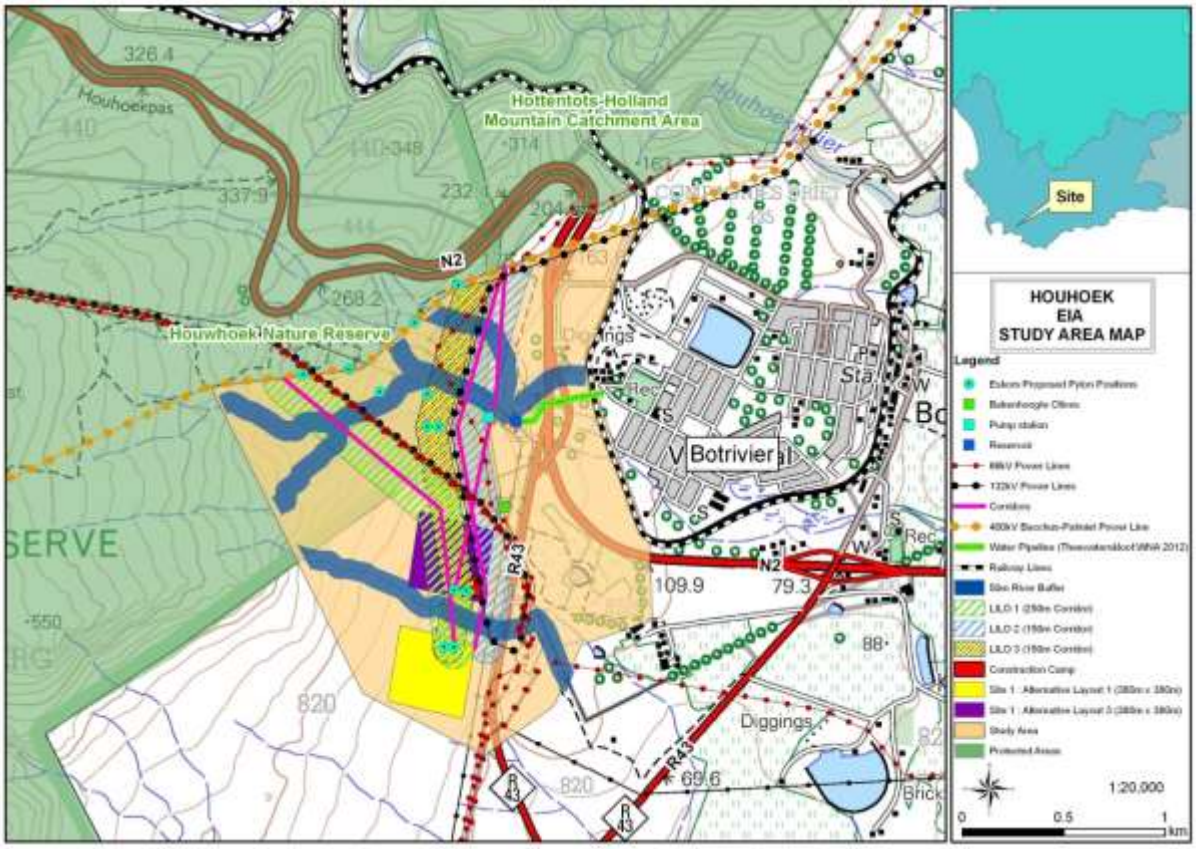
The study area is located approximately 90km east of Cape Town, within the Theewaterskloof (TWK) Local Municipality, in the Western Cape Province. The project site is located approximately 1km south-west of the town of Botrivier. The Houwhoek Nature Reserve is located to the west of the study area, whilst a railway line borders the north and east. The N2 Highway between Cape Town and Caledon borders the northern and eastern sides of the study area, whilst the R43 provincial road to Hermanus bisects the study area through the middle in a north-south direction. The northern boundary of the study area is the existing Bacchus-Palmiet 400kV Transmission power line.

ALTERNATIVES

The EIA process requires the identification and analysis of alternatives in order to satisfy the need of the Asteria Eskom MTS project. Therefore, the following items have been identified and are included as part of this EIA Report:

- The following macro alternatives have been considered:
  - No-Go Alternative – *status quo*
  - Demand-side Management
- The following design alternatives have been considered:
  - Optimisation of Existing Servitudes
  - Underground Transmission power lines
  - Underground Distribution power lines

- Site Alternative 1: Layout Alternative 2, Site Alternative 2 and Site Alternative 3 (both layout alternatives) were dismissed during the scoping phase. As such, only Site Alternative 1 was carried to the EIA phase, for further assessment.
- Site Alternative 1 entailed two layout alternatives (i.e. Layout Alternative 1 and Layout Alternative 3) for further assessment. Both layout alternatives are ~~350m × 320m~~ 380m × 380m (14.44 hectares) in area. The following layout alternatives have been considered for Site Alternative 1 as per **Figure 3-9**:
    - Layout Alternative 1 allows for a more efficient integration of future 132kV lines as more space is available to take future 132kV lines out of the Asteria Eskom MTS.
    - Layout Alternative 3 offers the same integration points as the previous Site Alternative 1 layout. However, Layout Alternative 3 may pose possible interference with a future toll gate planned in the area. In addition, construction is required underneath the main 132kV Bacchus-Houhoek Distribution power line that is currently entering the existing 132kV Houhoek Eskom Distribution Substation.



- The following three corridor alternatives for the LILO 400kV Transmission power lines were considered for assessment:
    - LILO 1: a servitude corridor width of 250m was considered to allow for placement of the LILO power line either adjacent to the existing power lines or away from the existing power lines (to reduce the visual impact caused by cluttering of power lines). LILO 1 is 1km – 1.6km long (depending on the positioning of both the Asteria Eskom MTS layout alternatives), which would allow the placement of the LILO either adjacent to the existing 66kV and 132 kV Distribution power lines leading to the Bacchus-Palmiet 400kV Transmission power line or a

distance of 150m away from these existing power lines to reduce the visual impact caused by cluttering of power lines.

- LILO 2: a servitude width of 150m was considered to allow Eskom sufficient flexibility to avoid existing water and sewage infrastructure (i.e. the pump station and reservoir) and the widening of the R43. LILO 2 is 1.3km – 1.8km long to avoid an impact on the existing dam, pump station and water supply line to the town of Botrivier and to run adjacent to the existing 132kV Distribution line to the existing Bacchus-Palmiet 400kV Transmission power line.
- LILO 3: a servitude width of 150m was considered. This alignment was included in the study as it would result in lesser cross-overs of existing power lines. LILO 3 is also between ±1.5km and ±1.8km long. This alignment is situated to the west of LILO 2.

- Pylon positions were profiled by Eskom based on the topography and existing Eskom infrastructure, which is referred to as **Eskom's technically acceptable route alignment**. The pylon positions are located within the study area and across LILO 1 and LILO 3 corridors as well as within the existing servitude of the Bacchus-Palmiet 400kV Transmission power line.

PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) included the distribution of documents by post and electronic mail, printed media, meetings with stakeholders and meetings held at the request of the DEA and I&APs. All issues and concerns that were raised by the I&APs, through the various channels during the EIA process to date, including I&AP registration forms, e-mail communications and the Public Open Days, were captured in an Issues and Response Report (IRR) (**Appendix C**). A public meeting ~~is scheduled~~ was held on 10 October 2013 to present the findings of the Draft EIA Report. Focus group meetings ~~are~~ were also scheduled from 9-10 October 2013.

ENVIRONMENTAL SPECIALIST STUDIES

The following specialist studies were undertaken for the EIA Phase:

- Geotechnical Assessment by Dirk van Rooyen (Geotechnics Africa).
- Soil and Agricultural Potential Assessment by Garry Paterson (Institute of Soil, Climate and Water of the Agricultural Research Council).
- Freshwater Ecosystems Assessment (including wetlands, dams and rivers) by Dean Ollis (The Freshwater Consulting Group).
- Ecological Assessment by Nick Helme (Nick Helme Botanical Surveys).
- Avifauna Assessment by Chris van Rooyen (Chris van Rooyen Consulting).
- Social Impact Assessment by Ingrid Snyman (Ingrid Snyman Development Consultants).
- Town Planning Assessment by Nina Otto (AECOM SA).
- Visual Assessment by Stephen Stead (VRM Africa).
- Heritage Assessment by Tim Hart (Archaeological Contracts Office, University of Cape Town).
- Traffic Assessment by Colin Tichauer (AECOM SA).

KEY FINDINGS OF THE EIA

The following potential significant impacts were identified by specialists and stakeholders during the Public Participation Process (PPP) for Site Alternative 1 (including layout alternatives 1 and 3) and for LILO ~~Routes 1, 2 and 3~~ corridors and Eskom's technically-acceptable route alignment:

- Kogelberg Sandstone Fynbos vegetation within the study area which results in the ecotones established in the study area.
- Ecological Impacts related to the critically endangered vegetation types within the study area. This includes the nature reserve and the areas with high botanical and avifaunal sensitivity.
- Freshwater ecosystems within the study area.
- Visual sensitivity of the study area, which relates to heritage and social aspects as well.
- The proposed developments are located on agricultural land, which could also relate to the geotechnical viability of the site.
- The visual integrity of the proposed developments in relation to their mountainous surrounding environment.
- The presence of farms (including potential land use for vineyards) and homesteads in the vicinity of the proposed developments as well as the impacts of these developments on the social fabric of Botrivier.
- The cumulative impact of the proposed Asteria Eskom MTS projection on the proposed wind energy facilities in the region and the related Distribution power lines that will link the infrastructure.

CONCLUSION

The EIA has not identified any fatal flaws that cannot be mitigated adequately that should prevent the proposed Asteria Eskom MTS project from being developed, but a number of significant issues were highlighted and strict adherence to the Site-Specific Draft EMPr is necessary to ensure an environmentally sustainable development. After due consideration of all the significant impacts, the EAP thus concludes that Site Alternative 1: Layout Alternative 1 and LILO 3 have the least negative impact on the environment. Appropriate mitigation measures include:

- Eskom shall be obliged to consult with all landowners (governmental, non-governmental and private) affected by the proposed Asteria Eskom MTS project during the servitude negotiation process.
- The recommendations of each specialist study shall be adhered to.
- The Site-Specific Draft EMPr must be made legally binding on the developer, owners and their Contractors. The Site-Specific Draft EMPr shall be finalised with inclusions of the specific conditions of the Environmental Authorisation, before the start of construction.
- A full-time independent Environmental Control Officer should be contracted by the Applicant to oversee the implementation of and undertake audits based on the Site-Specific Draft EMPr before the start of the construction phase of the project.
- Eskom shall also appoint an Environmental Manager to ensure compliance to the operational and maintenance aspects of the Site-Specific Draft EMPr.
- The construction camp shall be located within the ~~boundaries of the proposed Asteria Eskom MTS property on the Remainder of Farm 820 Caledon RD~~ assessed Site Alternative 1: Layout Alternative 3 and remains less than 1 hectare in extent.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

3. Freshwater Ecosystems Assessment
4. Ecological Assessment
5. Avifaunal Assessment
6. Social Impact Assessment
7. Town Planning Assessment
8. Visual Impact Assessment
9. Heritage Impact Assessment
10. Traffic Impact Assessment

Appendix F: Independent Peer Review

Appendix G: Site-Specific Draft Environmental Management Programme

LIST OF ABBREVIATIONS

ACO	Archaeology Contracts Office
AHPH	Association of Professional Heritage Practitioners
amsl	above mean sea level
ASAPA	Association of Southern African Professional Archaeologists
AU	Authority Zone: Government
BA	Basic Assessment
BELCOM	Built Environment and Landscape Committee
BID	Background Information Document
BLM	Bureau of Land Management
CALP	Collaborative for Advanced Landscape Planning
CAPE	Cape Action for People and the Environment
CARA	Conservation of Agricultural Resources Act (No. 43 of 1983)
CBA	Critical Biodiversity Area
CCR	Core Cape Subregion
CFK	Cape Floristic Kingdom
CLN	Customer Load Network
DEA	Department of Environmental Affairs
DEA&DP	Western Cape Provincial Department of Environmental Affairs & Development Planning
DEM	Digital Elevation Model
DMR	Department of Mineral Resources
DAFF	Department of Agriculture, Forestry and Fisheries
DoC	Degree of Contact
DoE	Department of Energy
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (No. 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity

EMF	Electro-Magnetic Fields
EMPr	Environmental Management Programme
FEPA	Freshwater Ecosystem Priority Areas
GCFR	Greater Cape Floristic Region
GIS	Geographical Information System
GN R	Government Notice Regulation
ha	Hectare
HIA	Heritage Impact Assessment
HSA	Hazardous Substances Act (No. 15 of 1973)
HV	High Voltage
HWC	Heritage Western Cape
I&AP(s)	Interested and affected party (-ies)
IAIAsa	International Association of Impact Assessments (South Africa Affiliate)
IBA	Important Bird Areas
IDP	Integrated Development Plan
IHI	Index of Habitat Integrity
IRR	Issues and Responses Report
km	kilometre
KNRC	Kogelberg Nature Reserve Complex
KOP(s)	Key Observation Point(s)
kV	kilovolt
LILO	Loop-in and Loop-out
LM	Local Municipality
LUPO	Land Use Planning Ordinance (No. 15 of 1985)
m	metre
m^2	squared metre
m^3	cubic metre
MTS	Main Transmission Substation
MVA	Mega Volt Amperes
N2	National Road No. 2
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act (No. 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Water Act (No. 36 of 1998)
ODM	Overberg District Municipality
QDGC	Quarter-Degree Grid Cell
PES	Present Ecological State
PPP	Public Participation Process
PoS	Plan of Study
SABAP	Southern African Bird Atlas Project
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SANS	South African National Standards

SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SDP	Spatial Development Plan
sec	second
SIA	Social Impact Assessment
SOC	State-Owned Company
SR	Scoping Report
TIA	Traffic Impact Assessment
TWK	Theewaterskloof
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WC:DoT	Western Cape Department of Transport and Public Works
WEF	Wind Energy Facility
ZVI	Zone of Visual Influence

1 INTRODUCTION

1.1 BACKGROUND

The Southern Cape customer load network of the Western Grid of the Western Cape Province requires further strengthening. As such, Eskom Holdings SOC Limited (herein referred to as Eskom) has applied for an environmental authorisation from the National Department of Environmental Affairs (DEA) for the proposed development, the Asteria Main Transmission Substation (MTS) project (DEA Reference Number: 14/12/16/3/3/2/401 and NEAS Reference Number: DEA/EIA/0001397/2012). After the scoping phase, the project name was changed by Eskom from the Houhoek Transmission Substation project to the **Asteria Eskom MTS project**.

The Asteria Eskom MTS project entails the construction of the proposed Eskom 400/132kV Asteria Eskom MTS, integrating the existing 132kV Eskom Distribution network, and, construction of the loop-in and loop-out (LILO) 400kV connecting power lines into the existing Bacchus-Palmiet 400kV Transmission power line.

The existing 132kV Houhoek Eskom Distribution Substation is 4.5 hectares in area and located approximately 1km south-west of the town of Botrivier in the Theewaterskloof (TWK) Local Municipality (LM) in the Western Cape Province. The study area considered for the development of the Asteria Eskom MTS project is in close proximity to the existing Houhoek Eskom Distribution Substation and Botrivier.

The Asteria Eskom MTS project requires the following activities:

- A 2×500MVA, 400/132kV MTS of ~~11.2~~ 14.44 hectares in area, near the existing 132kV Houhoek Eskom Distribution Substation site.
- LILO Transmission power lines that connect the existing Bacchus-Palmiet 400kV Transmission power line to the proposed Asteria Eskom MTS. This would entail 2 adjoining 400kV Transmission power lines. The distances of these power lines will depend on where the LILO power lines will intersect the Bacchus-Palmiet 400kV Transmission power line (between 1km and 2km from the proposed Asteria Eskom MTS).
- A 132kV Distribution power line that connects the proposed Asteria Eskom MTS to the existing Houhoek Eskom Distribution Substation. The distance of this Distribution power line depends on the location of the proposed Asteria Eskom MTS (between 250m and 300m from the existing Houhoek Eskom Distribution Substation).
- The construction of the LILO 400kV Transmission power lines could require the construction of related access roads, where there are no existing access roads.

BKS (Pty) Ltd was appointed by Eskom as the Environmental Assessment Practitioner (EAP) to undertake the required Environmental Impact Assessment (EIA) process for the Asteria Eskom MTS project.

The EIA process for the Asteria Eskom MTS project is being undertaken in accordance with Section 24 of the NEMA and sections 26 to 35 of the EIA Regulations (GN R543 of 18 June 2010, as amended).

1.2 PURPOSE OF THE STUDY

An EIA is a planning and decision-making tool. It identifies any potential negative and positive impacts that a proposed project may have and recommends ways to enhance the positive impacts and minimise the negative ones.

The EIA for this project will address the impacts associated with the project, and provide an assessment of the project in terms of the biophysical, social and economic environments to assist both the environmental authority (the DEA) and the Applicant (Eskom) in making decisions regarding the implementation of the Asteria Eskom MTS project.

The Asteria Eskom MTS project falls under the ambit of the EIA Regulations (GN R543 of 18 June 2010, as amended) promulgated in terms of Section 24(2)(a) and (d) of the National Environmental Management Act, 1998 (No. 107 of 1998) (NEMA), under the Government Notice Regulation (GN R) 543 of 18 June 2010, as amended. Cognisance will also be taken of the following:

- NWA – the National Water Act, 1998 (Act No. 36 of 1998).
- Related guideline documents.
- Other relevant legislation, including provincial and municipal legislation.

The EIA consists of three phases:

- The Scoping Phase.
- The EIA Phase.
- The Decision-Making Phase.

The Scoping Phase for this project (which has already been completed with the acceptance letter from the DEA dated 14 May 2013) identified and defined the issues that need to be addressed in the EIA Phase. In this regard, input from the technical team, the authorities and interested and affected parties (I&APs) were considered and integrated.

The EIA Phase is undertaken with the goal of informing the Decision-Making Phase. In order to do so, the findings identified and assessed by the EAP and specialists ensure that appropriate mitigation measures are presented for the purpose of a sustainable development.

1.3 METHODOLOGY OF THE COMPLETED SCOPING PHASE

The aim of the scoping phase of the project was to identify and define the issues that needed to be addressed in the impact assessment phase.

During the Public Participation Process (PPP), I&APs were identified and given the opportunity to identify issues and concerns that relate to the study area. A first round of public participation was undertaken as documented in **Chapter 6.3**.

The Draft Scoping Report (SR) was made available to I&APs for review and the Final SR incorporated all comments that were received before submission to the DEA for consideration. The Final SR was accepted by the DEA on 14 May 2013 (**Appendix A-2**).

1.4 STRUCTURE OF EIA REPORT

The following information, in accordance with Section 31 of GN R543, is included in this report:

- Project team details (**Chapter 2**).
- An overview of the Asteria Eskom MTS project, the extent of the study area and any assumptions/limitations/constraints linked to the EIA study (**Chapter 3**).
- A description of the project alternatives (**Chapter 4)**.
- Legislation and guidelines that pertain to the project (**Chapter 5**).
- A description of the methodology followed for the EIA process including the PPP and the terms of references for the specialist studies (**Chapter 6**).
- A description of the receiving environment (**Chapter 7**).
- A description of the assessment methodology (**Chapter 8**).
- An assessment of each environmental potential significant impact identified in the Scoping Phase as per Section 31(l) of the 2010 EIA Regulations (**Chapter 9**).
- A summary of the findings of the specialist studies (**Chapter 10**).
- A comparative alternatives analysis (**Chapter 11**).
- A brief description of the site-specific draft EMPr (**Chapter 12**).
- An Environmental Impact Statement (**Chapter 13**).
- A description of activities applicable to NEMA principles of sustainabile development (**Chapter 14**).
- A reasoned opinion as to whether the proposed project should or should not be authorised and recommendations (**Chapter 15**).

2 PROJECT TEAM

2.1 APPLICANT

Details of the Applicant are as follows:

Applicant	Eskom Holdings SOC Limited Transmission Division: Land and Rights
Contact Person	Ms Martina Phiri
Postal Address	PO Box 1091, Johannesburg, 2000
Telephone	(011) 800 3550
Fax	(011) 801 3917
Cell Phone	(082) 468 2137
E-mail Address	PhiriM@eskom.co.za

2.2 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Details of the Environmental Assessment Practitioner are as follows:

Environmental Consultant	BKS (Pty) Ltd
Environmental Assessment Practitioner	Mr Peter Teurlings
Postal Address	PO Box 3173, Pretoria, 0001
Telephone	(012) 421 3500
Fax	(086) 299 2145
Cell Phone	(083) 253 8322
E-mail Address	PeterT@bks.co.za

Peter Teurlings, Senior Principal Environmental Specialist at BKS, is the EAP and Project Director and is responsible for providing guidance on the EIA Process and ensuring the professional quality of the project reports. Peter is a registered Professional Natural Scientist (Registration No. 400027/95) in the Environmental Science field of practice in terms of Section 18(1) of the Natural Scientific Professions Act (No. 27 of 2003) and is a member of the South African Affiliate of the International Association of Impact Assessments (IAIAsa). Peter holds an MSc (Biogeography) and specialises in environmental assessment processes and project management. He has been involved over a period of 24 years in a variety of EIA processes, including residential developments, Transmission power lines, wastewater treatment projects, water supply projects, dams, roads and airports in Southern Africa. Peter meets the requirements for the independent EAP in terms of Section 17 the EIA Regulations (GN R543 of 18 June 2010, as amended).

Bharat Gordhan, a Senior Environmental Scientist at BKS, is responsible for managing this project and compiling this EIA Report. Bharat holds a BSc (Geography and Environmental Management) and specialises in environmental assessment processes. He has been involved in a variety of EIA processes in the last eight years, including Eskom Transmission power lines and substations, residential developments, road upgrades, filling stations and pipelines in Southern Africa.

Robin Swanepoel, a Chief Environmental Scientist at BKS, is responsible for the compilation of the Environmental Management Programme (EMPr) derived from the EIA process. Robin has a B.Tech in Nature Conservation and a B.Tech in Environmental Management. Robin has 16 years of hands-on specialist experience in the environmental/ conservation related fields and one year in the security industry. Through the former period he has been employed in both the government and private sectors managing areas of conservation worthy status. During this period he has managed an Environmental Technical Services company, providing specialist input/services to local and national governmental organisations and in the capacity of Principal Environmental Manager, and oversaw some of the large construction activities in Southern Africa. His focus has since shifted to include the overseeing of project inception and planning and design phases, through to and including, construction-related environmental compliance monitoring of large-scale infrastructural developments.

2.3 PUBLIC PARTICIPATION TEAM

Dr David de Waal (*DLitt et Phil*) is the Senior Principal Social Specialist at BKS who specialises in the fields of community development, community capacity building and participative planning processes. His experience includes numerous years of close involvement in the rural and urban development environment at policy, strategy and grass roots implementation levels. He has been extensively involved in community based capacity building process. He has facilitated a number of processes at Local Government level, which required intensive public participation. These included mediation between affected parties and government structures to ensure consensus-based outcomes and decision-making. Processes he has successfully facilitated include public participation and facilitation for the establishment of landfill sites, road structures, flood attenuation structures and pollution problems. He serves on a number of development and community based committees. He also sits on the ISO 14001 Advisory Committee of the South African Bureau of Standards. He is co-author of: *"The promotion of participate development management at grass roots level, a field guide"*, for the Water Research Commission of South Africa. He is also the author of various courses, articles and reports in his field of activity. David will oversee the public participation process and his team of experts. David will also act as facilitator, at need, should any conflicts require resolution.

Marti le Roux (NHD) is the social facilitator for the project for which she has a sound working knowledge of the public participation field over the last 12 years. During this time, Marti has worked on a range of projects of varying scales. Her ability to effectively communicate in Afrikaans and English will be an asset during consultation with I&APs. Marti will act as a direct interface between the environmental team and the members of the community.

Mamokete Maimane (BSc (Hons)) has gained experience in data collection and collation, identification of I&APs, taking and compiling of minutes of meetings, and, basic environmental management. Her ability to effectively communicate in English and Afrikaans, as well as Southern Sotho, will also be an asset during consultation with I&APs. Mamokete will oversee the day to day roll out of the PPP and will be a primary contact point for the community consultations.

2.4 GEOTECHNICAL, SOIL AND AGRICULTURAL POTENTIAL

Dirk van Rooyen is a Senior Engineering Geologist at Geotechnics Africa Western Cape and is a member of the South African Institute of Engineering and Environmental Geologists. Dirk is a registered Professional Natural Scientist (Registration No 400207/84) in the Geological Science field of practice and holds a BSc (Hons) in Engineering Geology. He has 33 years' experience in engineering geology and has undertaken geotechnical investigations throughout Southern Africa and neighbouring countries, including Central, East and West Africa. He has provided the engineering geological component for two major port expansion programmes, Saldanha in South Africa and Lobito in Angola. He has also worked on several major site selection studies for power stations and other industrial complexes, undertaken engineering geological investigations for a number of solar and wind energy facilities, townships, golf estates, shopping centres, hotels and casino complexes, investigations into problems related to groundwater and proving of borrow pits, materials and centreline investigations for roads and pipelines, and foundation investigations for projects ranging from low-cost housing to multi-storey developments. Dirk has also worked closely with geohydrologists and groundwater consultants to provide geological assistance and collection of groundwater data for small to major groundwater studies.

Garry Paterson (MSc) is a Senior Soil Scientist at the Agricultural Research Council – Institute for Soil, Climate and Water. Garry is a registered Professional Natural Scientist (Registration No 400463/04) in the Soil Science field of practice and holds an MSc (*cum laude*) in Soil Science. His fields of speciality are soil classification and mapping, soil interpretations, soil surveys and land capability, and ground penetrating radar.

2.5 FRESHWATER ECOSYSTEMS, ECOLOGICAL AND AVIFAUNAL

Dean Ollis is a Wetland Specialist from Freshwater Consulting and a member of the Southern African Society of Aquatic Scientists. Dean is a registered Professional Natural Scientist (Registration No 400102/06) in the Environmental Science field of practice. Dean has two Masters Degrees, namely an MPhil in Environmental Science from the University of Cape Town and an MSc in Ecological Assessment (specialising in Freshwater Ecology) from the University of Stellenbosch. He has more than 10 years of experience in the environmental sciences field, specialising in water quality, aquatic ecosystems, "river health" assessments, and, wetland assessments. He has contributed to the development of a national wetland classification system for South Africa. Freshwater Consulting has undertaken numerous assessments for a range of proposed developments in the Western Cape region.

Nick Helme is a botanical and ecological consultant at Nick Helme Botanical Surveys. Nick specialises in the diverse flora of the south-western Cape and the Greater Cape Floristic Region. Nick is a registered Professional Natural Scientist (Registration No 400045/08) with a BSc (Honours) in Botany. He has done over 1 000 botanical assessments for various proposed developments throughout the Western Cape Province. Nick is a co-author of the Fynbos chapter in the Vegetation Map for South Africa (Mucina &

Nick has worked on the Ecological Assessments for the following Eskom Distribution EIA processes in 2004:

- 66kV Distribution power line from Hermanus Substation to the existing Houhoek Substation.
- 132kV Distribution power line from Houhoek to Stikland.

Rutherford, 2006) and guidelines for biodiversity offsets in the Western Cape (DEA&DP, 2011). Nick provided a consideration of the biodiversity and ecological functionality of each of the site and corridor alternatives as they shall impacted on by the Asteria Eskom MTS project.

Chris van Rooyen has 17 years' experience in the management of avifaunal interactions with industrial infrastructure. He was head of the Eskom-Endangered Wildlife Trust Strategic Partnership from 1996 to 2007, which has received international acclaim as a model of cooperative management between industry and natural resource conservation. He is an acknowledged global expert in this field and has worked in South Africa, Namibia, Botswana, Lesotho, New Zealand, Texas, New Mexico and Florida. Chris also has extensive project management experience and has received several management awards from Eskom for his work in the **Eskom-EWT Strategic Partnership**. He is the author of 15 academic papers (some with co-authors), co-author of two book chapters and several research reports. He has been involved as ornithological consultant in more than 100 power line projects and 25 wind generation projects. Chris is also co-author of the Best Practice for Avian Monitoring and Impact Mitigation at Wind Development Sites in Southern Africa, which is currently (2013), accepted as the industry standard. Chris also works outside the electricity industry and had done a wide range of bird impact assessment studies associated with various residential and industrial developments.

2.6 SOCIAL, VISUAL, AND HERITAGE

Ingrid Snyman is an experienced social scientist with 14 years' experience in conducting and implementing Social Impact Assessments (SIA). Ingrid holds a BA (Hons) in Anthropology. The project themes for these SIAs consist of infrastructure development, waste management, road development, water and sanitation programmes, township and other residential type developments. She has also been involved in the design and management of numerous public participation programmes and communication strategies, particularly on complex development projects that require various levels and approaches. She has worked on over 20 SIAs for Eskom projects, and has worked in the areas surrounding the existing Houhoek Eskom Distribution Substation.

Stephen Stead (PrLArch) is a Visual Impact / 3D modelling Consultant at Visual Resource Management Africa CC. Stephen is an accredited VIA practitioner with the Association of Professional Heritage Practitioners (AHPH) Western Cape and holds a BA (Hons) in Human Geography and Geographic Information Management Systems. VRM Africa makes use of the well documented Visual Resource Management methodology developed by the Bureau of Land Management (USA) for assessing the suitability of landscape modifications. In association with ILASA qualified landscape architect Liesel Stokes, he has assessed over 100 major landscape modifications throughout southern and eastern Africa. VRM Africa has been operating for eight years and has successfully established and retained a large client base throughout Southern Africa. Stephen has 12 years of experience in the field of GIS mapping and 3D modelling through his work as a GIS consultant and visual impact practitioner. Stephen is also a past President of IAIAsa.

Tim Hart is an Archaeologist and general heritage practitioner at the Archaeology Contracts Office (ACO) at the University of Cape Town. Tim holds a MA in Archaeology and is a registered Professional Archaeologist (principal investigator level) and registered generalist/specialist heritage impact assessor. He is registered with the Association of Southern African Professional Archaeologists (ASAPA) and its Cultural Resource Management section and Association of Heritage Assessment Professionals. Tim has 23 years of working experience in Heritage Impact Assessment, heritage management and archaeological research. As a founder member of the ACO, he has worked in a very wide variety of contexts including mitigation of archaeological sites in suburban, rural and industrial situations. Tim served a term on the Heritage Western Cape's Built Environment and Landscapes Committee (BELCOM) and is now serving on the Archaeology, Palaeontology and Meteorites committee thereof. He has a particular interest in industrial heritage, historic landscapes and development of conservation management plans.

2.7 TRAFFIC AND TOWN PLANNING

Colin Tichauer is a Registered Technologist at AECOM SA (Pty) Ltd. Colin has been involved in providing traffic and transportation planning inputs into EIA processes for over fifteen years. In addition to assisting with EIA processes Colin has been responsible for managing and investigating the transportation requirements for various different land uses ranging from residential developments, commercial developments to public transport infrastructure.

Nina Otto is a Principal Town and Regional Planner at AECOM SA (Pty) Ltd and is responsible for assessing the town planning requirements of this project. Nina holds a BTRP (Town and Regional Planning) and specialises in planning integration processes and planning inputs to EMPrs. She has been involved in a variety planning integration processes including the Gautrain Rapid Rail Link, an Eskom Socio-Economic Impact Study and various rail projects for the Passenger Rail Association of South Africa, ensuring that the required land use rights are in place and that the facilities are integrated with the urban environment.

2.8 ENVIRO-LEGAL

The environmental legal input and review of the Draft EIA Report has been provided by **Gillian Arenstein**, Associate Attorney of Warburton Gunn Attorneys, a firm of attorneys specialising in proactively assisting to achieve and sustain legal compliance in the field of environmental law. Gillian will be providing a review of the documentation as generated for this submission and checking for legal compliance, potential oversights, etc. from an environmental specialist legal point of view. Gillian is an admitted South African attorney who conducted numerous environmental legal compliance audits, evaluations, reviews, risk assessments and other similar exercises for both mining and industrial companies. She holds a BA in industrial psychology, an LLB and an LLM in environmental law. Gillian's areas of practice specifically focus on environmental legal compliance, including environmental permitting, licensing and authorisation processes.

2.9 PEER REVIEW

The peer review will be undertaken by Bryony Walmsley of the Southern African Institute for Environmental Assessment. Bryony has over 30 years' experience in environmental consulting, starting in Canada in 1980, but she has lived and worked in southern Africa since 1983. She founded Walmsley Environmental Consultants in 1990 and after 24 years as a consultant, she is now managing the South African office of the Southern African Institute for Environmental Assessment. She has an MA and MSc in Geography from St Andrews University and the University of Alberta respectively. She has extensive experience in Integrated Environmental Management, Due Diligence Audits and Environmental Liability Assessments, External Reviews, Strategic Environmental Impact Assessments, Environmental Impact Assessments, Site Selection Studies, Scoping Studies and Public Participation, Environmental Training and Environmental Management Plans.

Her key focus areas at present include:

- Capacity building and training in all aspects of environmental management;
- Independent external review of EIA reports;
- Research and Development of EA tools (guidelines, books, development of methodologies, sustainability appraisals, etc);
- Audits, Risk Assessments and Due Diligence Studies.

2.10 GEOGRAPHICAL INFORMATION SYSTEMS

All data provided by the abovementioned specialist studies was captured on a Geographical Information System (GIS) tool by Vee Cowie of EcoGIS. This allowed the project team to recommend a location for the construction of the Asteria Eskom MTS and a route alignment for the 400kV Bacchus-Palmiet LILO Transmission power lines. This data also supported the Scoping and EIA Reports by producing various maps to indicate the different scenarios. The process of capturing the information and mapping was undertaken within the parameters of a standardised GIS format. This added value to the process as all available data sets was consistent with each other, resulting in the delivery of relevant and accurate information for decision-making purposes.

2.11 SUMMARY

The EAP and his team at BKS are supported by other BKS personnel and a range of specialists (listed in **Table 2-1**). Inputs from Eskom Transmission and Eskom Distribution are important for the completeness of the process and accuracy of project-related information. Refer to **Appendix D** for the *curricula vitae* of the project team members.

Table 2-1: Project Team

NAME	ROLE ON TEAM	COMPANY
Peter Teurlings	Project Director, EAP & Professional Natural Scientist	BKS
Dr David de Waal	Public Participation Facilitator	BKS
Bharat Gordhan	EAP's Project Manager & Environmental Scientist	BKS

NAME	ROLE ON TEAM	COMPANY
Robin Swanepoel	EMPr compilation	BKS
Marti le Roux	Public Participation Manager	BKS
Mamokete Maimane	Public Participation Officer	BKS
Elsje Greyling	Project Administrator	BKS
SPECIALISTS		
Dirk van Rooyen	Geotechnical Assessment	Geotechnics Africa
Garry Paterson	Soil and Agricultural Assessment	Agricultural Research Council
Dean Ollis	Freshwater Ecosystems Assessment	Freshwater Consulting
Nick Helme	Ecological Assessment	Nick Helme Botanical Studies
Chris van Rooyen	Avifaunal Assessment	Chris van Rooyen Consulting
Tim Hart	Heritage Impact Assessment	University of Cape Town
Steven Stead	Visual Impact Assessment	VRM Africa
Ingrid Snyman	Social Impact Assessment	Ingrid Snyman Development Consultants
Colin Tichauer	Traffic Impact Assessment	AECOM SA (Pty) Ltd
Nina Otto	Town Planning Requirements	AECOM SA (Pty) Ltd
Vee Cowie	GIS Coordinator	EcoGIS
INDEPENDENT REVIEWERS		
Gillian Arenstein	Enviro-Legal Review	Warburton Gunn Attorneys
Bryony Walmsley	Independent Peer Review	Southern African Institute for Environmental Assessment
ESKOM TRANSMISSION		
Rudzani Ranwedzi	Senior Environmental Advisor	Eskom Transmission
Lindi Haarhoff	Project Manager	Eskom Transmission
Ndangi Muthadi	Lines Design Engineer	Eskom Transmission
Ahmed Hansa	Chief Engineer Grid Planning	Eskom Transmission
Sipho Shabalala	Senior Surveyor	Eskom Transmission
Derrick Angrove	Civil Engineer	Eskom Transmission
Cass Naidoo	Substation Design Engineer	Eskom Transmission
Solly Phalanndwa	Senior Civil Design Engineer (Geotechnical)	Eskom Transmission
Pumza Jizana	Senior Negotiator	Eskom Transmission
Ebrahim Ismail	PM Capital Expansion	Eskom Transmission
ESKOM DISTRIBUTION		
Henk Landman	Senior Supervisor	Eskom Distribution
Muzafar Ebrahim	Senior Network Planner	Eskom Distribution
Maritza Rossouw	Senior Network Planner	Eskom Distribution

3 OVERVIEW OF THE PROJECT

3.1 BULK SUPPLY OF ELECTRICITY IN SOUTH AFRICA

Eskom is divided into Eskom Primary Energy, Eskom Generation, Eskom Transmission and Eskom Distribution divisions. Eskom Generation is responsible for the generation of electricity at power stations, while Eskom Transmission is responsible for the transmission of electricity at high voltages (between 132kV and 765kV) from power stations across the country to MTSs. Eskom Distribution is responsible for the distribution of electricity below 132kV from the MTS to local municipalities and other end-users.

Most cities and municipalities purchase electricity in bulk from Eskom Transmission / Eskom Distribution and sell it to households, industries and other end-users within their areas of jurisdiction, while Eskom Distribution also sells electricity directly to bulk end-users in some parts of South Africa.

Since electricity cannot be stored, demand and supply of electricity must be balanced instantaneously (Schoefield, 2007). Therefore, power has to be generated and delivered over long distances at the moment it is required. The bulk supply of electricity in South Africa is shown in **Figure 3-1**.

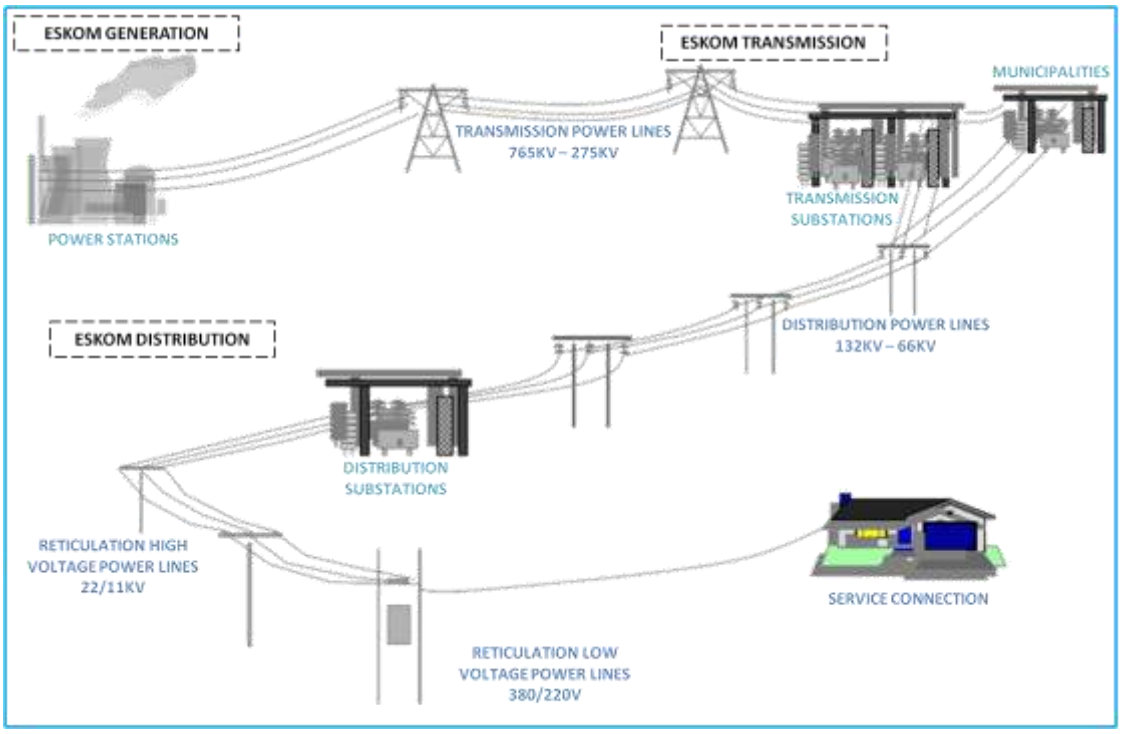


Figure 3-1: Nature of bulk electricity supply in South Africa

Eskom has a mandate to satisfy potential customer needs as an essential service, which implies certain responsibilities. One of the most significant of these is to find and maintain the balance between satisfying society's needs for electricity without having a detrimental effect on the environment. In order to achieve this, Eskom must continually re-assess its present infrastructure and take new developments into account to ensure that growing needs for electricity are satisfied, without considerably impacting on the environment.

3.2 NEED AND DESIRABILITY OF THE PROJECT

The Customer Load Network (CLN) in the Western Grid of the Western Cape Province is divided into the Cape Peninsular, West Coast, Southern Cape and Namaqualand CLNs. Each CLN is interconnected with an MTS and a distribution network (132kV and below). The Asteria Eskom MTS project area falls within the **Southern Cape CLN**, which accounts for 21% of the entire load in the Western Grid network, and consists of the following MTSs:

- Bacchus MTS.
- Droerivier MTS.
- Komnsberg MTS.
- Mossel Bay MTS.
- Palmiet MTS.
- Proteus MTS.

The Houhoek area is largely fed by the Bacchus MTS, with electricity supply also being received from the Stikland MTS (via the Firgrove MTS) and Muldersvlei MTS. **Figure 3-2** shows the network layout diagram of the Western and Southern Grid, indicating connectivity with the Bacchus MTS.

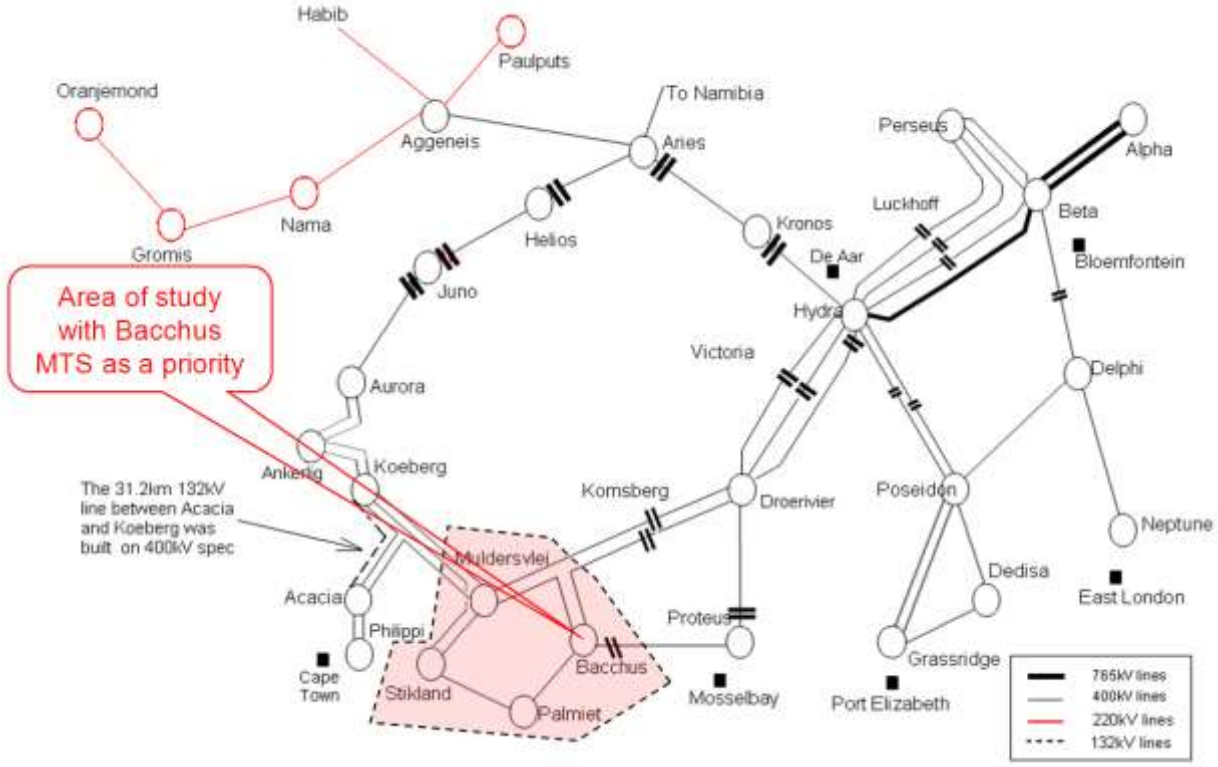


Figure 3-2: Network Layout Diagram of Western and Southern Grid

The Bacchus MTS is currently at 450 mega volt amperes (MVA) – 90% of the firm capacity of 500MVA. Based on the load forecast (or the anticipated demand for electricity), the Bacchus MTS will reach firm capacity by 2014-2015. The thermal capacity of the 132kV Distribution power lines that supply the Houhoek area will *technically* be exceeded by 2013. It is possible to operate the distribution network till approximately 2016 by providing supply to the Houhoek area from the Gala Distribution Substation in Grabouw. However, there are still

technical limitations that apply to this possible solution. The 132kV distribution network in the Houhoek area would no longer comply with the N-1 criteria (**see inset for further detail**).

In order to solve these network constraints, it is proposed that a new 400kV MTS be constructed **by ~~2014~~ 2016** to supplement the existing 132kV Houhoek Eskom Distribution Substation. The new Asteria Eskom MTS would relieve the pressure on the Bacchus MTS as more than 90% of the Houhoek Eskom Distribution network is fed from the latter MTS.

Criteria	Description
N-1	The network can withstand the loss of any element and maintain supply to all customers.
N-1 secure	The network can withstand the loss of any element and maintain supply to all customers. In addition the network can be subsequently reconfigured to withstand a further outage. During the time taken to re-configure, the network is at risk.

In addition, the new Asteria Eskom MTS will be able to supply the long-term future load growth anticipated in the Southern Cape CLN. At this stage, Eskom Transmission has not received any applications to connect any wind energy facilities (WEF) to the Asteria Eskom MTS project. Even so, there are four feeder bays that are included at the proposed Asteria Eskom MTS specifically for connections of 132kV Distribution power lines.

3.3 TECHNICAL DETAILS

The Asteria Eskom MTS project entails the construction of the 400/132kV Asteria Eskom MTS, integrating the existing 132kV Houhoek Eskom Distribution Substation, and, the LILO connecting 400kV Transmission power lines from the Asteria Eskom MTS into the existing Bacchus-Palmiet 400kV Transmission power line and back to the Asteria Eskom MTS. The Houhoek Eskom Distribution Substation is 4.5 hectares, in area.

3.3.1 Proposed Asteria Eskom Main Transmission Substation

The proposed Asteria Eskom MTS will be ~~11.2~~ 14.44 hectares, in area. Two layout alternatives of 320m × 350m in area were considered for the chosen Site Alternative 1. The other 2 location and layout alternatives were dismissed at the end of the scoping phase. A layout alternative of 320m × 350m (11.2 hectares) was considered for the Draft EIA Report. However, the increase in size of the substation to 380m × 380m (14.4 hectares) is considered for the Final EIA Report due to a change in the substation design philosophy. The design philosophy was amended to a more efficient design that would allow more flexibility to the network and reduce the potential down time and number of outages. The increased footprint allows Eskom the flexibility of keeping the feeder bays switched on during maintenance.

The proposed Asteria Eskom MTS will contain the following infrastructure:

- 4 x 500MVA Transformers (including 2 for future planning);
- 2 × 400kV line bays for the 400kV LILO from the Bacchus-Palmiet 400kV Transmission power line;
- Busbars, bus couplers and bus sections;
- 12 × 132kV feeder bays (including 6 for future planning);
- Foundations, steel structures and equipment;

- Stormwater drainage system;
- Outdoor switchgear (in a breaker and half configuration or double busbar configuration);
- ~~Telecommunication high mast~~ Fibre optic cables for telecommunication;
- Surge and lightning protection equipment/mast;
- Control and metering equipment;
- Office and ancillary buildings;
- Approximately 3.5m high fencing around the substation site to ensure the security of the substation is not compromised;
- Security lighting in and around the perimeter of the substation site, including a 24 m high floodlight mast. Lights at night would include security lighting in and around the perimeter of the proposed substation site;
- Platforms – the longest length of the cut platform required for the site is 270 m. The proposed cut height is approximately 20 m and the fill height is approximately 15 m; and
- Access road from the R43 to the proposed Asteria Eskom MTS and directly to the proposed construction camp location. The access road would need to be suitable for the usage of large flatbed trucks and possibly abnormal heavy vehicles, which would deliver the components and the transformers of the substation. No additional access roads would be allowed.

There will also be a transformer oil holding dam that is between 10 000 m^3 and 12 000 m^3 capacity. The large capacity includes ⅓ holding capacity to account for safety. The transformer oil will only be stored during the commissioning of the Asteria Eskom MTS, one month before energising of the MTS. This oil holding dam is an emergency and safety mechanism in case of leakage of the oil from the MTS during commissioning. The oil dam does not intend to store oil, if there is no emergency or leakage incident.

A total of 12 × 132kV feeder bays will be made available at the proposed Asteria Eskom MTS, which will:

- Serve two lines to the existing 132kV Houhoek Eskom Distribution Substation.
- Take in the Bacchus-Houhoek 132kV Distribution power line.
- Take in the Houhoek-Lourensrivier 132kV Distribution power line, on a double circuit with provision for the 66kV to 132kV upgrade of Houhoek-Lebanon Switching 1.
- The potential to connect in future on double circuit, either the Caledon WEF or the Langhoogte WEF; the other may be connected to the existing Houhoek Eskom Distribution Substation.
- Bredasdorp double circuit, future strengthening.
- Hermanus double circuit, future upgrade from 66kV to 132kV.
- Space for two future 132kV feeder bays.

Figure 3-3: Self-Supporting Pylon

3.3.2 Loop-in and Loop-out Transmission Power Lines

The project intends establishing two adjoining 400kV Transmission power lines to loop-in and loop-out (LILO) of the existing Bacchus-Palmiet 400kV Transmission power line.

The types of pylon towers considered for the LILO 400kV Transmission power lines are determined based on the following criteria:

- Space available to construct the LILO 400kV Transmission power lines and maintain their servitude.
- Generally, the horizontal distance between two pylon towers is approximately 350m to 400m for a typical 400kV Transmission power line. But, owing to the steeper terrain in the study area, the horizontal distance to be used for this project is estimated between 150m to 500m.
- The type of pylon towers adjacent to its horizontal axis.
- The angle created on its horizontal axis by the adjacent pylon towers.
- Visual impact on the affected landowners.

As such, only the Self-Supporting Pylon (**Figure 3-3**) will be used for the 400kV LILO Transmission power lines. This type of pylon is required for a bend of more than 2° in the horizontal alignment of the recommended route alignment of the power lines. Typical self-supporting pylons are between **26m and 29m** in height. No additional pylon alternatives will be considered because of the technical requirements of the 400kV LILO Transmission power lines.

The existing Bacchus-Palmiet 400kV Transmission power line would need to be split at the intersection with the proposed LILO 400kV Transmission power lines as shown in **Figure 3-4**. Temporary by-pass wooden pylons will be inserted into the ground within the existing 55m servitude of the Bacchus-Palmiet 400kV Transmission power line. This is in order to keep the existing Bacchus-Palmiet 400kV Transmission power line live and not to disconnect the power line during construction. The Bacchus-Palmiet 400kV Transmission power line will be split ~~for 60m 80m~~ over approximately 400m between Pylon 2 and Pylon 8. Therefore, ~~it is unlikely that more than two~~ five to six temporary by-pass pylons would be required to place the live power line during construction, subject to the final by-pass design and landowner negotiations. Once the LILO 400kV Transmission power lines are constructed (over approximately 90 days), the temporary by-pass pylons would be removed from the existing servitude.

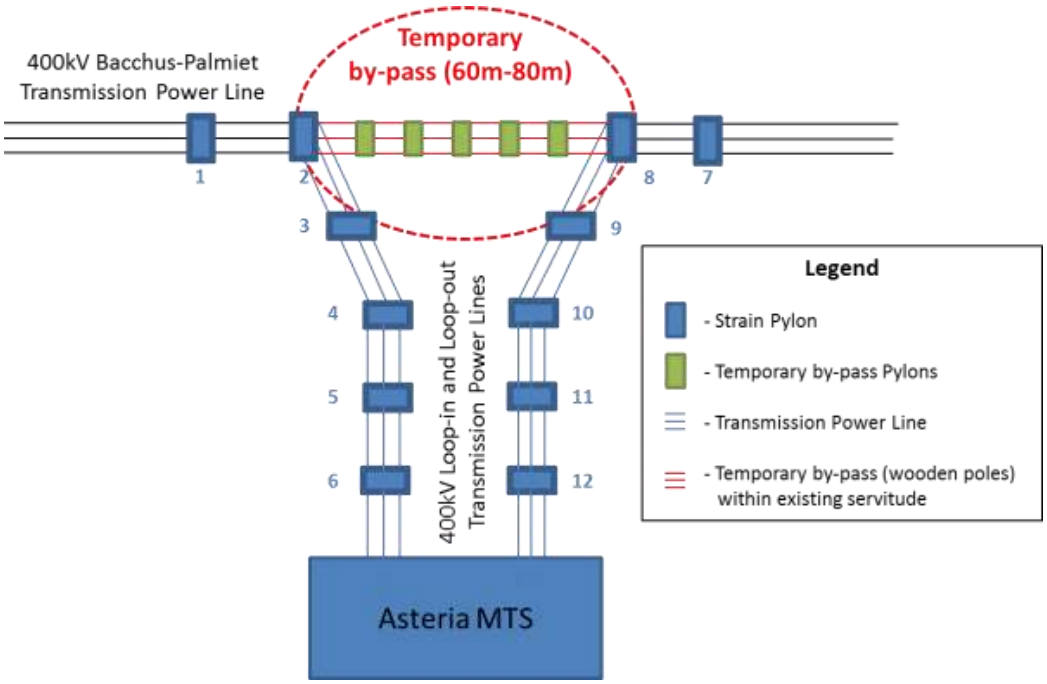
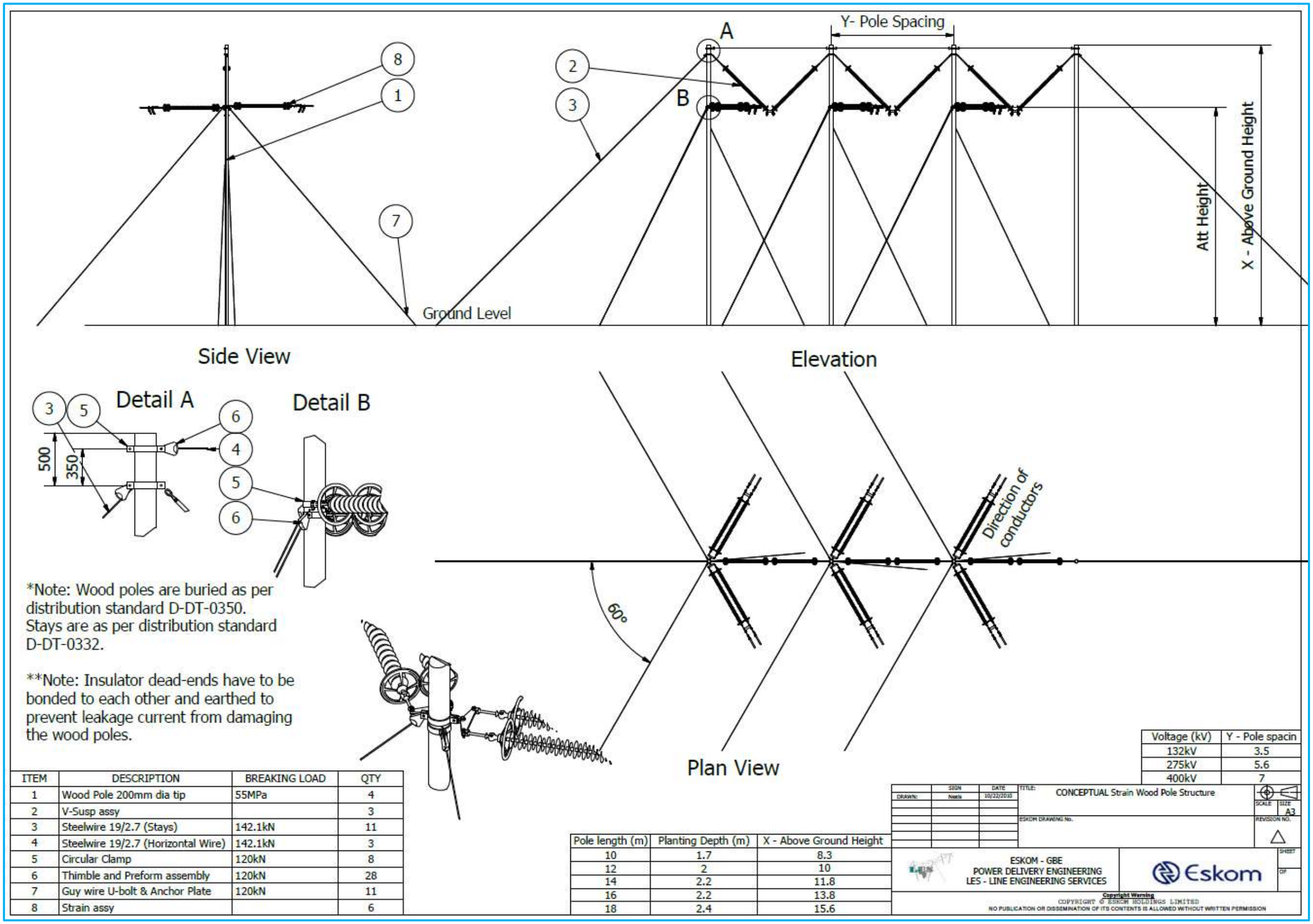


Figure 3-4: Construction of temporary by-pass

3.3.3 Distribution Power Line

The project intends establishing a 132kV Distribution power line to link the proposed 400kV Asteria Eskom MTS and the existing 132kV Houhoek Eskom Distribution Substation. The 132kV Distribution power line is estimated between 250m to 300m in length.

A standard Eskom Distribution steel monopole pylon would be used, as shown in **Figure 3-5**. The height of the pylon above ground ranges from 8m to 15m.



ITEM	DESCRIPTION	BREAKING LOAD	QTY
1	Wood Pole 200mm dia tip	55MPa	4
2	V-Susp assy		3
3	Steelwire 19/2.7 (Stays)	142.1kN	11
4	Steelwire 19/2.7 (Horizontal Wire)	142.1kN	3
5	Circular Clamp	120kN	8
6	Thimble and Preform assembly	120kN	28
7	Guy wire U-bolt & Anchor Plate	120kN	11
8	Strain assy		6

Pole length (m)	Planting Depth (m)	X - Above Ground Height
10	1.7	8.3
12	2	10
14	2.2	11.8
16	2.2	13.8
18	2.4	15.6

Voltage (kV)	Y - Pole spacin
132kV	3.5
275kV	5.6
400kV	7

Figure 3-5: Typical Distribution Power Line Drawing

3.3.4 Existing Eskom Distribution Network

The existing 132kV Houhoek Eskom Distribution Substation and High Voltage (HV) Line configuration is indicated in **Figure 3-7**. The context of the proposed Distribution Network is given in the sections that follow.

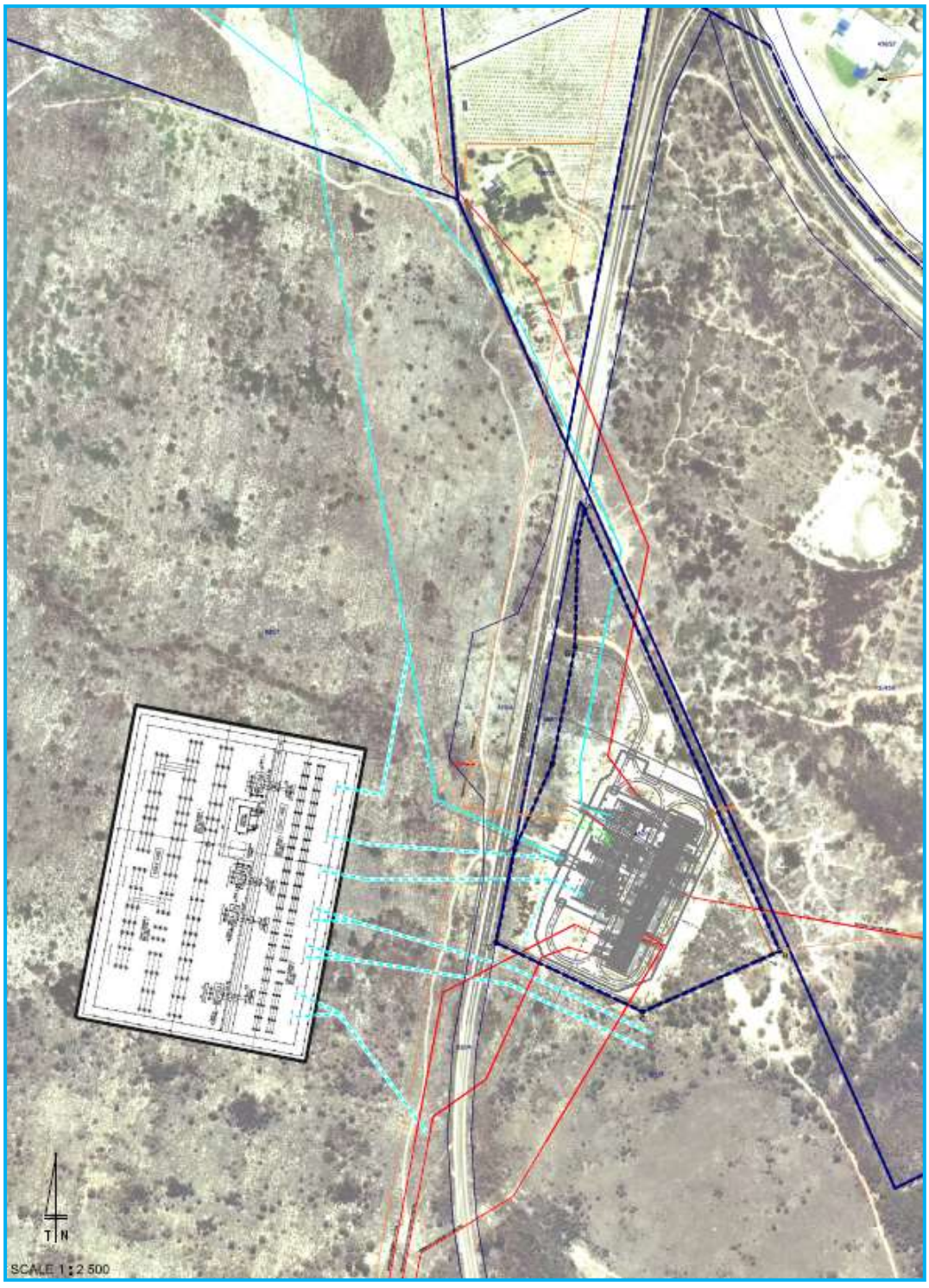


Figure 3-6: Proposed Asteria Eskom MTS Integration with Eskom Distribution Network

a) 132kV Lines

The existing Houhoek Eskom Distribution Substation is supplied via the 132kV Bacchus-Houhoek single circuit Distribution power line, and from the 132kV Lourensrivier single circuit Distribution power line.

The 132kV Lourensrivier single circuit Distribution power line shares a 132kV double circuit line with the Lebanon Switching 1 circuit which is running at 66kV. This double circuit line runs parallel to the decommissioned Lebanon 2 66kV line, which is not indicated in **Figure 3-7**.

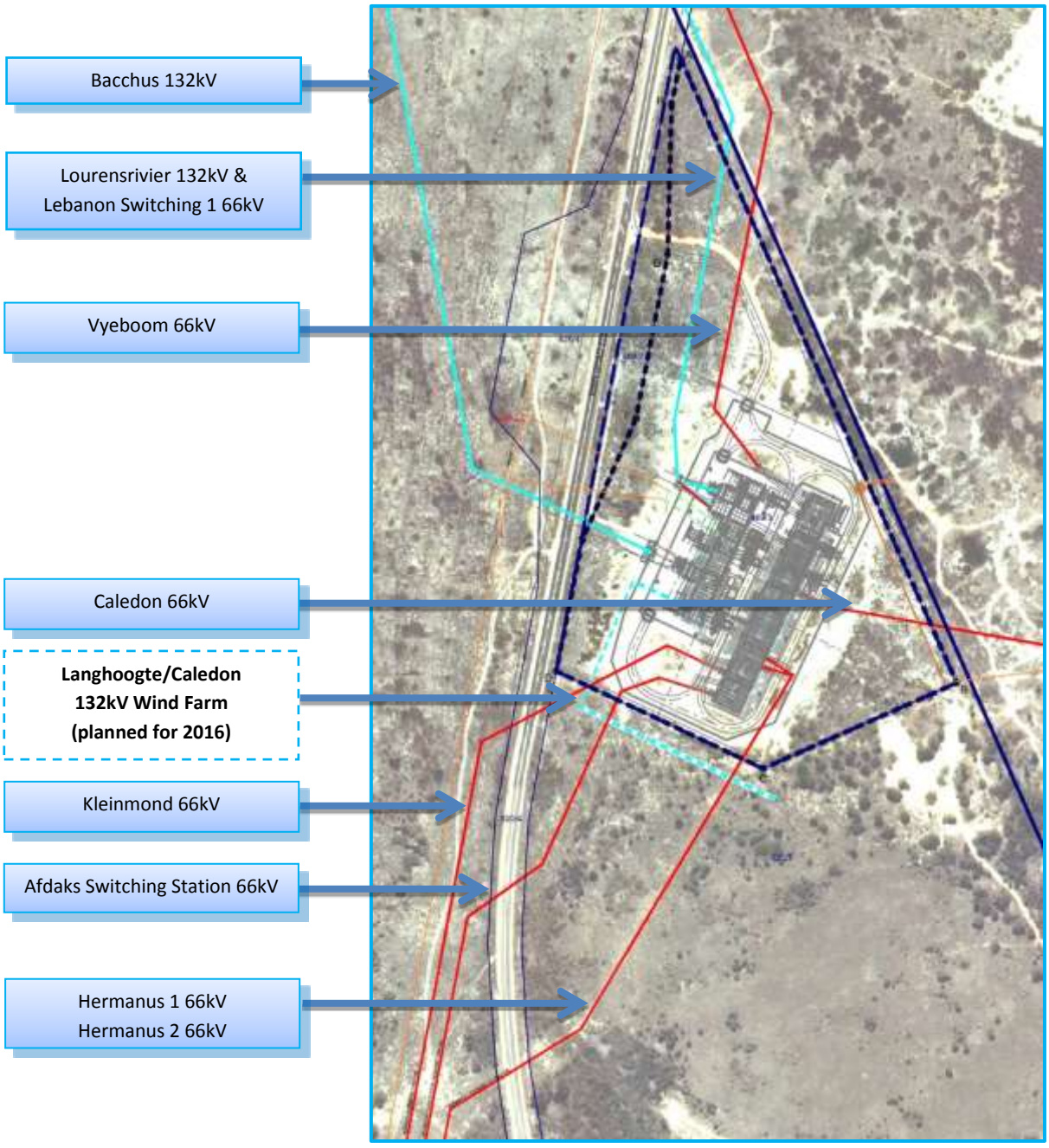


Figure 3-7: Power lines connected to the existing Houhoek Eskom Distribution Substation

b) 66kV Lines

The 132/66kV Houhoek Eskom Distribution Substation feeds:

- 2 x Hermanus circuits via a 66kV double circuit line running South.
- Kleinmond via a 66kV line running South.
- Afdaks Switching via a 66kV line running South.
- Caledon via a 66kV line running East.
- Lebanon Switching 1 @66kV via a 132kV double circuit line running North-West.
- Vyeboom via a 66kV line running North.

c) Future Developments

There are two wind farm applications currently awaiting approval of a preferred bidder status by the Department of Energy: the Langhoogte WEF and the Caledon WEF. Both aim to be connected to the grid by 2016 but there is only capacity for one of the wind farms to be connected to the Eskom Distribution network, as the network stands at this time. At the time of this EIA Report, the preferred bidder status of the WEFs is unknown.

Lebanon Switching 1, running at 66kV on a 132kV line, is expected to be upgraded to 132kV around 2025. A 66kV supply will still be needed in that direction, and the disconnected Lebanon 2 66kV line could be brought back into commission to accomplish that.

3.4 SERVITUDE AGREEMENT

The servitude width required to accommodate the towers on which the 400kV Transmission LILO power lines will be strung is 55m wide each (a combined total of 110m). The servitude is required in order to ensure safe construction, maintenance and operation of the Transmission power line and Eskom will be entitled to unrestricted access.

For safety reasons, the 400kV Transmission power line requires minimum clearance distances, which are summarised as follows and are shown in **Figure 3-8**, according to the SANS 10280:2013:

- The horizontal clearance to cater for Transmission power line swinging in adverse climatic conditions. The exact specifications are unknown by the EAP.
- The minimum vertical clearance distance between the ground and the conductor of the Transmission power lines is 8.1m.
- The minimum vertical clearance to any fixed structure that does not form part of the Transmission power line is ~~0.4 – 11m~~ 3.2m – 5.6m.
- ~~The maximum operational height under the tower conductors is 5.5m.~~
- Most farming activities can be carried out under the conductors, provided that there is adherence to safe working clearances, building restrictions and restrictions to certain crop types, e.g. tree crops.

For safety reasons, the 132kV Transmission power line requires minimum clearance distances, which are summarised as follows:

- The servitude width of the 132kV Distribution power line is ~~22m~~ 31m~~, but the minimum clearance distance is not known by the EAP~~.

- The minimum vertical clearance distance between the ground and the conductor of the Transmission power lines is 6.3m.
- The minimum vertical clearance to any fixed structure that does not form part of the Transmission power line is 2-3.8m.

1	2	3	4	5	6	7	8
			Minimum vertical clearances m				Horizontal clearances m
Highest system r.m.s. voltage kV	**System nominal r.m.s. voltage** kV	**Minimum safety clearance** m	**Ground clearance, all areas**	**Roads in townships and proclaimed roads, railways** [d]	**To buildings, poles, structures not part of power lines and vegetation**	**To tele-communication lines and between power lines**	**To all ground, buildings and structures not part of the power line**
<1	–	–	4,9[a]	6,1	3,0[a]	0,6[a]	3
7,2	6,6	0,15	5,5	6,2	3,0	0,7	3
12	11	0,20	5,5	6,3	3,0	0,8	3
24	22	0,32	5,5	6,4	3,0	0,9	3
36	33	0,43	5,5	6,5	3,0	1,0	3
48	44	0,54	5,5	6,6	3,0	1,1	3
72	66	0,77	5,7	6,9	3,2	1,4	3
100	88	1,00	5,9	7,1	3,4	1,6	3
145	132	1,45	6,3	7,5	3,8	2,0	3
245	220	2,1	7,0	8,2	4,5	2,7	3
300	275	2,5	7,4	8,6	4,9	3,1	3
362	330	2,9	7,8	9,0	5,3	3,5	3
420	400	3,2	8,1	9,3	5,6	3,8	3,2
800[b]	765	5,5	10,4	11,6	8,5	6,1	5,5
533d.c.[c]	–	3,7	8,6	9,8	6,1	4,3	3,7

[a] In the case of insulated power lines that comply with SANS 1418-1 and SANS 1418-2 (aerial bundled conductor systems) or SANS 1507-6 (concentric cables), no minimum safety clearances are required.

[b] The clearances provided in this table are intended to ensure the safety of personnel. Increased distances will be required to limit levels of electric fields, magnetic fields and audible noise which are dependant on the system voltage, conductor and bundle spacing, phase configuration and spacing, and the current carried by conductors.

[c] Maximum voltage to earth, for which insulation is designed.

[d] Certain railway authorities may have more onerous clearance requirements.

Figure 3-8: Minimum Clearances for Power Lines (SANS 10280:2013)

Registration of the servitude would give Eskom the right to erect, operate and maintain the Transmission power lines and to access the land to carry out such activities, but it does not constitute full ownership of the land. In turn, access and the activities must be carried out with due respect to the affected landowners. The servitude required for the project will be registered at the Deeds office and will form part of the title deed of the relevant properties once the environmental authorisation has been obtained. The Servitude Negotiation Process is described in detail in **Chapter 6.14.1**.

3.5 STUDY AREA OF PROJECT

The study area is located approximately 90km east from Cape Town within the town of Botrivier which forms part of the TWK LM. TWK is the largest local authority in the Overberg District Municipality (ODM), embracing the City of Cape Town on its western boundary and sharing the eastern coastline with the Overstrand Municipality, within the Western Cape Province. See **Figure 3-9** for a locality map of the study area that was considered during the scoping phase. This EIA Report will assess the details within this same study area.

The N2 Highway between Cape Town and Caledon borders the northern and eastern sides of the study area, whilst the R43 provincial road to Hermanus bisects the study area through the middle in a north-south direction.

There is a railway line, also running between Cape Town and Caledon that is situated just outside the north and eastern border of the study area.

The eastern section of the study area, adjacent to and into the lower edges of the Houwhoek Nature Reserve, slopes downwards towards the east and thus towards the middle of the study area.

Agricultural activities are noted along the R43 provincial road, toward the middle of the study area dominantly in the form of smallholdings on the western side of the R43, and larger agricultural developments such as vineyards on the eastern side.

The town of Botrivier is to the north-east of the study area and falls within the curve of the N2 highway.

The northern boundary of the study area is the existing Bacchus-Palmiet 400kV Transmission power line.

The study area includes for the proposed Transmission Substation and power line, and the Distribution power line (as described in **Chapter 3.3**).

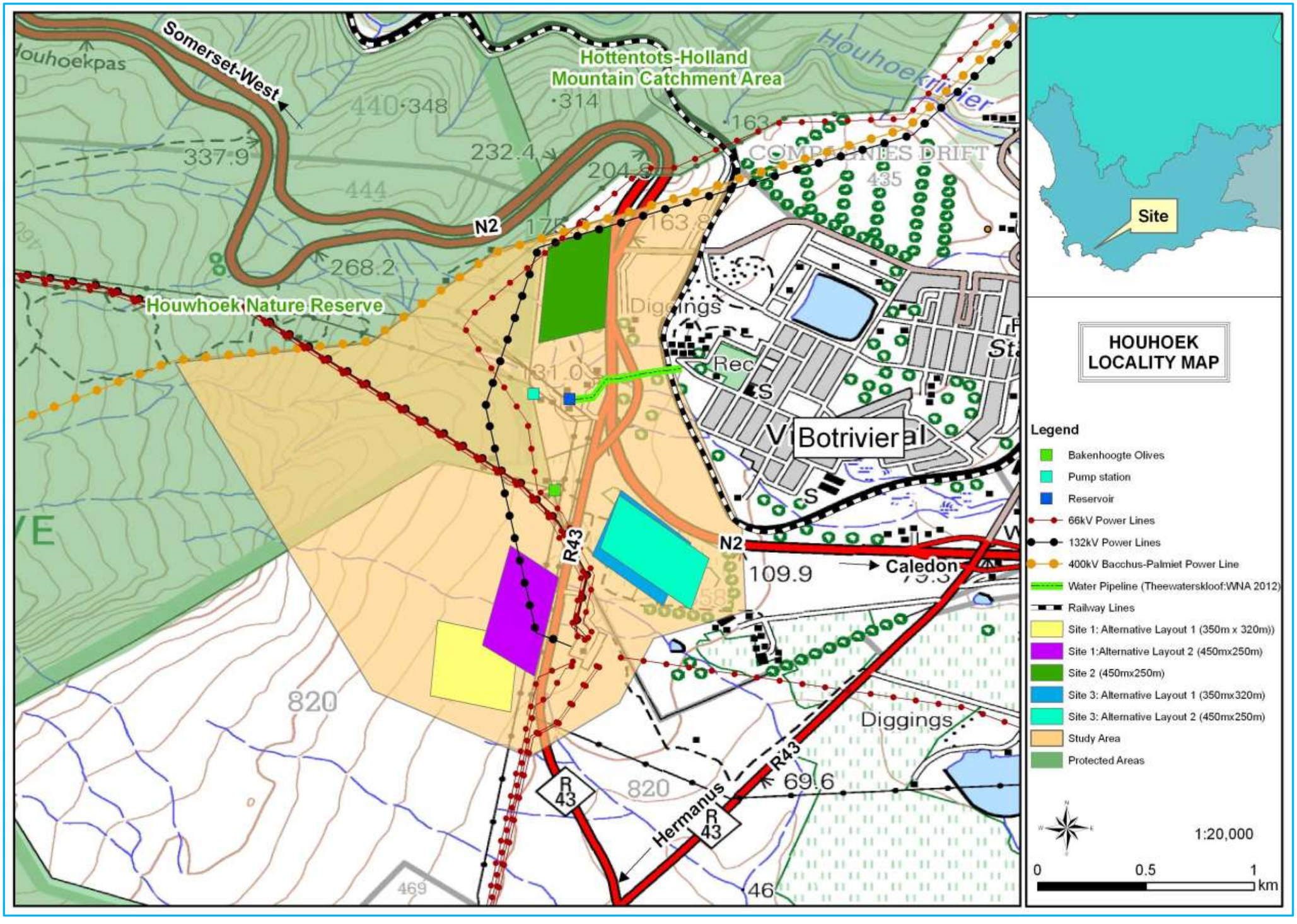


Figure 3-9: Locality Map of Study Area during the Scoping Phase

3.6 CONSTRUCTION PROCESS

3.6.1 Construction Camps

The Contractor will require a site office/yard for the duration of the contract period. The entire construction workforce is unlikely to be accommodated in a construction camp that will be situated along the recommended route alignment and substation location (**Figure 3-9**). This is especially so for the lesser skilled contract workers that will potentially be able to be drawn from the local community based at Botrivier.

Aspects such as access to the construction-site, access to services and access to materials will be considered for the location of the construction camp. The location of the construction camp will only be determined once a route alignment and substation location is recommended.

The Contractor's site camp shall be located within the development footprint, or on a site appropriately zoned and/or authorised for such use and approved by the Environmental Control Officer (ECO) that will need to be appointed to monitor the Contractor's compliance to the site-specific Environmental Management Programme (EMPr) once environmental authorisation has been obtained. The Contractor shall select a location that is easy to access and that has already been cleared or disturbed by previous human activity (e.g. previous construction camps or stockpile areas). The EAP suggests that the construction camp be located within the boundaries of the proposed Asteria Eskom MTS property (Remainder of Farm 820 Caledon RD) and more specifically within Site Alternative 1: Layout Alternative 3.

All construction activities, materials, equipment and personnel will be restricted to within the area specified. All materials are stored at the construction camp, with the exception of concrete and the steel towers (which may come direct from the factory). The site camp may not be extended to any of the environmentally sensitive areas, such as Critical Biodiversity Areas, nature reserves or wetlands. Accommodation will be sought from the closest town of Botrivier.

The rule of thumb is one construction camp per 100km of 400kV Transmission power line. Therefore, only **one construction camp** will be used for the construction of the proposed Asteria Eskom MTS project. **Figure 3-10** shows photographs of typical construction camps.

Figure 3-10: Examples of typical construction camps

3.6.2 Construction Process for the Proposed Asteria Eskom MTS

The Asteria Eskom MTS will be constructed using the following sequence of activities:

1. Determine technically feasible alternatives.
2. EIA input into alternative locations for substation and route alignments for the 400kV Transmission and 132kV Distribution power lines into the substation.
3. Negotiate with affected landowners, including Post-Authorisation negotiations.
4. Survey the site.
5. Design the substation.
6. Issue tenders and award the contract.
7. Clear vegetation and construct access roads (where required).
8. Construct terrace and foundations, including the Transmission oil pond. The longest length of the cut platform required for the site is 270 m. The proposed cut height is approximately 20m and the fill height is approximately 15 m.
9. Assemble and erect equipment.
10. Connect conductors to equipment.
11. Rehabilitate any disturbed areas and protect erosion-sensitive areas.
12. Test and commission.
13. Continue maintenance.

a) Timing

The construction of the proposed Asteria Eskom MTS will be undertaken over 30 months.

b) Access/Service Roads

Eskom requires access/service roads for the construction and maintenance phases. The access roads for existing infrastructure (green, red and blue lines) are shown in **Figure 3-11**. An access road would need to be constructed to link the proposed Asteria Eskom MTS to the provincial R43 road. The access road would need to be suitable for the usage of large flatbed trucks and possibly abnormal heavy vehicles, which would deliver the components and the transformers of the substation. The construction of the 400kV LILO Transmission power line may require the construction of related access roads.

c) Ongoing Maintenance

The standard lifespan of an MTS and its associated components is approximately 25 years. Continuous maintenance will be carried out (including the replacement of components).

Figure 3-11: Google Earth Image of the Existing Power Lines and Associated Existing Access Roads

3.6.3 Construction Process for LILO Transmission Power Line

The construction process outlined in **Table 3-1** will be followed for the route of the 400kV LILO Transmission power line to tie into the existing Bacchus-Palmiet 400kV Transmission power line.

Activities will be undertaken in steps so that, at any point, an observer will see a chain of events with different working teams involved. At any time, some or all of the different teams may work at different points along the Asteria Eskom MTS project.

Construction of this line will take approximately 3 months to complete, and is expected to begin in 2019, after the negotiation process as approximated (**Chapter 4.3.1**) and the construction of the proposed Asteria Eskom MTS has been completed.

Table 3-1: Construction Process for Transmission and Distribution Power Lines

Activity		± Team Size	± Duration of Activity
1	Detailed survey of the route	-	-
2	• Determination of the conductor type and selection of best-suited conductor, towers, insulators and foundations • Define final centre line • Determine the coordinates of each bend in the line • Undertake an aerial or conventional survey to obtain an accurate profile of the area (the existing power lines would be taken into consideration when determining which survey to undertake) • Identify optimal tower sizes and positions	-	2 months
3	Final design of power line	-	2 months
4	Issue tenders and award contract to construction company (-ies)	-	3 – 6 months

Activity		± Team Size	± Duration of Activity
5	The construction camp is to be located within the footprint boundaries of the proposed Asteria Eskom MTS site	-	1 week
6	• Vegetation clearance centre line (4x4 vehicle access for the shallower slopes and access limited to by foot for the steeper areas, is required) • Clear shrubs and trees (as determined by the Site-Specific Draft EMPr) along the centre line with the aid of a surveyor • Clear vegetation (trees and large shrubs only – grass and forb species (including Fynbos shrubs) will not be cleared in order to minimise disturbance and potential erosion in accordance with the minimum standards to be used for vegetation clearing for the construction of the proposed Transmission and Distribution power lines	5 – 15	1 – 2 days, depending on local conditions
7	• Centre line pegging and identification of requirements and locations for the new gate (4x4 vehicle access for the shallower slopes and access limited to by foot for the steeper areas, is required)	3	1 day
8	• Access negotiations (4x4 vehicle access for the shallower slopes and access limited to by foot for the steeper areas, is required) • Develop and agree on an access plan (Eskom, Contractor and landowners) • Agree to rehabilitation process • Photograph pre-construction conditions off-site • Establish access roads (where required)	1	1 day
9	New gate installation (4x4 vehicle access for the shallower slopes and access limited to by foot for the steeper areas, is required)	5	1 day
10	• Vegetation clearance (tower positions) • Clear four strips (40m×40m square for Cross Rope Suspension towers and 20m×20m areas for the self-supporting towers) for assembly and erection at each marked tower position	5 – 15	1 – 2 days, depending on-site conditions
11	• Foundation nominations for main structure and anchors (heavy vehicle access is required) (see **Figure 3-12**) • Check soil types to determine foundation requirements • Dig trial pits at main foundation points (usually using mechanical back-actor/auger methods, although manual labour may be used)	5	2 days
12	• Excavate foundations (heavy vehicle access is required) • Excavate foundations of up to 4m×4m and up to 4m deep per pylon footing, depending on soil conditions (mechanically where access to tower sites is available, and by hand where access is poor) • Cover or fence-off the foundation pit until foundation is poured (see **Figure 3-13**)	15	2 days
13	• Foundation steelwork – reinforcing (heavy vehicle access is required) • Transport steelwork structure to site by truck or potentially by air for mountainous landscapes • Transport of steelwork structure to any parts of the site higher up the slope may need to be by air • Fitting and wiring on-site (limited welding on-site)	10	2 days
14	• Pour concrete foundation (heavy vehicle access is required) • Shuttering • Use standard concrete truck	20	30 days

	Activity	± Team Size	± Duration of Activity
	• Where there are access problems, mix concrete on-site • A 28-day period is required after concrete has been laid • Heavy usage of access/service roads during this stage		
15	• Deliver tower steelwork (heavy vehicle access; extra-long trucks used, or potentially by air for mountainous landscapes) • Deliver steelwork in sections and assemble on-site (see **Figure 3-14**) • Mark access roads to ensure the correct tower is delivered to each site (towers are designed as unique for each location)	5	1 day
16	• Assembly team/punching and painting (light vehicle access is required) • Assemble steelwork on the ground • Punch nuts and paint with non-corrosive paint	10	3 days
17	• Erection (abnormal load vehicle access or potentially by air is required for mountainous landscapes) • Final assembly of towers by cranes (minimum of 50 tons) – see **Figure 3-15**	20	2 days
18	Temporary by-pass (only if no outages during construction) • Placement of temporary by-pass pylons within the existing 55m servitude of the Bacchus-Palmiet 400kV Transmission power line • Connection of the LILO 400kV Transmission power line to the Bacchus-Palmiet 400kV Transmission power line	20	90 days
19	• Stringing (abnormal load vehicle access or potentially by air is required for mountainous landscapes) • Place cable drums within the servitude • Undertake stringing in both directions • The working area at each drum will be as long as 130m, but will be within the servitude • Intensive vehicle activity within the working area is likely • Pilot tractor will lay cable on the ground • Pull up cable using a pulley • Ensure conductors never touch the ground	50	7 days
20	• Sag and tension (heavy vehicle access or potentially by air is required) • Tension the line from each station to ensure minimum ground clearance heights (8.4m for 400kV Transmission power lines)	10	3 days
21	• Rehabilitation (heavy and light vehicle access is required) • Continuous process throughout the construction phase • Typically only commences after the first 100 towers are constructed but, in this instance, will commence after all the towers are constructed • There is a one year guarantee on the Contractor's work, during which rehabilitation must be concluded	5 – 15	2 – 10 days, depending on local site conditions

Figure 3-12: Foundations drilling

Figure 3-13: Cover for foundations

Figure 3-14: On-site erection of towers

Figure 3-15: Erection of towers by crane

3.7 ESKOM AGRICULTURAL POLICY

Eskom's *Vegetation Management under Power Lines* (Vosloo, 2009) has elements that relate to agricultural activities under Transmission power lines, and is therefore applicable to this project. There is no specific guideline document that relates directly to the agricultural activities under any power lines.

Agricultural activities are allowed to be undertaken under Eskom Transmission power lines as long as the agricultural crops and equipment do not interfere with the power line infrastructure. The minimum ground clearances and minimum safe distances to trees / structures according to the particular voltages are presented in **Table 3-2**.

Table 3-2: Safe Distance Specifications of Transmission Power Lines (Vosloo, 2009)

Voltage	Servitude Width	Ground Clearance	Safe Distance to Trees
220kV	47m	6.7m	4.2m
275kV	47m	7.2m	4.7m
400kV	55m	8.1m	5.6m
765kV	80m	10.4m	8.5m

Eskom will not allow overhead irrigation under any power lines. Furthermore, the use of pivot irrigation if a power line intersects the pivot circle is not permissible. Drip and micro-irrigation are possible under a power line, but Eskom needs to confirm this in the servitude agreement with the specific landowner (see **Section 6.14.1** for the Servitude Negotiation Process).

The servitude width required depends on the type of pylon tower required. For a 400kV Transmission power line, a servitude width of 55m is required, whereas for a 132 kV Distribution power line, a servitude width of 22m is required. The servitude is required to ensure safe construction, maintenance and operation of the power line and Eskom will be entitled to unrestricted access, following negotiations with the landowners.

Eskom will need to use access/service roads for the construction and maintenance of the proposed substation and power lines. ~~Where there are no access/service roads they will be negotiated with the specific landowner.~~ The access road would need to be suitable for the usage of large flatbed trucks and possibly abnormal heavy vehicles, which would deliver the components and the transformers of the substation. The construction of the 400kV LILO Transmission power line may require the construction of related access roads.

3.8 ESKOM'S TECHNICAL ASSESSMENT

Eskom expressed the following limitations attached to the infrastructure for the proposed Asteria Eskom MTS project:

- The proposed Langhoogte WEF recommended a connection to the existing Houhoek Eskom Distribution Substation from the south. The proposed Caledon WEF recommended a connection to the existing Houhoek Eskom Distribution Substation from the north. Both power lines are proposed as 132kV overhead power lines. Of the two WEFs, only one WEF may be connected to the existing Houhoek Eskom Distribution Substation. There is a possibility of connecting the other wind farm to the proposed Asteria Eskom MTS at a later stage (after 2019), but no application has been received by

Eskom Transmission at this stage and the wind farms would need to connect to Eskom infrastructure before 2019.

- In **Chapter 3.3.1** it is stated that the proposed Asteria Eskom MTS would be ~~11.2~~ 14.44 hectares. Eskom actually requires an area of 300m × 270m (8.1 hectares) for the construction of the proposed Asteria Eskom MTS project. The additional 3.1 hectares provides Eskom with the necessary flexibility to place the substation according to the topographical profile and allows sufficient space for connecting power lines into the substation site. The construction camp would also be located within ~~this additional 3.1 hectares~~ the assessed Site Alternative 1: Layout Alternative 3 and remains less than 1 hectare in size.
- The proposed Asteria Eskom MTS will be designed for 12 feeder bays. However, there are only six feeder bays required at this stage. The other 6 feeder bays are included to cater for possible additional connections in the future.
- Due to the steeper terrain in the area for the LILO Transmission power lines, the horizontal distances between pylon towers would need to be reduced from approximately 350m-400m to 150m-250m. The final profiles will be dependent on the final route alignment determined by the detailed design and profiling of the power line.
- A 400kV double circuit Transmission power line (only 55m servitude width) cannot be considered for the LILO Transmission power lines. The main reason provided was the height of the power line would be 24.5m with a ground clearance (including any rocks) of 8.1m, as stated in **Chapter 3.3.2**. Further, the same conductor and towers would then be used for maintenance purposes. The risk to the network is also increased if one of the double-circuit pylons were to collapse.
- 2 ×400kV Transmission power lines would be required for the LILO Transmission power lines, amounting to a combined servitude width of 110m. In order to allow Eskom with sufficient flexibility to profile the power line, a larger corridor width has been considered in the EIA phase.
    - A 250m corridor width will be considered for LILO 1 to allow for placement of the LILO power line either adjacent to the existing power lines or away from the existing power lines (to reduce the potential visual impact caused by the cluttering of power lines). In addition, as this corridor width goes through parts of the Houwhoek Nature Reserve, the wider corridor width is suggested to ensure that the placement of pylons avoids sensitive vegetation communities.
    - A 150m corridor width will be considered for LILO 2 and LILO 3 to allow Eskom sufficient flexibility to avoid existing water and sewage infrastructure (i.e. pump station and reservoir) and the widening of the R43.

3.9 ASSUMPTIONS, LIMITATIONS AND CONSTRAINTS

The following assumptions, limitations and constraints, associated with this project as described above, have been identified for this EIA process:

- The EIA process is multi-disciplinary, which is informed by the project team (**Table 2-1**). It is thus necessary to assume that the information provided by the project team is accurate and true, at the time.

- Data shown in the maps were supplied by various sources and was used as received. The data was not verified.
- A preliminary site investigation was undertaken by the EAP's project team in consultation with representatives of Eskom Transmission and Eskom Distribution on 26 June 2012 to identify the alternative sites and consider which alternatives should be considered within the scoping phase of the EIA process.
- A layout alternative of 320m × 350m (11.2 hectares) was considered for the Draft EIA Report. However, the increase in size of the substation to 380m × 380m (14.4 hectares) is considered for the Final EIA Report due to a change in the substation design philosophy. The design philosophy was amended to a more efficient design that would allow more flexibility to the network and reduce the potential down time and number of outages. The increased footprint allows Eskom the flexibility of keeping the feeder bays switched on during maintenance.
- It is assumed that no additional infrastructure (except access roads and stormwater drainage) would be placed outside of the footprints assessed for the 400kV Substation, the 400kV Transmission power lines and the 132kV Distribution power line.
- The construction camp site would remain less than 1 hectare in size and be located within Site Alternative 1: Alternative Layout 3. This section of the property was assessed as part of the Draft and carried over into this Final EIA Report.
- Specific pylon locations were profiled by Eskom in order that preliminary impacts of the locations could be assessed. Although the area of the proposed Transmission power line routing was visited, the specific locations of the tower points were not covered in the site visits by the project team. The recommendation is that, during the walk down phase of the assessment, that a recognised Fynbos Ecologist, heritage specialist, visual specialist and geotechnical specialist are utilised to ensure that the recommended mitigations are adequately implemented.
- **Public Participation Process:** every effort was made to contact all stakeholders within the study area and within 100m of the project area. Information presented by the stakeholders is presumed to be accurate and has been presented timeously in the study.
- The following **gaps in knowledge** and **limitations** were identified in accordance with Regulation 24(4)(b) of the EIA Regulations (2010):
    - The route alignment for the 132kV Distribution power line has not been determined as the distance between the recommended site alternative for the proposed Asteria Eskom MTS and the existing Houhoek Eskom Distribution Substation is approximately 300m, which would only require two pylons. The areas covered by the 132kV Distribution power line is also assessed in this EIA Report, with no particular route alignment suggested. Thus, the shortest route alignment to connect the two substations would require a pylon in each substation, with a 132kV power line linking the two pylons.
    - The pylon positions for the ~~400kV Transmission power line LILO and the~~ 132kV Distribution power line have not been determined during the EIA process.
    - The pylon positions for the 400kV Transmission power line LILO were suggested by Eskom based on the technical feasibility and profile of the landscape. Environmental sensitivities identified for the Draft EIA Report were also considered during pylon

positioning. The preliminary data used to determine the pylon positions were based on concept profiles that was generated using Digital Elevation Model (DEM) data and not actual survey (LiDAR) data. The concept profiles were used to determine the critical bend points within the power line profile. Therefore, additional pylons may be required once the LiDAR survey is completed, post-Environmental Authorisation. The location of all the pylon positions (including any additional pylons proposed following the LiDAR survey) should be subject to a walk-down by an ecologist, geotechnical specialist, hydrologist and a heritage practitioner.

- Soil & Agricultural Potential Assessment:
  - There was limited detailed soil information available. Thus, only a broad level soil description was provided, with soil classification according to the Soil Classification Working Group (1991).
  - No high potential agricultural soils were identified and no arable agriculture is taking place on any of the alternative sites. Thus, it was decided that no soil samples would be collected for analysis.
- Ecological Assessment:
  - A site visit was undertaken by the Fynbos Ecologist on 26 June 2012. This site visit was undertaken within the winter growing season, but prior to the optimal spring flowering season. Thus, the seasonal constraints on the comprehensiveness of the botanical findings are thus considered to be low to moderate confidence. A follow-up site visit is planned in August 2013 to further reduce these constraints. The results of the second site visit are not included in the Draft EIA Report, but will be in the Final EIA Report.
  - The Ecologist did not undertake any additional site visit for the compilation of the addendum report.
  - The seasonal constraints on the comprehensiveness of the faunal findings are considered to be of low confidence.
  - The study area of the Asteria Eskom MTS project as shown in **Figure 3-9**, are assumed to be accurate to within about 20m. Portions (<20%) of both substation layout alternatives had been burnt in the previous summer (2012-2013), and thus supported very young vegetation.
  - Characteristic plant species were noted in the field, as well any rare or threatened species or habitats. Voucher specimens were taken, where necessary.
  - The professional experience (±20 years) of work undertaken in the area of the Ecologist on the project team, and the following sources were consulted to draw conclusions:
    - GIS-based South African National Biodiversity Institute (SANBI) vegetation map of South Africa (Mucina & Rutherford, 2006).
    - National Spatial Biodiversity Assessment (Rouget, *et al.*, 2004) and its updated version (Driver, *et al.*, 2011).
    - National List of Threatened Ecosystems (DEA, 2011).
    - Overberg Critical Biodiversity Area (CBA) Maps (Holness & Bradshaw, 2010).
    - Various faunal references in the text.

- Impact tables with both scored and unscored assessments are provided, as the resulting assessments are sometimes different. Both are included in this EIA Report for completeness.

- Freshwater Ecosystems Assessment:
  - Certain parts of the western portion of the site could not be assessed during the site visits due to the mountainous nature of the topography in this area and a lack of access road paths. Thus, the presence of freshwater ecosystems in this area was not properly ground-truthed, although the availability of high-resolution aerial imagery and contour lines allowed for desktop mapping of freshwater ecosystems in mountainous areas with reasonably good confidence.
  - All rivers within the study area are seasonal systems and dry up during the summer months. Given that fieldwork had to be conducted during the summer, it was not possible to collect water quality data or samples of aquatic macro-invertebrates from the rivers, which may have helped categorise the Present Ecological Status (PES) of these systems with a higher degree of confidence. This is not likely to be a significant limitation as the Index of Habitat Integrity (IHI) method of DWAF (1999) is deemed sufficient for the purpose of classifying river condition in this study. Furthermore, the use of aquatic macro-invertebrates for determining river condition would have been somewhat limited given the widely used South African Scoring System aquatic bioassessment protocol is only valid for perennial rivers.
  - Rivers or wetlands that were incorrectly mapped by the NFEPA project or on the 1:50 000 scale map for the area (map sheet 3419AA) were noted and demarcated as non-aquatic on the preliminary map.

- Avifauna Assessment:
  - In this instance, the 3419AA QDGC has been well covered by SABAP2, with data being recorded on 189 checklists to date. The SABAP2 data was therefore regarded as reliable and representative of the avifauna. For purposes of completeness, the list of species that could be encountered was supplemented with observations and general knowledge of the area by the avifauna specialist, by consulting species lists for adjacent QDGCs with similar habitat, and by consulting local bird experts.
  - Predictions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will hold true under all circumstances. Therefore, professional judgement played an important role in this assessment.
  - It is important to note that, although the predicted impacts are mostly concerned with Red Data species, the non-Red Data species should also benefit from the proposed mitigation measures as they share the same habitat and face the same potential impacts as the Red Data species.

- Social Impact Assessment:
  - A SIA aims to identify possible social impacts that could occur in the future. These impacts are based on existing baseline information. There is thus always an uncertainty with regard to the anticipated impact actually occurring, as well as the

intensity thereof. Impact predictions have been made as accurately as possible based on the information available at the time of the study.

- The SIA relied on the information received during the PPP undertaken as part of the EIA process. Additional data gathering, research and consultation were undertaken. Sources consulted are not exhaustive and additional information can still come to the fore to influence the contents, findings, ratings and conclusions made.
- Technical and other information provided by the Applicant are assumed correct.
- Individuals view possible social impacts differently due to their association with the anticipated impact. Therefore, impacts could be perceived and rated differently than those contained in the SIA Report.
- Information on possible future developments included all the information gathered during the SIA study timeframe. Additional information may become known or available during a later stage, which could not have been allowed for at the time of the study.
- The aim of the SIA was to assess the impacts associated with the proposed Asteria Eskom MTS project. **Cumulative social impacts as a result of other projects such as proposed wind farms in the region were not assessed.**

- Town Planning Assessment: The title deed refers to Deed of Transfer No. 183 (dated 11 July 1864), which could not be traced. Thus, it cannot be conclusively determined that there are no restrictive Title Deed conditions, which need to be removed. If it is ascertained that Title Deed conditions exist, then application for the removal and/or amendment of Title Deed restrictions would have to be lodged in terms of Section 3(1) of the Removal of Restrictions Act, 1967 (No. 84 of 1967).
- Visual Impact Assessment:
  - Although every effort to maintain accuracy was undertaken, as a result of the Digital Elevation Model (DEM) being generated from satellite imagery and not being a true representation of the earth's surface, the viewshed mapping is approximate and may not represent an exact visibility incidence.
  - The use of Google Earth Pro for mapping is licensed for use in the VIA Report.
  - Some of the mapping in this document was created using Bing Maps (previously *Live Search Maps*, *Windows Live Maps*, *Windows Live Local*, and *MSN Virtual Earth*) and powered by the Bing Maps for Enterprise framework.
  - The information for the terrain used in the 3D computer model on which the visibility analysis is based on is the ASTGTM_S23E014 and ASTGTM_S24E014 data set. ASTER GDEM is a product of Ministry of Economy, Trade and Industry (METI) in Japan and NASA in USA (ASTER GDEM. METI / NASA, 2011).
  - Determining visual resources is a subjective process where absolute terms are not achievable. Evaluating a landscape's visual quality is complex, as assessment of the visual landscape applies mainly qualitative standards. Therefore, subjectivity cannot be excluded in the assessment procedure (Lange, 1994). The project deliverables, including electronic copies of reports, maps, data, shapefiles and photographs, are based on the authors' professional knowledge, as well as available information. The study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of assessment

undertaken. VRM Africa reserves the right to modify aspects of the project deliverables if and when, new/ additional information may become available from research or further work in the applicable field of practice, or pertaining to this study.

- In some areas, access was restricted and only partial views of the site could be undertaken.
- Due to the preliminary stage of the project planning, a detailed site-specific layout has not yet been generated by Eskom which could influence the feasibility of the concept drawing of the Site 1 Alternative 1 mitigated footprint and the significant ratings for the site.
- 'Principles that influence (development) within a receiving environment include:
  - The need to maintain the overall integrity (or intactness) of the particular landscape or townscape.
  - The need to preserve the special character or sense of place of a particular area.
  - The need to minimise visual intrusion or obstruction of views within a particular area' (Oberholzer, 2005).

- Heritage Impact Assessment (HIA): Since the compilation of the original HIA, the Heritage Western Cape implemented a requirement for the grading of landscapes affected by development proposals. Since the proposed change in the development activity will not affect any heritage other than the landscape character, the HIA was updated by an Addendum report (included as **Appendix E-9**) that considers the landscape grade and the effect that the activity will have on the landscape grading.

4 DESCRIPTION OF ALTERNATIVES

4.1 INTRODUCTION

> "*Alternatives are different means of meeting the general purpose and need of a proposed activity. The identification, description, evaluation and comparison of alternatives are important for ensuring the objectivity of the assessment process. In cases where there is no objective and thorough assessment of alternatives, the EIA process usually only confirms a chosen activity and the value of the assessment as an input to a decision-making may be compromised*" (DEAT Guideline 5, 2006c).

The following alternatives will be assessed (which were determined and screened based on specialist planning, environmental, social, engineering and economic inputs):

- Macro Alternatives
  - No-Go Alternative – *status quo*
  - Demand-Side Management
- Design Alternatives:
  - Optimisation of Existing Servitudes
  - Underground Transmission power lines
  - Underground Distribution power lines
- Technical Alternatives:
  - Site Alternatives for the Asteria Eskom MTS
  - Layout Alternatives for the Asteria Eskom MTS
  - Route Alternatives for the LILO 400kV Transmission power lines and for the 132kV Distribution connection power lines

4.2 MACRO ALTERNATIVES

4.2.1 The No-Go Alternative

The DEA stresses that the No-Go Alternative must be considered in cases where the proposed activities will have a significant negative impact that cannot be avoided and/or effectively or satisfactorily mitigated.

The No-Go alternative necessitates that the construction of the proposed Asteria Eskom MTS project should **not** be undertaken.

If the aforementioned scenario transpires, then the Bacchus MTS will reach firm capacity and not be able to provide a secure supply of electricity to the Houhoek area and the remainder of the Southern Cape CLN after 2014 – 2015.

In addition, the existing distribution network would exceed thermal capacity by 2013, resulting in possible lack of/intermittent supply of electricity to the Houhoek area. It should be noted that future development in the region would not have access to a firm supply of electricity in the near future.

The No-Go alternative will illustrate the implications of the proposed activity not being authorised and will be used as a *status quo*, against which the other alternatives will be assessed.

4.2.2 Demand-Side Management

Demand-side management is a task undertaken by Eskom in order to reduce the amount of electricity used during peak periods. This can be attained by the reduction of peak demand and load shedding.

However, this alternative cannot be assessed further as Eskom has been undertaking load shedding since 2008, which was not able to provide the Southern Cape CLN with the necessary power supply to meet the projected shortfalls as described in **Chapter 3.2**.

4.3 DESIGN ALTERNATIVES

4.3.1 Optimising of Existing Servitude(s)

This alternative entails Eskom Transmission expanding into existing servitudes instead of acquiring new servitudes for the LILO 400kV Transmission power lines or the Distribution 132kV connection power lines into the proposed MTS. This will result in the expansion of the existing servitudes from a minimum of 20m for a 66kV Distribution power line to a maximum width of 55m, depending on the type of pylons to be used.

The risk attached to this alternative is that the existing power line will need to be switched off for the duration of the construction phase. The existing link would be temporarily removed (see inset on Page 12 for details of N-1). This could result in voltage collapses and an unreliable electric network, which will affect Eskom's customers and the end-users in the Houhoek and Southern Cape CLN regions.

Based on the anticipated demand for electricity in the Southern Cape, the risk to the CLN is too great to be considered a feasible option. Therefore, this design alternative will not be possible and has not been considered further in this report.

4.3.2 Underground Transmission Power Lines

A design alternative of burying Transmission power lines as opposed to overhead power lines in excess of 132kV is currently technically not feasible in South Africa. This would entail an excavation as wide as a 12-lane highway and 1.5m deep to allow for the spacing required to avoid overheating. Overhead power lines are cooled with the air. But if the power lines are placed underground, a cooling system would need to be installed. The technology for these specific cooling systems is however not available in South Africa for power lines in excess of 132kV.

Although the existing Houhoek Eskom Distribution Substation needs to connect to the proposed Asteria Eskom MTS using 132kV Distribution power lines, it would not be technically possible to bury these 132kV power lines without significant changes to the existing above-ground configuration and design of the existing Distribution substation.

Trees or shrubs would also be prohibited on or within a specified buffer due to the risk of root invasion. Excavation in the servitude would be restricted to 0.5m deep.

In addition to a significantly greater impact (with the exception of visual intrusion), underground power lines cost significantly more to construct and maintain. Considering the undulating terrain within the study area, the fact that the natural vegetation that may in places need to be kept from growing above the buried power lines is a critical consideration in the Western Cape, the placement of power lines underground will be not be feasible and has thus not been considered further for this project.

4.3.3 Underground Distribution Power Lines

The technology does exist in South Africa for Distribution power lines of less than 132kV to be placed underground. However, the existing Houhoek Eskom Distribution Substation currently contains an overhead configuration for the 132kV Distribution power line link with the proposed Asteria Eskom MTS. If this alternative were to be considered further for this project, the existing 132kV connection bays would need to be reconfigured. This would mean switching off some existing feeder bays that link into the Houhoek Eskom Distribution Substation to accommodate the change in configuration, resulting in a non-supply to some of Eskom Distribution's clients in the region. In addition, based on the undulating terrain, underground power lines (even of 132kV) cannot be considered further for this project.

4.4 TECHNICAL ALTERNATIVES

4.4.1 Site Alternatives for Asteria Eskom MTS

The following site alternatives of 350m × 320m were considered in the scoping phase:

- **Site Alternative 1** is located ±200m to the west of the existing Houhoek Eskom Distribution Substation, across the R43 road. **Site Alternative 1** is presented as a **yellow** and a **purple** (for the two layout alternatives) pair of coloured square blocks in **Figure 3-9**.
- **Site Alternative 2** is located ±1.6km north of Site Alternative 1, and to the north-west of the existing Houhoek Eskom Distribution Substation. **Site Alternative 2** is presented as a **green** coloured square block in **Figure 3-9**.
- **Site Alternative 3** located north and adjacent to the existing Houhoek Eskom Distribution Substation. **Site Alternative 3** is presented as a **light blue** and a **dark blue** (for the two layout alternatives) pair of coloured square blocks in **Figure 3-9**.

The result of the scoping phase is that only Site Alternative 1 was carried into the EIA phase, for assessment. Site Alternative 2 and Site Alternative 3 were dismissed on environmental grounds given below.

The following environmental reasons were provided for the dismissal of Site Alternative 2 and Site Alternative 3:

- Site Alternative 2:
  - Since Site Alternative 2 is steeper than Site Alternative 1, more extensive cutting and filling would be required. The fact that shallower bedrock conditions are expected on the high-lying part of Site Alternative 2, excavation difficulties should be anticipated. This may lead to significant erosion impacts during the rainy season.
  - The upper portion of Site Alternative 2 is of Medium botanical conservation value.

- Alternative 2 contains more trees than alternative 1, which makes it potentially more attractive to raptors for perching, roosting and breeding.
- The following negative and positive social impacts apply to Site Alternative 2:
  - The site is adjacent to the nearest residential area of Botrivier. The N2, however, assists in providing a buffer between the site and the residential area of Botrivier.
  - The existing infrastructure in that area (roads and power lines) makes the proposed substation as land use relatively compatible to the existing land-use in that area.
  - Various servitudes are already present on the southern section of the farm on which the substation is proposed (i.e. Site Alternative 1) such as servitudes for a water pipeline and existing power lines. A reservoir and pump station is also present to the south of the proposed substation.
  - The site is anticipated to be highly visible from certain points along the N2 (west of the site and east of the site and the town of Botrivier). The visual impact of the site, as well as the impact on the sense of place on the town of Botrivier and the surrounding areas thus remains a source of concern even though the land use could be compatible to some extent to the existing surrounding land uses.
  - The visual impact of the substation site and the sterilisation of land as well as visual impact due to the length of the 132kV lines to the existing Houhoek substation, remain issues to be addressed.
  - As part of the proposed toll gates and road upgrading in the area, the existing access from the southbound carriageway of the N2 to the town of Botrivier is proposed to be closed. It is thus unlikely that access to the site from the northbound carriageway of the N2 would be allowed.
  - The 400kV Transmission power line link to the Bacchus Palmiet 400kV Transmission power line would have a minimum impact due to the distance of the site to the line.
- Site Alternative 2 is not recommended due to visual exposure as a result of its location on the eastern slope of the Houwhoek Mountain and its visibility from major tourist routes including the N2 and R43.
- The upgrading of the N2 will result in the closure of the at-grade intersection which provides access to Botrivier and to the properties on the western side of the N2. As part of the upgrading an underpass will be in the position of the existing at-grade intersection which will provide access to the properties on the western side of the N2. However, this access will require vehicles to travel through the town of Botrivier. If the proposed substation were to be located on Site Alternative 2 the underpass will be used for access, requiring construction and maintenance vehicles to travel through Botrivier, which will result in additional impacts.

- Site Alternative 3:
  - The reworked residual and residual shale beneath Site Alternative 3 will be a very poor fill for road construction material.
  - Site Alternative 3 is of medium to high botanical conservation value.

- Site Alternative 3 also contains more trees than Site Alternative 1 (making it potentially attractive for raptors) and a dam, which will attract waterbirds, especially during the wet season when levels of inundation will be higher.
- Site Alternative 3 is not preferred due to the possible sterilisation of land for the Donderboskop Industrial Development and any future extension potential of Botrivier.
- Due to very close proximity to the N2 east and west-bound, as well as the R43 traffic, high levels of visual intrusion are likely for Site Alternative 3. The additional Distribution power lines drawn to this site will compromise future planning of development and access to the areas to the south and east of this site. For these reasons, this site is not recommended.
- Site Alternative 3 contains a moderate amount of archaeological material of low significance.
- No access will be allowed off the N2. As part of its upgrading the N2 will be lowered in the vicinity of Site Alternative 3 to facilitate the approach to the proposed toll plaza which will be located just east of the site. It is recommended that Site Alternative 3 share the access off the R43 with the existing Houhoek Distribution substation. This will have the least impact on the surrounding road network.

Further analysis of the sensitivities of Site Alternative 2 and Site Alternative 3 are provided in Chapter 6.6 below.

4.4.2 Layout Alternatives for Asteria Eskom MTS

Layout alternatives of the proposed Asteria Eskom MTS site were considered, due to the topography of the study area, and the limited availability of flat land for the placement. The following two layout alternatives were considered during the concluded scoping phase:

- Layout Alternative 1: a standard layout of 350m × 320m.
- Layout Alternative 2: The EAP suggested that a more elongated (rectangular) layout alternative be investigated by Eskom's Substation Designers. As such, a layout of 450m x 250 m was also considered for Site Alternative 1 and Site Alternative 3. **However, Layout Alternative 2 was dismissed for incompatible technical reasons during the scoping phase.**

Site Alternative 1: Layout Alternative 3 is also based on a standard 350m × 320m area. This layout alternative was identified based on the topography, proximity to the watercourse that bisected Site Alternative 1 and proximity to the existing Houhoek Eskom Distribution Substation.

The result of the scoping phase is that Layout Alternative 1 and Layout Alternative 3 were carried into the EIA phase, for assessment. Layout Alternative 2 was dismissed.

4.4.3 Site Integration Options Linked to Site Alternatives

The integration plan for each site is outlined below. The orientation of the substation will be based on the final design, post Environmental Authorisation.

a) Site Alternative 1, Layout 1 Scenario

Site Alternative 1, Layout 1 (as detailed in **Table 4-1** below) allows for a more efficient integration of future 132kV lines as more space is available to take future 132kV lines out of the MTS. It should be noted that this alternative has no impact on the future Toll gate across the N2 and will have little or no effect on the Bakenhoogte Olive Farm near to the substation.

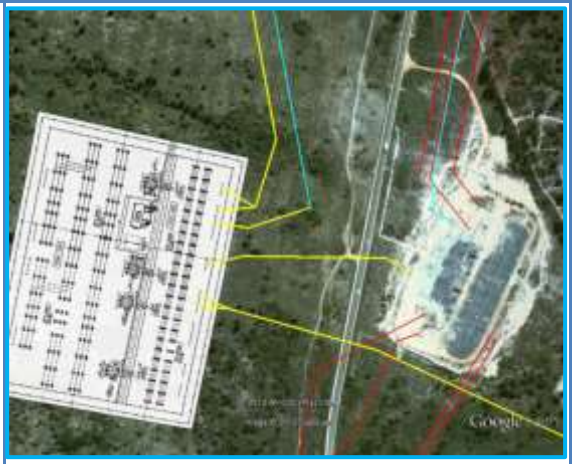
b) Site Alternative 1, Layout 3 Scenario

This site layout, **Site Alternative 1, Layout 3**, offers the same integration points as the previous Site Alternative 1 layout, but with the following disadvantages:

- It may pose possible interference with a future toll gate planned in the area.
- It also requires construction underneath the main 132kV power line, Bacchus-Houhoek, entering the existing Houhoek Eskom Distribution Substation. This would require the 132kV Bacchus-Houhoek Distribution power line on temporary by-pass wooden poles in order to ensure that this power line does not need to be switched off. The crossing over of existing power lines is also shown in Scenario 6 in **Table 4-1**.

Table 4-1: Technical Scenarios for Site Alternative 1, Layout 1

	DESCRIPTION	LAYOUT DRAWING
1	Move the southern wind farm linkage from Houhoek Eskom Distribution Substation to the proposed Asteria Eskom MTS, freeing up a 132kV feeder bay at the existing site.	
2	(i) Disconnect the northern wind farm at Houhoek Eskom Distribution Substation and disconnect at the crossing point. (ii) Reroute the Lourensrivier circuit into the proposed Asteria Eskom MTS using the disconnected portion of Caledon WEF double circuit line. (iii) Connect the Caledon WEF onto the Houhoek Eskom Distribution Substation via the portion of Lourensrivier circuit which is no longer in use.	

	DESCRIPTION	LAYOUT DRAWING
3	Build a 132kV circuit on a double circuit line from the proposed Asteria Eskom MTS to supply the existing Houhoek Eskom Distribution Substation.	
4	Reroute the Bacchus-Houhoek line into the proposed Asteria Eskom MTS, leaving an open 132kV feeder bay at the existing Houhoek Eskom Distribution Substation.	
5	Add in an additional 132kV circuit from the proposed Asteria Eskom MTS to supply the existing Houhoek Eskom Distribution Substation on the old Bacchus feeder bay.	

	DESCRIPTION	LAYOUT DRAWING
6	Provisioned to allow double circuit 132kV to the northern wind farm from the existing Houhoek Eskom Distribution Substation by moving Lebanon Switching 1 over to the old Lebanon 2 structure (would require re-conductoring and rebuilding of a section of the Lebanon Switching 2 line, with a single circuit up to a point and a double circuit 66kV to connect the Houhoek-Vyeboom 66kV line by diverting it to the 66kV busbar at the back of the substation using two 66kV feeder bays. This would avoid crossing the 132kV feeder bay.	
7	(i) Provisioned to reroute the Hermanus 66kV feeder to the Asteria Eskom MTS when increased to 132kV in the future. (ii) Provisioned to build a 132kV line to Bredasdorp.	

4.4.4 LILO Corridor Alternatives for Power Lines

The EIA process only considered the proposed 400kV Transmission LILO power lines and the 132kV Distribution power line within the study area. As such, the corridor within which these power lines were considered is presented as an orange shaded area in **Figure 3-9**. This corridor is located south of the existing Bacchus-Palmiet 400kV Transmission power line, and includes all the site and layout alternatives mentioned above. The irregular shape of the corridor is approximately 2.5km × 2km in area.

The outcome of the scoping process was that three corridors were identified for the construction of the proposed 400kV Transmission LILO power lines:

- **LILO 1:** a servitude corridor width of 250m was considered to allow for placement of the LILO power line either adjacent to the existing power lines or away from the existing power lines (to reduce the visual impact caused by cluttering of power lines). As this corridor width goes through parts of the Houwhoek Nature Reserve, the wider corridor width is suggested to avoid sensitive vegetation communities during pylon positioning. LILO 1 is 1km – 1.6km long (depending on the positioning of both the Asteria Eskom MTS layout alternatives), which would allow the placement of the LILO either adjacent to the existing 66kV and 132 kV Distribution power lines leading to the Bacchus-Palmiet 400kV Transmission power line or a distance of 150m away from these existing power lines to reduce the visual impact caused by cluttering of power lines.

- **LILO 2:** a servitude width of 150m was considered to allow Eskom sufficient flexibility to avoid existing water and sewage infrastructure (i.e. the pump station and reservoir) and the widening of the R43. LILO 2 is 1.3km – 1.8km long to avoid an impact on the existing dam, pump station and water supply line to the town of Botrivier and to run adjacent to the existing 132kV Distribution line to the existing Bacchus-Palmiet 400kV Transmission power line.
- **LILO 3:** a servitude width of 150m was considered. This alignment was included in the study as it would result in lesser cross-overs of existing power lines. Crossing over existing power lines would require the LILO pylon towers to be constructed higher than the typical 26m-29m, resulting in potential high visual impacts. LILO 3 is also between ±1.5km and ±1.8km long and is aligned to the west of LILO 2.

Thus, the alternatives to be assessed in this EIA Report are shown in **Figure 4-1**.

Following the compilation of the Draft EIA Report, the affected landowners suggested that the location of the proposed pylon positions should be assessed as part of the EIA process to determine the site-specific impact of each pylon position. As such, Eskom profiled constructable positions for the pylons. These pylon positions considered the results of the Draft EIA Report and avoided, where possible, the following environmental aspects:

- Watercourses and associated 50 m buffer zones as discussed in the Freshwater Assessment (**Appendix E-3**).
- Attempts were made to remain within the existing servitude of the existing Bacchus-Palmiet 400kV Transmission power line to avoid the impacts identified in the Ecological Assessment (**Appendix E-4**).
- Bakenhoogte Olive Farm, as discussed in the SIA (**Appendix E-6**).

Thus, the proposed pylon positions that were assessed in this Final EIA Report are shown in **Figure 4-2** and are based on conceptual profiles generated using DEM data. The final pylon positions will be optimised during the detailed design and will be located within the existing servitudes or the recommended corridor for the 400kV Transmission power lines.

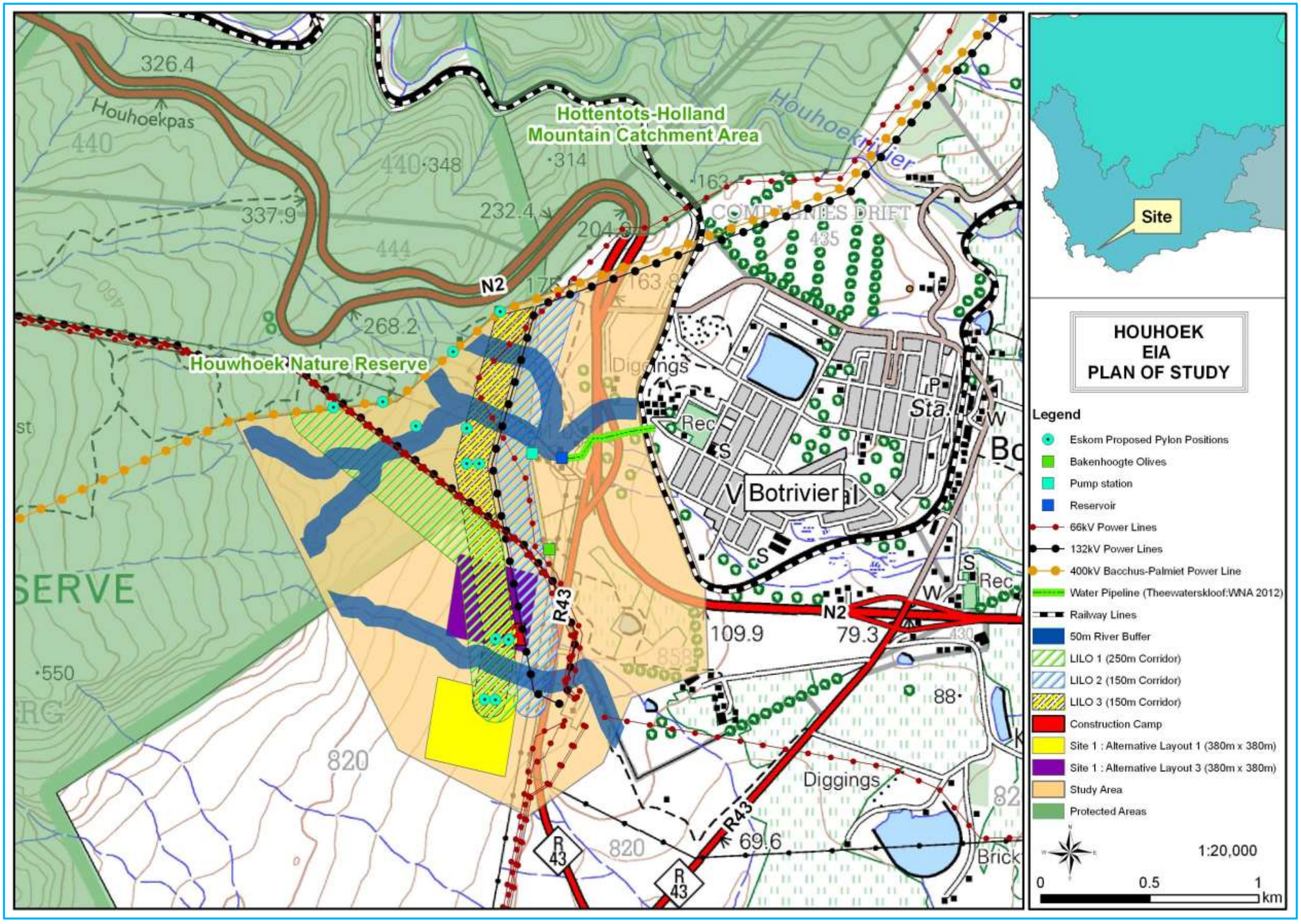


Figure 4-1: Plan of Study for EIA Map

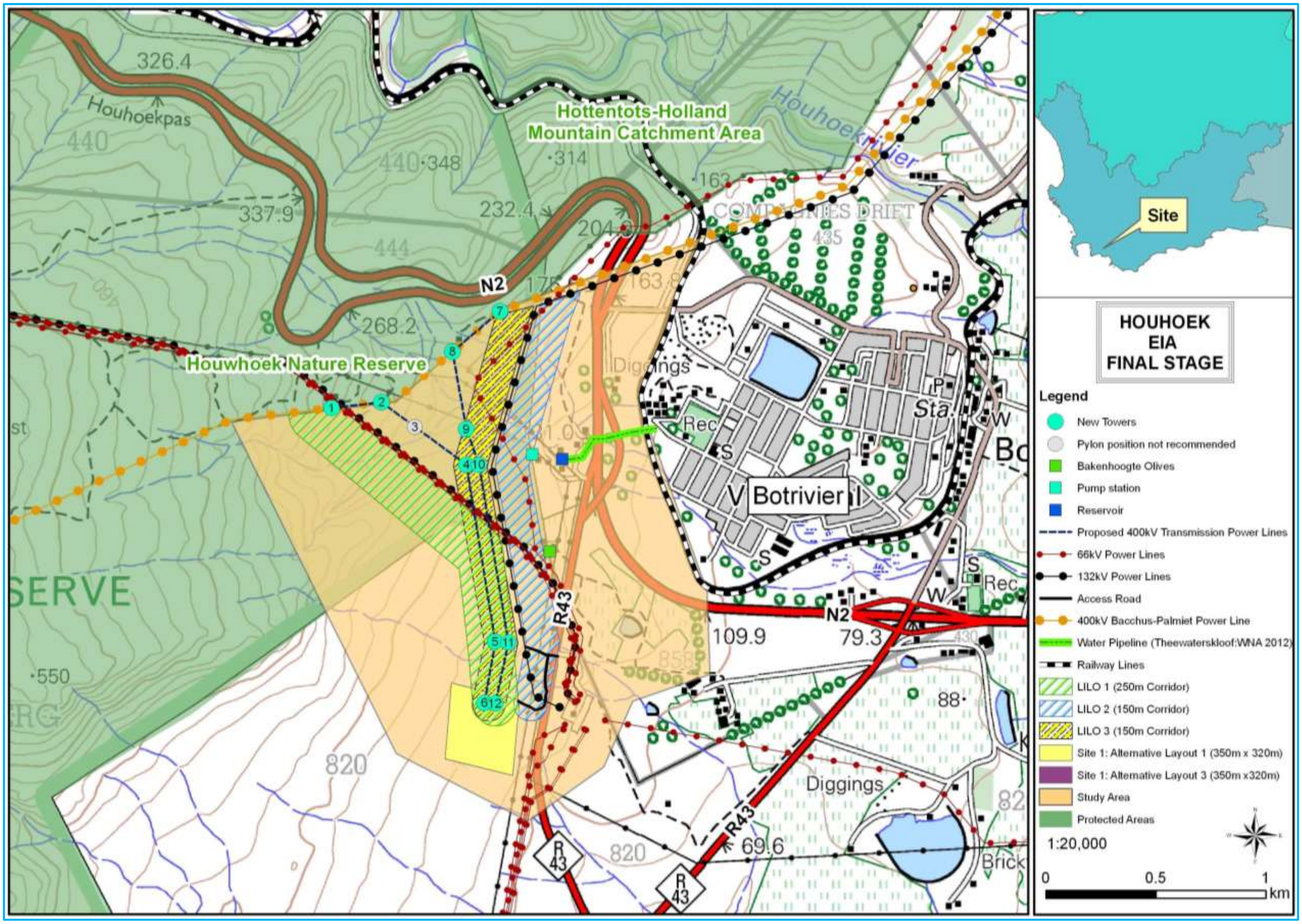


Figure 4-2: Final EIA Report Study Area Map, including pylon positions

5 LEGISLATION AND GUIDELINE DOCUMENTS

5.1 APPLICABLE ENVIRONMENTAL LEGISLATION

The applicable key environmental legislation that Eskom must consider during the implementation of the Asteria Eskom MTS project is summarised in **Table 5-1**.

Table 5-1: Summary of Applicable Legislation

LEGISLATION	SECTIONS	RELATES TO:
The Constitution (No. 108 of 1996)	Chapter 2	Bill of Rights
	Section 24	Environmental rights
	Section 25	Rights in property
	Section 32	This section provides that every person has the constitutional right of access to information held by the state, including for example a state department such as the DEA, and any information held by another person in so far as that information is required for the exercise or protection of any of their rights, including their environmental right.
	Section 33	The Constitution entitles everyone to administrative action that is lawful, reasonable and procedurally fair and if one's rights have been adversely affected by administrative action one has the right to be given written reasons for the decision.
National Environmental Management (No. 107 of 1998) as amended[1]	Section 2	The national environmental management principles contained in Chapter 1 of the Act, serve as guidelines by reference to which organs of state shall exercise their functions when taking a decision in terms of NEMA. The principles will furthermore guide the interpretation, administration and implementation of NEMA and any other law concerned with the protection of the environment. The environmental management principles apply to the actions of all organs of state that may significantly affect the environment. The section 2 principles contain an overarching emphasis of the principle that development must be environmentally, socially and economically sustainable and the principle of sustainable development is referenced at section 2(4).
	Section 24	Chapter 5 of the Act deals with integrated environmental management, including environmental impact assessments. Section 24 requires the Applicant of an environmental authorisation to consider, investigate, assess and report the consequences for or impacts on the environment of the listed activity or specified activity to the competent authority.
	Section 28	Section 28 imposes a duty of care on every person who causes, has caused, or may cause significant pollution or environmental degradation to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring.

1 The EIA Regulations (2010) R543, R544, R545 and R546 may be relevant for certain construction and maintenance activities, such as those that may need to take place in or close to water resources.

LEGISLATION	SECTIONS	RELATES TO:
		The Applicant has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
	Section 30	Control of emergency incidents. Section 30 requires that "a responsible person" or, where the "incident" occurred in the course of that person's employment, must take all measures reasonably practicable to contain and minimise the effects of the incident, including' its effects on the environment and any risks posed by the incident to the health, safety and property of persons. There is also a requirement to report such incidents through the most effective means reasonably available. It is an offence to fail to comply with the reporting requirements and obligations to address an incident, as contained in sub-sections 30(3), (4), (5) or (6) of NEMA.
Environment Conservation Act (No. 73 of 1989) (ECA) and regulations	Although the ECA has been substantially repealed by the NEMA and NEM:WA, certain Regulations promulgated under the Act remain in effect. Of importance are the National Noise Control Regulations.	
National Environmental Management: Protected Areas Act (No. 57 of 2003)	The aim of the Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes. The Act repealed sections 16, 17 & 18 of the Environment Conservation Act (No. 73 of 1989) (ECA). In 2004, the National Environmental Management: Protected Areas Amendment Act (No. 31 of 2004) was promulgated to amend Act 57 of 2003 with regard to the application of that Act to national parks and marine protected areas. The Amendment Act came into operation on 01 November 2005 and it also repeals the National Parks Act with the exception of section 2(1) and Schedule 1. The Act operates in conjunction with the National Environmental Management: Biodiversity Act No. 10 of 2004.	
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Sections 65-69	These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species.
	Sections 71 and 73	These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species.
Conservation of Agricultural Resources Act (No. 43 of 1983) and regulations	Sections 2, 5, 6	Implementation of control measures for soil conservation works as well as alien and invasive plant species in and outside of urban areas.
National Water Act (No. 36 of 1998) and regulations	Section 19	Prevention and remedying the effects of pollution.
	Section 20	Control of emergency incidents.
	Section 21	Section 21 lists the water uses for which authorisation under the NWA is required. The DWA will require water use licences for various construction-related activities. Refer to **Chapter 5.4** of this report for further details.
	Section 26	Empowers the Minister to make certain Regulations.
	Section 27	Provides for considerations that must be taken into account by

LEGISLATION	SECTIONS	RELATES TO:
		the responsible authority when issuing general authorisations.
	Section 28	Provides the essential requirements that must be contained in a water use licence.
	Section 29	Provides for the discretionary conditions that the responsible authority may include in a water use licence.
	Section 30	Provides the responsible authority with the discretion to request a security in respect of any obligation or potential obligation arising from a licence.
	Section 31	States that the issuing of a water use licence does not guarantee certain matters (such as the availability of water supply).
	Section 32	Provides the definition of existing lawful water use.
	Section 33	Allows for the declaration of water use as existing lawful water use.
	Section 34	Provides Authority to continue with existing lawful water use.
National Heritage Resources Act (No. 25 of 1999)	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site.
	Section 36	No person may, without a permit issued by the SAHRA or provincial heritage resources authority (Heritage Western Cape in this instance) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such a place.
	Section 38	This section provides for a HIA. The HIA will be approved by the DEA, which is required to take SAHRA's and HWC's comments into account prior to making a decision on the HIA.
Removal of Graves and Dead Bodies Ordinance 7 of 1925	Authorisation for exhumation and re-internment of human remains must be obtained from the relevant local authority where the grave is situated, as well as where the grave is being relocated to.	
National Environmental Management: Air Quality Act (No. 39 of 2004)	Section 32	Measures for the control of dust
	Section 34	Measures for the control of noise
	Section 35	Measures for the control of offensive odours
	Chapter 5	Licensing of listed activities
	Schedule 2	Ambient air quality standards
National Environmental Management: Waste Act (No. 59 of 2008)	Section 16	General duty of care relating to waste management
	Section 17	Reduction, re-use, recycling and recovery of waste
	Section 20	No person may commence, undertake or conduct a waste management activity, except in accordance with: • the requirements or standards prescribed by said Act and regulations; and • a waste management licence issued in respect of that activity, if a licence is required.

LEGISLATION	SECTIONS	RELATES TO:
	Section 26	Prohibition of unauthorised disposal of waste
	Section 27	Prohibition of littering
South African National Roads Agency Limited and National Roads Act, 1998 (No. 7 of 1998): **1. Damaging a National Road**	Section 46(5)(a) and (b)	The Agency may issue a written notice demanding that the owner or occupier prevents or stops any activity that may cause damage to a national road. The demand may include, among others, the removal, filling in, alteration, relocation or establishment of any dam, canal, trench, wall, sluice, pipe, excavation, structure or other works, or the cessation of such an act, on the land.
	Section 46(3)	The owners or occupiers of land adjoining any national road must: • Take all measures on their land that are reasonably necessary to prevent the occurrence of any damage to the national road concerned. • Refrain from doing or permitting anything on or below the surface of that land which is likely to cause damage to that national road.
	Section 46(4)	The owner or occupier of any land adjoining a national road will be held liable for any damage to the national road which was or reasonably should have been foreseen.
South African National Roads Agency Limited and National Roads Act (No. 7 of 1998): **3. Structures and other works on, over or below national roads or certain other land**	Section 48(1)	No person may do any of the following without the Agency's permission: • On or over, or below the surface of, a national road erect, construct or lay, or establish any structure. • Make any structural alteration or addition to a structure situated on or over, or below the surface of a national road. • Give permission for either (a) or (b).
	Section 48(5)	The Agency may give written notice for the removal of any such structure, or may remove the structure and recover the costs from that person.
	Section 48(8)	Any person who contravenes this section is guilty of an offence and liable to one year in prison and/or a fine.
Explosives Act (No. 15 of 2003) and regulations	Provisions for the control of explosives in terms of use, disposal, storage, transportation, dealing, importation, exportation and packaging of explosives.	
Occupational Health and Safety Act (No. 85 of 1993) and regulations	General Administration Regulations GN R929 of June 2003	Material Safety Data Sheets must be made available at the request of any interested or affected party.
	Section 8	General duties of employers to their employees.
	Section 9	General duties of employers and self-employed persons to persons other than their employees.
Fencing Act (No. 31 of 1963)	Section 17	Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to the

LEGISLATION	SECTIONS	RELATES TO:
		protection of flora.
Hazardous Substances Act (No. 15 of 1973) and regulations	Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No. 36 of 1947) and regulations	Sections 3-10	Control of the use of registered pesticides, herbicides (weed killers) and fertilisers. Special precautions must be taken to prevent workers from being exposed to chemical substances in this regard. Workers handling these remedies must also be registered in terms of the Act.
National Road Traffic Act (No. 93 of 1996) and regulations	Section 54	Transportation of dangerous goods.
National Veld and Forest Fire Act (No. 101 of 1998)	Chapter 2	Promotes and regulates the formation of fire protection associations which aim to manage and coordinate fire protection and fire services in an area.
	Chapters 4-5	Organisations are required to make and maintain firebreaks and fire-fighting equipment and personnel should a risk exist that a fire may start or spread from the premises.
Subdivision of Agricultural Land Act (No. 70 of 1970)	To control the subdivision and, in connection therewith, the use of agricultural land.	
Western Cape Provincial Land Use Planning Ordinance (No. 15 of 1985)	To control town and regional planning and is also cross linked to the EIA process. This ordinance falls under the jurisdiction of the TWK LM.	
Western Cape Provincial Land Use Planning Act (No. 3 of 2014)	Even though this Act is already promulgated, regulations pertaining to this Act have yet to be gazetted. These regulations would amend the current land development application process (land use planning) when they come into effect in the near future.	
Spatial Planning and Land Use Management Act (No. 6 of 2013)	Even though this Act is already promulgated, regulations pertaining to this Act have yet to be gazetted. These regulations would amend the current land development application process (land use management) when they come into effect in the near future.	
Land Survey Act (No. 8 of 1997)	To regulate the survey of land in South Africa.	
Removal of Restrictions Act (No. 84 of 1967)	To alter, suspend or remove certain restrictions and obligations in respect of land and to provide for incidental matters.	
SANS 1929	Ambient air quality – limits for common pollutants.	
SANS 10103	The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication.	
SANS 10128	Bunding of fuel storage tanks.	

5.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The National Environmental Management Act (No. 107 of 1998) (NEMA) provides a framework for cooperative environmental governance between the various spheres of government, by establishing principles for decision-making on matters relating to the environment. Furthermore, NEMA promotes integrated management to ensure sustainable resource utilisation and development and requires that the DEA be the lead agent in ensuring effective custodianship of the environment. It also provides that sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where subjected to significant human resource usage and development pressure.

The NEMA principles, as contained in Section 2, essentially guide the interpretation, administration and implementation of the Act and any other law concerned with the protection of the environment. An overarching emphasis of the principle that development must be environmentally, socially and economically sustainable. It is also stated that sustainable development requires the consideration of the following factors:

- Pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- waste is avoided, or where it cannot be altogether avoided, is minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- the development, use and exploitation of renewable resources and the eco-systems of which they are part do not exceed the level beyond which their integrity is jeopardised; and
- negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented are minimised and remedied.

The NEMA principles apply to the actions of all organs of state that may significantly affect the environment and serve as guidelines by reference to which organs of state shall exercise their functions when taking a decision in terms of NEMA.

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an environmental authorisation, the result being that NEMA began governing the EIA process with the promulgation of the EIA Regulations in April 2006 (Government Gazette No. 28753 of 21 April 2006). These regulations have subsequently been replaced by the NEMA EIA 2010 Regulations listed in Government Gazette No. 33306 of 18 June 2010 (GN543, 544, 545 and 546 of 18 June 2010, as amended). The NEMA EIA 2010 Regulations are contained in four Government Notices and came into effect on 2 August 2010, as amended.

Applications listed in these regulations will require environmental authorisation from the relevant competent authority, which in this case is the DEA as Eskom is a state-owned company or so-called parastatal entity. Section 24(f) of the NEMA prohibits the undertaking of identified activities except by virtue of authorisation from a competent authority.

On submission of an application, the competent authority must consider all the relevant information contained in the SR and EIA Report (including any pollution, environmental impacts or environmental degradation likely to be caused if the application is approved or refused) and thereafter make a decision of whether to grant or refuse environmental authorisation for the proposed project.

Certain minimum conditions are attached to environmental authorisations, as required by Section 24E of NEMA, however it is at the competent authority's discretion to include additional project-specific conditions. In terms of section 24F of NEMA it is an offence not to comply with any condition applicable to an environmental authorisation issued for a listed activity.

Typical conditions that may be applied by the competent authority include, but are not limited to:

- Measures to prevent, manage and mitigate environmental impacts to acceptable levels.
- Prevention of pollution of water bodies and groundwater.
- Rehabilitation programme for disturbed natural and/or heritage areas.
- Appointment of an independent ECO by the Applicant to oversee the construction phase and to ensure that the development phase is conducted in an environmentally responsible manner.
- Conservation management and visitor management plans.
- Requirements of other authorities, such as the Department of Water Affairs (DWA), the Department of Energy (DoE), the Department of Agriculture, Forestry and Fisheries (DAFF), the Department of Mineral Resources (DMR) and the South African Heritage Resources Agency (SAHRA) and/or relevant provincial authorities.

5.3 Activities Applicable to EIA Regulations (2010)

The construction of the Asteria Eskom MTS project falls within the ambit of the list of activities (**Table 5-2**) identified in terms of Sections 24(2)(a) and (d) of the NEMA. Note that comments on the listed activities are presented in the table, as identified by being in *italics*.

Table 5-2: Listed Activities in Terms of NEMA

No	Description of Each Listed Activity	Description of Activities Applicable to Each Listed Activity
LISTING NOTICE 1 (GN R544 of 18 JUNE 2010) – BASIC ASSESSMENT PROCESS		
10	The construction of facilities or infrastructure for the transmission and distribution of electricity: (xi) outside urban areas or industrial complexes with a capacity of more than 33kV but less than 275kV.	*The Asteria Eskom MTS project entails the construction of a 400/132kV Substation, including 400kV Transmission and 132kV Distribution power lines and associated infrastructure, outside of an urban area / industrial complex.*

No	Description of Each Listed Activity	Description of Activities Applicable to Each Listed Activity
11	The construction of: (xi) infrastructure or structures covering 50m^2 or more, where such construction occurs within a watercourse or within 32 m of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind a development setback line.	*The Asteria Eskom MTS project entails the construction of a 400/132kV Substation, including 400kV Transmission and 132kV Distribution power lines and associated infrastructure. The associated power lines or access roads, that link to the substation, may cross drainage lines and non-perennial watercourses.*
13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80m^3 but not exceeding 500 m^3.	*The Asteria Eskom MTS project will have an oil holding dam during the commissioning of the proposed Asteria Eskom MTS. The oil holding dam will store Transformer oil (dangerous good) up to 8 000 m^3 with a holding capacity up to 12 000 m^3. Therefore, this oil holding dam will exceed the 500 m^3 capacity of the listed activity and will be removed from the application. Activity No. 3 of Listing Notice 2 will still apply.*
18	The infilling or depositing of any material of more than 5 m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from: (i) a watercourse.	*The Asteria Eskom MTS project could entail the construction of access roads for use during the construction phase and operational phase (for maintenance purposes) which may cross over drainage lines and non-perennial watercourses occurring in the area.* *The installation of pylons associated with the LILO Transmission power lines may also impact on any crossed drainage lines and non-perennial watercourses encountered in the study area.*
22	The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 m. (ii) where no reserve exists where the road is wider than 8 m.	*The proposed Asteria Eskom MTS project would entail the construction of access roads to link the R43 to the proposed Asteria Eskom MTS. Existing access roads and single-lane maintenance tracks will be used during the operational phase (for maintenance purposes).*
23	The transformation of undeveloped, vacant and derelict land to: (ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area an where the total area to be transformed is bigger than 1 hectare but less than 20 hectares. except where such transformation takes place (i) for linear activities.	*The proposed Transmission and Distribution power lines will not be applicable for this activity. However, the Asteria Eskom MTS will require the transformation of undeveloped land to industrial use and will be 14.4 hectares in size.*
24	The transformation of land bigger than 1 000 m^2 in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule such land was zoned open space, conservation or had an equivalent zoning.	*One of the proposed alternatives being considered falls within the existing Houwhoek Nature Reserve, which is by definition "conservation" in nature. The Asteria Eskom MTS will be approximately 12 ha, which is significantly larger than 1 000 m^2 (i.e. 0.1 ha). The land use proposed for the Transmission Substation is institutional (Authority Zone: Government (AU)). The combined servitude of*

No	Description of Each Listed Activity	Description of Activities Applicable to Each Listed Activity
		the LILO lines would also exceed 1 000 m^2.
26	Any process or activity identified in terms of Section 53(1) of the National Environmental Management: Biodiversity Act (No. 10 of 2004).	*The proposed Transmission and Distribution power lines fall within areas of importance in terms of NEM:BA. The position of the Transmission Substation itself will also be influenced by the biodiversity status.*
38	The expansion of facilities for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.	*The Asteria Eskom MTS project will link a 132kV Distribution power line from the proposed 400kV Transmission Substation to the existing 132kV Distribution Substation. The Asteria Eskom MTS project could then entail the expansion of the existing Eskom servitudes, which will increase the development footprint.*
40	The expansion of: (iv) infrastructure by more than 50 m^2 within a watercourse or within 32 m of a watercourse, measured from the edge of a watercourse.	*The Asteria Eskom MTS project will not result in the expansion of any infrastructure as described in this activity. However, the construction of infrastructure as described in Activity No. 11 of Listing Notices 1 would still apply. Therefore, this activity is removed from the application.*
47	The widening of a road by more than 6 m, or the lengthening of a road by more than 1 km (i) where the existing reserve is wider than 13.5 m; or (ii) where no reserve exists, where the existing road is wider than 8 m.	*The Asteria Eskom MTS project would entail the expansion of existing roads to use as access roads for use during the construction phase and operational phase (i.e. for maintenance purposes).*
LISTING NOTICE 3 (GN R546 of 18 JUNE 2010) – BASIC ASSESSMENT PROCESS		
4	The construction of a road wider than 4m with a reserve less than 13,5m (d) in Western Cape Province: in (ii) all areas outside urban areas.	*The temporary single-lane maintenance tracks and the access road between the R43 and the proposed Asteria Eskom MTS will be more than 4m in width and outside an urban area.*
10	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 m^3 but not exceeding 80 m^3, (e) in the Western Cape: in (ii) All areas outside urban areas.	*The proposed project will have an oil holding dam during the commissioning of the proposed Substation. The oil holding dam will store Transformer oil (dangerous good) up to 8 000 m^3 with a holding capacity up to 12 000 m^3. Therefore, this oil holding dam will exceed the 80 m^3 capacity of the listed activity and will be removed from the application. Activity No. 3 of Listing Notice 2 will still apply.*
12	The clearance of an area of 300 m² or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation: (a) Within any critically endangered or endangered ecosystem listed in terms of Section 52 of the NEM:BA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment (2004).	*Clearance land of vegetation for the proposed power lines and substation areas will be required. 12 hectares would require clearing of vegetation for the Asteria Eskom MTS. Vegetation clearance of 300 m^2 may also be required around each Transmission pylon structure.*

No	Description of Each Listed Activity	Description of Activities Applicable to Each Listed Activity
	(b) Within critical biodiversity areas identified in bioregional plans.	
13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for (2) the undertaking of a linear activity falling below the thresholds mentioned in Listing Notice 1 in terms of GN R No. 544 of 2010. (a) Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority. (b) National Protected Area Expansion Strategy Focus areas. (c) in Western Cape: (ii) outside urban areas, the following: (aa) A protected area identified in terms of NEM:PAA, excluding conservancies. (bb) National Protected Area Expansion Strategy Focus areas. (cc) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority. (ee) Core areas in biosphere reserves. (ff) Areas within 10km from national parks or world heritage sites or 5km from any other protected area identified in terms of NEM:PAA or from the core area of a biosphere reserve.	*Clearance land of vegetation for the proposed power lines and substation areas will be required. 12 hectares would require clearing of vegetation for the Asteria Eskom MTS. The LILO Transmission power lines are proposed within 5 km from the Houwhoek Nature Reserve.*
14	The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation: (a) in the Western Cape: in (i) all areas outside urban areas.	*Clearance land of vegetation for the proposed power lines and Asteria Eskom MTS areas will be required. 12 hectares would require clearing of vegetation for the proposed Asteria Eskom MTS, which is located outside the urban edge of Botrivier.*
16	The construction of: (xi) infrastructure or structures covering 10 m^2 or more, where such construction occurs within a watercourse or within 32 m of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind a development setback line (d) in Western Cape (ii) Outside urban areas, in: (aa) A protected area identified in terms of NEM:PAA, excluding	*The proposed Asteria Eskom MTS and LILO pylons will be located outside of the unnamed watercourse and its 50 m buffer area.*

No	Description of Each Listed Activity	Description of Activities Applicable to Each Listed Activity
	conservancies. (bb) National Protected Area Expansion Strategy Focus areas. (dd) Sensitive areas as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority. (ff) Critical biodiversity areas or ecosystems service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (gg) Core areas in biosphere reserves. (hh) Areas within 10km from national parks or world heritage sites or 5km from any other protected area identified in terms of NEM:PAA or from the core areas of a biosphere reserve.	
19	The widening of a road by more than 4 m, or the lengthening of a road by more than 1 km (d) in the Western Cape: in (ii) all areas outside urban areas.	*The temporary single-lane maintenance tracks and the access road between the R43 and the proposed Asteria Eskom MTS will be more than 4 m in width and outside an urban area.*
23	The expansion of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 m^3 but not exceeding 80 m^3, (d) in the Western Cape: in (ii) all areas outside urban areas.	*The proposed project will have an oil holding dam during the commissioning of the proposed Substation. The oil holding dam will store Transformer oil (dangerous good) up to 8 000 m^3 with a holding capacity up to 12 000 m^3. Therefore, this is not an expansion of an existing oil holding dam, will exceed the 80 m^3 capacity of the listed activity, and will thus be removed from the application. Although, Activity No. 3 of Listing Notice 2 will still apply.*
24	The expansion of: (d) infrastructure where the infrastructure will be expanded by 10m^2 or more where such construction occurs within a watercourse or within 32 m of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind a development setback line. (d) in Western Cape (ii) outside urban areas, in: (aa) A protected area identified in terms of NEM:PAA, excluding conservancies. (bb) National Protected Area Expansion Strategy Focus areas. (cc) Sensitive areas as identified in an environmental management framework as contemplated in	*The proposed project will not result in the expansion of any infrastructure as described in this activity. However, the construction of infrastructure as described in Activity No. 11 of Listing Notice 1 would still apply. Therefore, this activity is removed from this application.*

No	Description of Each Listed Activity	Description of Activities Applicable to Each Listed Activity
	Chapter 5 of the Act and as adopted by the competent authority. (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (ff) Core areas in biosphere reserves. (gg) Areas within 10km from national parks or world heritage sites or 5km from any other protected area identified in terms of NEM:PAA or from the core areas of a biosphere reserve.	
LISTING NOTICE 2 (GN R545 of 18 JUNE 2010) – SCOPING/EIA PROCESS		
3	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 m^3.	*The proposed project will have an oil holding dam during the commissioning of the Asteria Eskom MTS. The oil holding dam will store Transformer oil (dangerous good) up to 8 000 m^3 with a holding capacity up to 12 000 m^3. Therefore, the combined capacity of the storage of the dangerous good exceeds 500 m^3.*
8	The construction of facilities or infrastructure, for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.	*The Asteria Eskom MTS project entails the construction of infrastructure for the transmission of electricity with a capacity of 400kV, outside an urban area.*

5.4 NATIONAL WATER ACT

The National Water Act (No. 36 of 1998) (NWA) provides a framework to protect, develop, conserve and manage the nation's water resources. Water use is defined broadly in terms of NWA, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. In general a water use must be licensed (in terms of Section 21) unless it is listed in Schedule 1, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. Section 21 of the NWA lists the water uses for which authorisation under the Act is required.

The NWA also provides for pollution prevention measures, with particular emphasis on water resource pollution. In accordance, the licensee shall ensure that activities impacting upon water resources and effluent releases are monitored for compliance with the applicable regulations. Emergency incidents involving water resources are included in the Act, requiring the polluter to remediate and mitigate the impacts of such an emergency incident.

In terms of Section 19 of the NWA "An owner of land, a person in control of land or a person who occupies or uses the land on which … any activity or process is or was performed or undertaken; or … any other situation exists, which causes, has caused or is likely to cause

pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring". These measures may include, but are not limited to:

- Measures to cease, modify, or control any act or process causing the pollution.
- Compliance with any prescribed waste standard or management practice.
- Containment or prevention of the movement of pollutants.
- Remediation of the effects of the pollution.
- Remediation of the effects of any disturbance to the bed and banks of a watercourse.

Construction-related activities will impact upon water resources, thereby requiring the issue of a license for such activities in accordance to Section 21 of the NWA. The listed activity in terms of Section 39 of the NWA (GN R26187 of 26 March 2004) is shown in **Table 5-3**.

Table 5-3: Listed activities in terms of NWA (General Authorisation)

ACTIVITY NO	DESCRIPTION OF EACH LISTED ACTIVITY
21 (c)	Impeding or diverting the flow of water in a watercourse.
21 (f)	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.
21 (i)	Altering the bed, banks, course or characteristics of a watercourse.
21 (j)	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

5.5 NATIONAL HERITAGE RESOURCES ACT

The National Heritage Resources Act (No. 25 of 1999) (NHRA) is the primary statute regulating the protection and management of South Africa's heritage resources. The NHRA aims to promote good management of the national estate, and ensures community participation in the protection of national heritage resources and involves all three levels of government (national, provincial and local) in the management of the country's national heritage. The South African Heritage Resources Agency (SAHRA) is the enforcing authority for the NHRA. The national estate includes but is not limited to places, buildings, structures and equipment of cultural significance, places to which oral traditions are attached or which are associated with living heritage; historical settlements and townscapes, landscapes and natural features of cultural significance, geological sites of scientific or cultural importance, archaeological and palaeontological sites, graves and burial grounds, and sites of significance relating to South African history and movable objects.

A variety of formal protection measures are provided for in the NHRA, ranging from national and provincial heritage sites, protected areas, provisional protection, inclusion on the heritage register of a province, heritage areas and heritage objects legal protection of palaeontological and archaeological sites (including rock art) and meteorites, burial grounds and graves, and the protection of structures older than 60 years and public monuments and memorials.

Applicants must contact the SAHRA or the relevant authorised provincial agency, Heritage Western Cape (HWC), to ascertain which properties and objects are formally protected by the Act and how any future development would impact on these heritage resources. Formal

permit applications or authorisations would be required from the relevant heritage resource management authority to make changes to heritage resources.

The provisions of Section 38 of the NHRA provide that the Applicant is responsible for contacting the SAHRA at the earliest stages of initiating a development and for furnishing the SAHRA with details relating to the Asteria Eskom MTS project so that the SAHRA can determine if a Heritage Impact Assessment (HIA) is required. The following activities listed in Section 38 of the NHRA apply to the Asteria Eskom MTS project:

(a) *The construction of a road, wall,* ***power line****, pipeline, canal or other similar form of linear development or barrier* ***exceeding 300m in length****.*

(c) *Any development or other activity which will change the character of a site (i) exceeding 5 000m^2 in extent.*

The Asteria Eskom MTS project includes a power line that exceeds 300m in length and a substation that exceeds 5 000m^2 in extent.

The cultural significance of a place or objects is defined according to the following criteria in Section 3(3) of the NHRA, which is applicable to the Asteria Eskom MTS Project:

(e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.

5.5.1 Scenic Routes

While not specifically mentioned in the NHRA Scenic Routes are recognised as a category of heritage resources which require grading as the Act protects area of aesthetic significance (see clause "e" above). Baumann *et al.* (2005) state that the visual intrusion of development on a scenic route should be considered a heritage issue. The HWC has taken this opinion further by acknowledging that the aesthetics of a landscape/place/area are protected by the NHRA and, like any other form of heritage, should be considered a grade-able entity.

5.5.2 Heritage Grading

A key tool in the assessment of heritage resources is the heritage grading system which uses standard criteria now established as a guideline by the HWC. In the context of an EIA process, heritage resources are graded following the system established by Baumann *et al.* (2005) in the guidelines for involving heritage practitioners in EIAs (**Table 5-4**). The system is also used internally within Heritage Authorities around the country for making decisions about the future of heritage places, buildings and artefacts.[2] Presently, the HWC has a guide to grading which is nationally applicable on their website (http://www.westerncape.gov.za/public-entity/heritage-western-cape). The grading system was designed with structures in mind but has been applied to archaeological sites, streetscapes, and objects. The call has been made by the HWC to apply the system to landscapes. The decision making process that has been used in the HIA is based on a simple 3-phase process.

2 http://www.westerncape.gov.za/other/2012/9/grading_guide_&_policy_version_5_app_30_may_2012.pdf

1. Decide what kind of landscape is involved (rural, natural wilderness, historical townscape or historical agricultural area) and establish its dominant characteristics taking cognisance of UNESCO guidelines and previous work.
2. Establish the value of the landscape in terms of its history, its aesthetic value and its value to a given community (in this case its tourism value).
3. Consider the intactness of the landscape – has it been recently intruded on by new development (60 years is used as a marker as this is generally used as a historic cut-off), and using the grading system as a guide suggesting a field grading.

The system is in its early days of development and would probably need to be refined further.

Table 5-4: Grading of Heritage Resources

GRADE	LEVEL OF SIGNIFICANCE	DESCRIPTION
I	National	Of high intrinsic, associational and contextual heritage value within a national context, i.e. formally declared or potential Grade 1 heritage resources.
II	Provincial	Of high intrinsic, associational and contextual heritage value within a provincial context, i.e. formally declared or potential Grade 2 heritage resources.
IIIA	Local	Of high intrinsic, associational and contextual heritage value within a local context, i.e. formally declared or potential Grade 3A heritage resources.
IIIB	Local	Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.
IIIC	Local	Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources.

Heritage specialists use the grading system to express the relative significance of a heritage resource. This is known as a field grading or a recommended grading. Official grading is done by a special committee of the relevant heritage authority. However, heritage authorities rely extensively on field grading in terms of decision making.

5.6 HAZARDOUS SUBSTANCES ACT

The Hazardous Substances Act (No. 15 of 1973) (HSA) provides for the control of substances that may cause injury, ill-health or death to humans by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure, thereby, in certain circumstances, and for the control of certain electronic products.

The Act divides such substances or products into groups in relation to the degree of danger and also to prohibit and control the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of the substances and products indicated in this Act. The Act acknowledges that these substances will lose their economic value after use, and would therefore require disposal. Section 29 of this Act therefore makes provision for the promulgation of regulations "authorising, regulating, controlling, restricting or prohibiting the storage, transportation, or dumping and other disposal" of any grouped hazardous substances or class of grouped hazardous substances.

5.7 POLICIES AND EIA GUIDELINES

The EIA process must consider the planning policies that govern the study area to ensure that the scale, density and nature of activities/developments are harmonious and in keeping with the sense of place and character of the area. The proposed environmental and infrastructure modifications must be viewed in the context of the planning policies from the following organisations:

- Western Cape Provincial Spatial Development Framework (2005) of the DEA&DP.
- Western Cape Provincial Land Use Planning Ordinance (No. 15 of 1985), which is the legislation controlling town and regional planning and is also cross linked to the EIA process. This ordinance falls under the jurisdiction of the TWK LM.
- Western Cape Provincial Guideline for involving Visual and Aesthetic Specialists in EIA Processes (2005) should address the following (Oberholzer, 2005):
    - Ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area. The best practicable environmental option must also ensure that development must be located to prevent structures from being a visual intrusion (i.e. to retain open views and vistas).
    - Long-term protection of important scenic resources and heritage sites.
    - Minimisation of visual intrusion in scenic areas.
    - Retention of wilderness or special areas intact as far as possible.
    - Responsiveness to the area's uniqueness, or sense of place.
- Overberg District Municipality: Spatial Development Framework (2005).
- Overberg District Municipality: Integrated Development Plan (2011).
- Overberg District Municipality: Integrated Transport Plan (2010).
- Critical Biodiversity Areas of the Overberg District Municipality: Conservation Planning Report (2010).
- TWK LM has the following comments (also included in the IRR):
    - The valley within which Botrivier falls, especially the area to the west and south-west of the town, falls within a high veld fire risk area. This is due to the funnelling of wind down the Houwhoek Pass.
    - The presence of an industrial node within the triangle formed by the N2 and the two arms of the R43 was noted south of the town of Botrivier. It was further indicated that a link across the N2 would be built in time to link the area to the town. The land usage was seen as compatible with the MTS.
    - Potential water pipeline that may impact on-sites.
    - Sites set in close proximity to the existing Eskom substation were considered by the TWK officials as viable as it was the best fit with their municipal planning initiatives.

The following guideline documents were considered during the process:

- DEA (2012a) Guideline 5: Companion Guideline on the Implementation of the Environmental Impact Assessment Regulations, 2010 (GN R805 of 10 October 2012).
- DEA (2012b) Guideline 7: Public Participation Guideline as part of the Integrated Environmental Management Guideline Series (GN R807 of 10 October 2012).

- DEA (2012c) Guideline 9: Need and Desirability in terms of the Environmental Impact Assessment Regulations, 2010 (GN R792 of 5 October 2012).
- DEA&DP (2011) Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape DEA&DP, October 2011.
- DEA&DP (2011) Guideline on Need and Desirability, EIA Guideline and Information Document Series. Western Cape DEA&DP, October 2011.
- DEA&DP (2011) Guideline on Public Participation, EIA Guideline and Information Document Series. Western Cape DEA&DP, October 2011.
- DEAT (2006) Guideline 5: Assessment of Alternatives and Impacts in support of the Environmental Impact Assessment Regulations 2006, Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
- DEAT (2004) Guideline 12: Environmental Management Plans, Integrated Environmental Management Guideline Series, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
- Brownlie, S (2005) Guidelines for involving biodiversity specialists in EIA. Edition 1. CSIR Report No ENV-S-C 2005 053 C. Provincial Government of Western Cape: Department of Environmental Affairs and Development Planning. Cape Town.
- De Villiers C., Driver A., Clark B., Euston-Brown D., Day L., Job N., Helme N., Holmes P., Brownlie S. And Rebelo T. (2005) Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape. Fynbos Forum and Botanical Society of South Africa: Kirstenbosch. Cape Town.
- Section 10 of the "Minimum Requirements for Storage, Handling and Disposal of Hazardous Waste" (DWAF Guidelines, 1998) refers to the temporary storage of hazardous waste related to time, volume and other requirements.
- Baumann, N., Winter, S. & Aikman, H. (2005) The Horns of a Dilemma: Housing and Heritage. In: VASSA Guidelines for Proceedings from a Workshop Studies and Debates in Vernacular Architecture in the Western Cape. Cape Town.
- UNESCO Operational Guidelines for the World Heritage Convention (1995).

5.8 AUTHORITY CONSULTATION

The original application form for an EA was submitted to the DEA on 15 August 2012. The application included a declaration of interest from the EAP, landowner consents, a locality map and a project schedule. The DEA acknowledged receipt of these documents on 30 August 2012. See **Appendix A-1** for further details. The draft and final SR documents were also submitted to and acknowledged by the DEA. The Final SR was accepted by the DEA on 14 May 2013. See **Appendix A-2** for further details.

The following changes had to be made to the original application form, based on outcomes of the EIA phase to date:

- The name of the project changed from "Houhoek Eskom MTS" to "Asteria Eskom MTS".
- The contact person for the Applicant changed from "Ms Mmamoloko Seabe" to "Ms Martina Nailana".

Therefore, an updated application form was submitted to the DEA on 27 September 2013. See **Appendix A-3** for further details, which include the cover letter, the delegation of authority letter from Eskom and an updated project schedule. The changes reflected in the updated application form were highlighted in yellow, for ease of reference. The DEA acknowledged receipt of the updated application form on 10 October 2013.

Letters were submitted to the DEA on 17 July 2014 and 7 October 2014 that requests for the extension of the validity period of the application to allow for the delays experienced in the compilation of the Final EIA Report. See **Appendix A-4** for further details.

6 ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

6.1 STUDY APPROACH

The EIA process is a planning and a decision-making tool that identifies the potential negative and positive impacts of the proposed 400kV Transmission substation and associate infrastructure for the Asteria Eskom MTS project. It also recommends ways to enhance the positive impacts and minimise the negative ones.

The environmental studies that were undertaken addressed the impacts associated with the Asteria Eskom MTS project and provided an assessment in terms of the biophysical, social, cultural-historic and economic environments. This will assist the DEA and Eskom in their decision-making regarding the implementation of the proposed Asteria Eskom MTS project.

The EIA process consists of three phases: the scoping phase, the impact assessment phase and the decision-making phase. The environmental assessment will be undertaken in compliance with the NEMA, specifically EIA Regulations (GN R543, 544, 545 and 546 of 18 June 2010, as amended). Cognisance has also been taken of related guideline documents and other relevant legislation. This section outlines the study approach taken to meet the legislative framework requirements as outlined in **Chapter 5** of this report.

6.2 SCOPING PHASE

Input from the technical team, I&APs and the authorities were considered and integrated in the Final SR. The purpose of the SR was to document all the issues that were identified during the Scoping Phase of the EIA process and the feedback from the PPP.

A **site visit** was undertaken on **26 and 27 June 2012**. The site visit was attended by the EAP project team, representatives from Eskom to provide technical input, and the Ecologist (Nick Helme) as the ecological aspects were identified at the outset to be of importance.

The formal application for environmental authorisation and a declaration of independence of the EAP were submitted to the DEA on 15 August 2012.

The specialists in the project team (**Table 2-1**) were appointed to undertake their own site visits and identify specialised issues at the outset. Their inputs were then included in the SR.

Prior to finalisation and submission to the DEA, the Draft SR was made available to the public for comment for a period of **40 calendar days** (excluding the period between 15 December 2012 and 2 January 2013 in terms of Section 1(3) of GN R543) from **29 November 2012** to **25 January 2013** to afford I&APs the opportunity to check that their comments and input have been accurately captured and correctly understood.

A Technical Specialists Workshop (**Chapter 6.4**) was undertaken on 6 February 2013, to determine the final inputs of the specialists into the Final SR. The workshop was also used to determine the scope of works for the specialist studies to be undertaken in the EIA phase.

6.3 PUBLIC PARTICIPATION PROCESS (SCOPING PHASE)

The PPP is an integral requirement of the NEMA. Under the supervision and guidance of the DEA, BKS recommends the PPP for the Asteria Eskom MTS project be in accordance with the requirements of Section 54 of the EIA Regulations (2010). This is due to the scale, nature and affected footprint of the Asteria Eskom MTS project.

The purpose of this initial PPP will be to inform the I&APs about the EIA process to be followed. This initial interaction with the I&APs would also include requesting their input into the manner in which the proposed PPP will be conducted.

6.3.1 Objectives and General Approach

The main objectives of the PPP are to:

- Inform identified I&APs of and provide sufficient background and technical information on the Asteria Eskom MTS project.
- Create networks and feedback mechanisms so I&APs could participate and raise their viewpoints (issues, comments and concerns) on the Asteria Eskom MTS project.
- Assist in identifying potential environmental (biophysical, cultural-historical, social and economic) impacts using on-the-ground information through the I&APs' available experience.

The PPP thus ensures that I&APs' views are reflected and considered by the Applicant. The approach to any PPP depends on the details of the project, as each project has a particular geographic and technical nature. Thus, the PPP should be structured accordingly. Where possible, and within the required statutory frameworks, such a process should be structured to address the needs of project-specific I&APs. All I&APs shall be given an equal opportunity to comment and raise any issues relating to the impact of the Asteria Eskom MTS project on the biophysical, social and economic environment.

6.3.2 Identification and Registration for I&APs Database

The following key stakeholders were identified for engagement on any issues that may transpire during the EIA process:

- Landowners and occupiers of land affected by the three alternative site locations of the proposed Asteria Eskom MTS.
- Western Cape Department of Environmental Affairs and Development Planning (DEA&DP), as the commenting authority.
- Regional Office of the Department of Water Affairs (DWA).
- National Department of Agriculture, Forestry and Fisheries (DAFF).
- South African Heritage Resources Agency (SAHRA) and the provincial office, Heritage Western Cape (HWC).
- The South African National Roads Authority Limited (SANRAL).
- Western Cape Department of Transport and Public Works (DoT).
- TWK LM (including Councillors).
- Cape Nature.

A database has been compiled and has been kept up to date throughout the EIA process as and when new stakeholders were identified. To date, there are 458 registered stakeholders. Refer to **Annexure 1 of Appendix B** for the full database.

6.3.3 Project Announcement Phase

Phase 1 of the PPP entailed the announcement of the project to the identified key stakeholders during the designated timeframe. The project was announced on **25 September 2012**. Consultations with I&APs and relevant stakeholders were according to the following methods (see **Appendix B** for further details):

- A **Background Information Document** (BID) was circulated to I&APs and stakeholders that registered and were identified for registration.
- **Advertisements** were placed in the main section of the following newspapers on Tuesday, 25 September 2012:
    - Cape Times; and
    - Theewaterskloof Gazette – English and Afrikaans versions.
- **106** e-mail notifications, registered mails and faxes (including several phone calls) on 25 September 2012.
- **Flyers** in English and Afrikaans were distributed in the study area.
- **Site notices** were placed at **12** strategic locations within the study area.
- A **public open day** was hosted on Thursday, 6 December 2012 from 17:00 – 19:00 at the Botrivier Advice & Development Centre (12 Fontein Street, Botrivier).

6.3.4 Draft Scoping Report Review

The purpose of the Draft SR is to enable the registered I&APs to verify that their contributions have been captured, understood and interpreted correctly. The Draft SR was available for review by registered I&APs from **29 November 2012 to 25 January 2013**. Advertisements were placed in the newspapers indicated above to announce the availability of the Draft SR for review on 22 November 2012.

I&APs were still allowed to register during this period. However, only the comments and issues raised up to 25 January 2013 were incorporated in the Final SR, for submission to the DEA. Comments and issues raised after the end date are taken into consideration during the EIA Phase.

I&APs commented on the Draft SR in various ways, such as completing the comment sheet, submitting individual comments in writing, by facsimile or by e-mail and through one-on-one discussions with members of the EIA team during meetings.

Some of the issues identified during the PPP undertaken to date included:

- The cumulative impact of the proposed Asteria Eskom MTS project on the proposed wind farms in the region and the related Distribution power lines that will link both infrastructures.
- The need for Traffic Impact Assessment study to determine traffic and transport engineering impacts related to the proposed toll booth on, as well as access to and from the R43.

- The need for a Town Planning Assessment to determine the applicability of the Land Use Planning Ordinance (No. 15 of 1985) (LUPO) process on the proposed Asteria Eskom MTS.
- The use of Xhosa translations for future correspondence and consultations with the public.
- The need for this EIA process to consider the existing electrical and road infrastructure within the study area.

6.3.5 Final Scoping Report Review

The SR was finalised based on the comments and issues raised during the review of the Draft SR. The Final SR was subsequently submitted to the DEA for their consideration and acceptance. Registered I&APs were also notified of the availability of the Final SR to ensure that the same information submitted to the DEA was made available to them. I&APs were provided with a period of 21 calendar days to review the Final SR from 13 March 2013 to 15 April 2013. Upon request by an I&AP, the comment period was extended to 30 calendar days. As such, the **revised timeframe to review the Final SR was extended to 22 April 2013**. This 30-day notification period excluded the coastal school holiday period from 28 March to 8 April 2013. Comments and issues that were raised by I&APs were then incorporated during the EIA Phase.

6.4 TECHNICAL SPECIALISTS WORKSHOP AND *AD HOC* INTERACTION

A Technical Specialists Workshop was held on 6 February 2013, after the specialists had undertaken scoping investigations to identify and describe potential issues and determine potential impacts.

The purpose of the Technical Specialists Workshop was to weigh the specialists' initial findings according to sensitivity and integrate these findings to determine which site alternative, layout alternative, LILO Transmission route alignment, and Distribution power line connection to the existing Houhoek Eskom Distribution Substation should be assessed in more detail during the EIA Phase.

Each specialist assigned a sensitivity rating to each alternative site for the Asteria Eskom MTS project, based on their visit to the site and their experience. Sensitivities were determined in terms of low, medium or high sensitivity of the development on the environment and the environment on the proposed development.

The following factors were also taken into account in allocating a significance impact rating to the proposed infrastructure:

- The following ecologically sensitive areas would be avoided, as far as practically possible:
  - Wetlands and stormwater dams.
  - Rivers and their floodplains.
  - Critical Biodiversity Areas (CBAs).
  - Nature Reserves.

- Specific criteria for freshwater ecosystems:
  - Encroachment into freshwater ecosystems and their recommended 50m buffer areas should be avoided as far as possible.
  - Where the crossing of rivers by infrastructure such as roads is necessary, this should be located at existing road crossings as far as possible.
  - Land that has already been substantially disturbed and/or transformed from its natural state (e.g. through long-term farming activities or prior infilling) should be targeted for the establishment of structures and infrastructure associated with the proposed development, as far as possible, because this would lower the risk of impacting on freshwater ecosystems that are in a good present ecological state.
  - Effective measures should be designed for the management of stormwater runoff from the substation and other hardened surfaces (including new roads), so as to minimise the hydrological changes to freshwater ecosystems in the study area as far as possible.
  - Provision should be made for the establishment of ecological corridors through the study area, which should be located and designed through a consultative process including all the biophysical specialists involved in the environmental assessment for the project.
- Existing power lines:
  - Other Eskom Transmission and Distribution power lines running parallel to a proposed alignment could be treated as a risk-reducing factor, or if the visual aspect is considered significant enough, should be treated as a high risk factor (to avoid cluttering of power lines together).
  - Existing power lines have to be crossed as perpendicular as possible and as close as possible to the lowest height between existing pylon towers (i.e. where the line sag is the lowest).
  - Due to the steep terrain for the LILO Route Corridors, only self-supporting towers can be used on this project. In addition, the span between towers will also be less than for towers on flatter terrain.
- Towns and industrial activity:
  - These are centres of human activity and are generally avoided by large power line sensitive bird species.
  - The presence of towns, settlements and industrial activity is therefore a risk-reducing factor from a bird collision, disturbance and habitat destruction perspective.
  - Formal and informal settlements, commercial and industrial activities need to be avoided, as far as practically possible.
- Agricultural lands and vineyards:
  - The integral value of vineyards and certain agricultural properties cannot be discarded as there could be a loss of production within its respective industry.
  - Consideration will also be carried out of existing *vis-à-vis* potential future agricultural potential of the proposed Site Alternatives being considered.

Through Eskom's technical inputs, and the inputs of the various specialists, site alternatives were dismissed during the Scoping Phase, and particular site location and layouts were taken into the EIA phase, for further analysis and assessment. In addition, the corridors for the LILO 400kV Transmission power lines and the 132kV Distribution power lines were identified by optimally positioning to avoid sensitive areas, where practically possible. If it is determined that the impacts cannot be avoided, practical mitigation measures would be prescribed and listed in the EMPr to reduce the significance of the impacts.

Specialists were consulted on an ad hoc basis during the finalisation of the EIA Report. They were requested to re-consider their findings based on the adjustment of the size of the substation, the placement of the construction camp site and Eskom's proposed pylon positions. The results of their findings were captured in Addendum Reports, where applicable.

6.5 METHODOLOGY FOR SCOPING ALTERNATIVES ANALYSIS

Each substation site was assigned a rating that was calculated in terms of the physical extent and time scale described in **Table 6-1**.

The following specialist scoping studies were assigned a weighting of 2:

- The Freshwater Ecosystems Assessment. There are watercourses and associated 50 m buffer zones within the study area. Physical crossings of these watercourses would require a Water Use Licence Application as per the NWA. Impacts could be avoided by spanning watercourses and buffer zones.
- The Ecological Assessment. The study area is located close to the Houwhoek Nature Reserve. Depending on the location of the Asteria Eskom MTS, LILO Transmission and Distribution lines, the ecological functioning of the study area in relation to the Kogelberg Sandstone Fynbos vegetation type and rare and endangered Fynbos species, may require further preservation.
- The Social Impact Assessment. Wine estates in the region are dependent on tourism. The Bakenhoogte Olive Farm is potentially impacted by the LILO Transmission power lines. There is also additional infrastructure proposed in the region (i.e. widening of the R43 and toll gate on the N2). These issues may impact on the social fabric of Botrivier.
- The Visual Impact Assessment. The visual integrity of the Houwhoek Pass and the surrounding areas is documented in the region's planning documents. Electricity infrastructure must be assessed while considering the visual appeal of the study area and surrounds. The risk exists that the area becomes cluttered with power lines.
- The Town Planning Assessment. An SDF is in place and areas have been identified for industrial and residential expansion. The proposed development could have an impact on the current and future land use planning of the TWK LM and the Overberg District Municipality.

These specialist studies were assigned a weighting of 1:

- The Geotechnical Assessment.
- The Soil and Agricultural Assessment.
- The Avifauna Assessment.

- The Heritage Impact Assessment.
- The Traffic Impact Assessment.

Table 6-1: Route Alignment Significance Rating

SIGNIFICANCE	DESCRIPTION	SPECIALIST RATING	AVERAGE SIGNIFICANCE
Low	The impacts are less important. Some mitigation is required to reduce the negative impacts.	1	0.5 – 1.4
Medium	The impacts are important and require attention. Mitigation is required to reduce the negative impacts.	2	1.5 – 2.4
High	The impacts are of high importance. Mitigation is essential to reduce the negative impacts.	3	2.5>

A summary of the sensitivities of each specialist study during the scoping phase is shown in **Table 6-2**.

Table 6-2: Scoping Phase Summary of Sensitivities Identified by each Specialist Study

	Ecological Assessment	Freshwater Ecosystem Assessment	Avifauna Assessment	Soil & Agricultural Potential Assessment	Social Impact Assessment	Visual Impact Assessment	Geotechnical Assessment	Heritage Impact Assessment	Traffic Impact Assessment	Town Planning Assessment	TOTAL	AVERAGE	WEIGHTED TOTAL	WEIGHTED AVERAGE
WEIGHTING	**2**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**1**	**2**				
Substation 1 Layout 1	1	1	1	2	2	2	2	1	2	2	**16**	**1.6**	**24**	**2.4**
Substation 1 Layout 2	1	2	1	2	2	2	2	1	1	2	**16**	**1.6**	**25**	**2.5**
Substation 2 Layout 1	2	1	2	1	2	3	3	1	3	2	**20**	**2.0**	**30**	**3.0**
Substation 3 Layout 1	3	1	2	2	3	3	2	1	1	3	**21**	**2.1**	**34**	**3.4**
Substation 3 Layout 2	3	1	2	2	3	3	2	1	1	3	**21**	**2.1**	**34**	**3.4**

6.6 RESULTS OF THE SCOPING PROCESS

Eskom's Transmission and Distribution divisions' project team members were consulted for technical details about the proposed Asteria Eskom MTS project. The results of the Technical

Specialists Workshop (see **Chapter 6.4**) and the various consultations, the following were decided at the end of the scoping process, which is also shown in **Figure 4-1**:

- Site Alternative 1:
  - A slightly modified Alternative Layout 1 (to allow for the R43 widening and construction of the toll booth);
  - Alternative Layout 3 was proposed to allow for easier technical access of the Distribution power line from the existing Houhoek Eskom Distribution Substation to the proposed new Asteria Eskom MTS; and to avoid the modification and/or crossing of the drainage line by the substation platform and access road.
- The route corridors for the 400kV Transmission LILO power lines would have to cater for 2 x 400kV Transmission power lines with a combined servitude width of 110m and are proposed as follows:
  - **LILO 1:** a servitude corridor width of 250m was considered to allow for placement of the LILO power line either adjacent to the existing power lines or away from the existing power lines (to reduce the visual impact caused by cluttering of power lines).
  - **LILO 2:** a servitude width of 150m was considered to allow Eskom sufficient flexibility to avoid existing water and sewage infrastructure (i.e. pump station and reservoir) and the widening of the R43.
  - **LILO 3:** a servitude width of 150m was considered. This alignment was included in the study as it would result in lesser cross-overs of existing power lines.

A more detailed description is provided in **Chapter 4.4** above.

6.7 Environmental Impact Assessment Phase

The EIA for the Asteria Eskom MTS project is being conducted in accordance with the process described in regulation 26 to 35 of the EIA Regulations (GN R543 of 18 June 2010, as amended) promulgated in terms of section 24(5) of the NEMA. BKS is responsible for the processing and collation of information from the specialist reports, including the issues raised from the PPP.

6.8 Methodology of Specialist Studies

The specialist studies were undertaken in compliance with regulation 32(3) of the EIA Regulations (GN R543 of 18 June 2010, as amended), and include:

a. details of:
   i. the person who prepared the report; and
   ii. the expertise of that person to carry out the specialist study or specialised process;
b. a signed declaration that the person is independent in a form as may be specified by the competent authority;
c. an indication of the scope of, and the purpose for which, the report was prepared;
d. a description of the methodology adopted in preparing the report or carrying out the specialised process;
e. a description of any assumptions made and any uncertainties or gaps in knowledge;

f. a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment;
g. recommendations in respect of any mitigation measures that should be considered by the Applicant and the competent authority;
h. a description of any consultation process that was undertaken during the course of carrying out the study;
i. a summary and copies of any comments that were received during any consultation process; and
j. any other information requested by the competent authority.

The following specialist studies were undertaken for the EIA Phase:

- Geotechnical Assessment by Dirk van Rooyen (Geotechnics Africa).
- Soil and Agricultural Potential Assessment by Garry Paterson (Institute of Soil, Climate and Water of the Agricultural Research Council).
- Freshwater Ecosystems Assessment (including wetlands, dams and rivers) by Dean Ollis (The Freshwater Consulting Group).
- Ecological Assessment by Nick Helme (Nick Helme Botanical Surveys).
- Avifauna Assessment by Chris van Rooyen (Chris van Rooyen Consulting).
- Social Impact Assessment by Ingrid Snyman (Ingrid Snyman Development Consultants).
- Town Planning Assessment by Nina Otto (AECOM SA).
- Visual Assessment by Stephen Stead (VRM Africa).
- Heritage Assessment by Tim Hart (Archaeological Contracts Office, University of Cape Town).
- Traffic Assessment by Colin Tichauer (AECOM SA).

Competency descriptions of the abovementioned specialists have been provided in **Chapter 2** above.

6.8.1 Terms of Reference: Geotechnical Investigation

A Geotechnical Investigation (**Appendix E-1**) was undertaken by Mr Dirk van Rooyen of Geotechnics Africa Western Cape. The methodology of the Geotechnical Investigation used for this process is described in this section.

The purpose of the investigation was to provide technical advice on:

- The expected bedrock geology and soil cover within the study area, based on the available data.
- Recommendations on the foundation trench stability, founding masts and poles, and seismicity.
- Information on excavation potential together with the presence of active soil layers and any slope stability problems.

The nature of the investigation entailed:

- Investigation of the available information and the interpretation off the Google Earth images from the study area.
- Site visit to assess the broad study area, surface conditions and an inspection of existing excavations on and surrounding the alternative sites.

- Photographs were taken of relevant surface features.

6.8.2 Terms of Reference: Soil and Agricultural Potential Assessment

The Soil and Agricultural Potential Assessment (**Appendix E-2**) was undertaken by Mr Garry Paterson of the Agricultural Research Council. The methodology of the Soil & Agricultural Potential Assessment for this process is described in this section.

A desktop study was undertaken to establish the nature of the available soils information. The land type information, at a scale of 1: 250 000, from the 3319 Worcester map (ARC, 1985) and the unpublished Soil Association Map of the Western Cape (ARC, 1979), also at a scale of 1: 250 000, was used.

Based on this available soil information, the soils with comparable physical and morphological properties were grouped together into seven broad soil association groups (see **Table 6-3**). Soil information, gathered from a soil survey of the farm Keerweer, Botrivier (Lampbrechts, et al., 1992) was also used.

Table 6-3: Preliminary soil map units (according to Soil Classification Working Group, 1991)

MAP UNITS	GENERAL DESCRIPTION	EFFECTIVE DEPTH
Cf 1	Soil / Rock complex. Shallow, coarse textured soils on sandstone (Cartref and Mispah soil forms), with rock outcrops	< 300mm
Cf 2	Coarse textured, gravelly and stony, lithosolic and podzolic soil association (Cartref, Houwhoek, Lamotte, Concordia and subdominant Kroonstad and Fernwood soil forms))	600mm – 900mm
Ct 1	Poorly-drained, coarse textured sandy soils (Constantia, Lamotte, Fernwood and Concordia soil forms)	600mm – 1 200mm
Es 1	Duplex soils; poorly-drained, coarse textured, gravelly topsoil abruptly overlying dense prismatic structured clay (Estcourt, Cartref, Kroonstad soil forms)	300mm – 600mm
Es 2	Duplex soils ; poorly-drained, fine to coarse textured, gravelly and stony topsoil abruptly overlying dense prismatic structured clay (Estcourt, Kroonstad soil forms)	600mm – 700mm
Pn 1	Poorly-drained, coarse textured, gravelly, yellow and grey sandy topsoil with hydromorphic subsoil (Pinedene, Avalon and Kroonstad soil forms)	600mm – 700mm
Ss 1	Duplex soils; poorly-drained, fine to medium-textured, gravelly topsoil abruptly overlying dense prismatic structured clay (Sterkspruit and Estcourt soil forms)	300mm – 600mm

The soil information was considered in terms of the agricultural potential, specifically in terms of the existing agricultural land uses in the wider area, and the potential lost. This information was then plotted on a GIS format map and integrated into the EIA Report.

6.8.3 Terms of Reference: Freshwater Ecosystems Assessment

The Freshwater Ecosystems Assessment (**Appendix E-3**) was undertaken by Mr Dean Ollis of the Freshwater Consulting Group. The methodology of the Freshwater Ecosystems Assessment for this process is described in this section.

a) Identification and Classification of Rivers and Wetlands

Relevant existing maps, GIS covers, aerial photographs and satellite images were examined to inform the preliminary desktop assessment of freshwater ecosystems (rivers and wetlands) present on and immediately adjacent to the site.

The initial desktop assessment was followed by a site visit on 16 November 2012 during which the presence of the preliminary-mapped rivers and wetlands was ground-truthed and any additional freshwater ecosystems were mapped using handheld GPS. The presence of wetlands (see box below) was assessed on the basis of landscape setting, vegetation and soil moisture characteristics, using a soil auger to check the soil for signs of hydromorphism at selected points. As **no wetlands were found on-site**, further assessment of wetlands is not included in this EIA report.

Wetland Definition

The definition of "wetland" that has been adopted for this investigation is that of the National Water Act (No. 36 of 1998), whereby a wetland is defined as "land which is transitional between terrestrial and aquatic systems, where the water table is usually at, or near the surface, or the land is periodically covered with shallow water and which land in normal circumstances supports, or would support, vegetation adapted to life in saturated soil." The prolonged presence of water is a fundamental feature of wetlands because of its driving influence on the soil characteristics and the plant and animal species composition associated with these areas. Any part of the landscape where water accumulates for long enough and often enough to influence the plants, animals and soils occurring in that area is thus considered to be a wetland according to the National Water Act definition thereof (DWAF, 2005).

A further site visit was conducted on 1 March 2013 whereby certain areas that were not visited in November 2012 due to access constraints were assessed in the field so as to conclude the ground-truthing process for the freshwater ecosystem map.

A wetland sensitivity map was compiled with the following scope and provides the baseline conditions for the Freshwater Ecosystems Assessment during the EIA phase:

- The boundary of the study area ('corridor' as referred to in **Figure 3-9**) and the proposed substation layouts were overlaid as GIS shapefiles onto existing geo-referenced 1:10,000 scale aerial photographs of the area obtained from Chief Directorate: National Geo-spatial Information.
- Currently mapped rivers (perennial and non-perennial), as shown on the 1:50,000 scale digital map layer for rivers obtained from Chief Directorate: National Geo-spatial Information (map sheet 3419AA), were overlaid onto the GIS map. A 50m wide 'no-go' buffer zone were allocated to rivers in the study area that fall within a Protected Area (e.g. a formal nature reserve) or a terrestrial Critical Biodiversity Area (CBA), according to the Overberg CBA Map (Holness & Bradshaw, 2010)[3].

3 Most of the land within the study area is categorised as a Protected Area or terrestrial CBA on the Overberg CBA Map

- Currently mapped dams, as shown on the 1:50 000 scale digital map layer for 'Inland Water Areas' obtained from Chief Directorate: National Geo-spatial Information (map sheet 3419AA), were overlaid onto the GIS map.
- Wetlands mapped by the NFEPA project were overlaid onto the GIS map of the area. Two categories were distinguished in the map legend, namely FEPA wetlands and non-priority wetlands. Following (Driver, *et al.*, 2011), a 100m wide 'no-go' buffer zone was allocated to all FEPA wetlands in the study area.
- Critical Biodiversity Areas and Protected Areas, as shown on the CBA map for the ODM (Holness & Bradshaw, 2010), were intersected with the existing wetlands layer for the Overberg (mapped by Nancy Job as part of the CAPE Fine-Scale Biodiversity Planning project) in order to identify wetlands occurring in areas of high conservation importance, thus warranting specific protection. A 50m wide 'no-go' buffer zone was allocated to these wetlands, given their ecological importance.
- Recent colour aerial photographs (from Chief Directorate: National Geo-spatial Information) and Google Earth satellite images of the site were examined, to ascertain whether any visible signs of wetland presence would be discernible in the study area. Additional aquatic ecosystems in the study area were manually digitised using GIS software, based on visual cues in the background imagery.
- The study area for the proposed LILO power lines and the development footprint of each of the proposed substation sites were overlaid onto the GIS map.

b) Categorisation of the Present Ecological State and the Ecological Importance and Sensitivity of Rivers

The present ecological state of the potentially impacted river sketches was determined using the IHI method (DWAF, 1999), which provides an Ecological Category from A to F (**Table 6-4**). The ecological importance and sensitivity of these river stretches was determined using a method developed by DWAF (1999), which provides a rating of Very High, High, Moderate, or Low/Marginal (**Table 6-5**). Detailed descriptions of these methods are provided in the Freshwater Ecosystems Assessment (**Appendix E-3**).

Table 6-4: Habitat Integrity (Present Ecological State) categories (DWAF, 1999)

ECOLOGICAL CATEGORY	PES % SCORE	DESCRIPTION
A	90-100	Unmodified, natural.
B	80-90	**Largely natural with few modifications.** A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	60-80	**Moderately modified.** Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	40-60	**Largely modified.** A large loss of natural habitat, biota and basic ecosystem functions has occurred.
E	20-40	**Seriously modified.** The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	1-20	**Critically / Extremely modified.** Modifications have reached a critical level and the system has been modified completely with an almost

		complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

Table 6-5: Ecological Importance & Sensitivity categories (DWAF, 1999)

EI&S CATEGORY	DESCRIPTION
Very High	Quarternaries/delineations that are considered to be unique on a national or even international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.
High	Quarternaries/delineations that are considered to be unique on a national scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases, may have a substantial capacity for use.
Moderate	Quarternaries/delineations that are considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually not very sensitive to flow modifications and often have a substantial capacity for use.
Low/Marginal	Quarternaries/delineations that are not unique at any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have a substantial capacity for use.

6.8.4 Terms of Reference: Ecological Assessment

The Ecological Assessment (**Appendix E-4**) was undertaken by Mr Nick Helme of Nick Helme Botanical Surveys. The methodology of the Ecological Assessment for this process is described in this section.

The following standard terms of reference for biodiversity specialists was followed, as recommended by Cape Nature, and includes:

- Produce a baseline analysis of the ecological attributes (vegetation and terrestrial fauna only) of the study areas as a whole.
- This report should clearly indicate any constraints that would need to be taken into account in considering the development proposals further.
- This report must include a map of the identified ecologically sensitive areas as well as indications of important constraints on the property. It must also:
    - Describe the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

- In terms of biodiversity pattern, identify or describe:

  Community and ecosystem level

  - The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography.
  - The types of plant and animal communities that occur in the vicinity of the site.
  - Threatened or vulnerable ecosystems (*cf. DEA 2011/SA vegetation map/National Spatial Biodiversity Assessment,* etc.).

  Species level

  - Plant and terrestrial faunal Species of Conservation Concern (SCC) – provide location if possible.
  - The viability and estimated population size of the SCC that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High confidence = 70%-100%, Medium confidence = 40%-70%, Low confidence 0%-40%).
  - The likelihood of other SCC occurring on the site (include degree of confidence).

  Other pattern issues

  - Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
  - The extents of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
  - The condition of the site in terms of current or previous land uses.

- In terms of biodiversity process, identify or describe:

  - The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
  - Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. “corridors” such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and “vegetation boundaries” such as edaphic interfaces, upland-lowland interfaces or biome boundaries).
  - Any possible changes in key processes, e.g. increased fire frequency or drainage / artificial recharge of aquatic systems.

- What is the significance of the potential impact – with and without mitigation – of the proposed Asteria Eskom MTS project on biodiversity pattern and process at the site, landscape, and regional scales?
- Provide a map, at suitable scale, of key conservation areas and corridors.
- Recommend actions that should be taken to prevent or mitigate impacts. Indicate how these should be scheduled to ensure long-term protection, management and restoration of affected ecosystems and biodiversity.

- Indicate limitations and assumptions, particularly in relation to seasonality.

The avifauna (**Chapter 6.8.5**) and wetland (**Chapter 6.8.3**) components to biodiversity were excluded from the Ecological Assessment as these components are covered in these respective specialist studies.

6.8.5 Terms of Reference: Avifauna Assessment

The Avifauna Assessment (**Appendix E-5**) was undertaken by Mr Chris van Rooyen of Chris van Rooyen Consulting. The methodology of the Avifauna Assessment for this process is described in this section.

The following information sources were consulted to conduct the Avifauna Assessment:

- Bird distribution data of the Southern African Bird Atlas Project 2 (SABAP2) (Animal Demography Unit, 2013) was obtained for the QDGC (the equivalent of a 1:50 000 topo-cadastral map) where the proposed infrastructure was located, namely 3419AA.
- The conservation status of all species considered likely to occur in the area was determined as per the most recent iteration of the southern African Red Data list for birds (Barnes, 2000), and the most recent and comprehensive summary of southern African bird biology (Hockey, *et al.*, 2005).
- The author has travelled and worked extensively on power line projects in the Western Cape Province since 1996, and since 2010, also on renewable energy projects, including the proposed Langhoogte wind energy facility, which is situated approximately 7km east of the current study area. Personal observations of avifauna and bird/habitat associations have therefore also been used to supplement the data that is available from SABAP2.
- The power line bird mortality incident database of the Eskom – Endangered Wildlife Trust Strategic Partnership (1996 to 2007) was consulted to determine which of the species occurring in the study area are typically impacted upon by power lines and the extent to which they are impacted on (Jenkins, *et al.*, 2010) (van Rooyen, 2007).
- A classification of the vegetation types in the 3419AA QDGC was obtained from the Southern African Bird Atlas Project 1 (SABAP1, (Harrison, *et al.*, 1997)), and the Vegetation Map of South Africa (Mucina & Rutherford, 2006).
- Information on the micro habitat level was obtained through visiting the area and obtaining a first-hand perspective. Micro habitats were identified using a combination of ornithological and ecological experience of avifaunal/habitat associations in the region.
- Rob Martin, local bird expert with 40 years' experience of birding in the Western Cape, was consulted on the habitat requirements of specific Red Data species recorded in 3419AA, and to obtain the location of existing raptor nests in the vicinity of the study area.
- A second site visit was conducted in February 2013 by Jessie Walton, local bird expert with 20 years' experience of birding in the Western Cape on behalf of Chris van Rooyen to further investigate the dam located at Site Alternative 3 (since dismissed for further analysis in this EIA Report), and to investigate potential raptor breeding activity at the potential substation site alternatives.

6.8.6 Terms of Reference: Social Impact Assessment

The Social Impact Assessment (SIA) (**Appendix E-6**) was undertaken by Mrs Ingrid Snyman of Ingrid Snyman Development Consultants. The methodology of the SIA is described in this section. A site visit was undertaken during January 2013 to enable the consultant to familiarise herself with the area and the social characteristics of the receiving environment.

a) Literature Review, Analysis and Desktop Studies

The literature review and desktop studies assisted the consultants in establishing the social setting and characteristics of the study area, as well as the key economic activities.

b) Data Gathering

Primary data assisted the consultants in establishing the social setting and characteristics of the study area, as well as the key economic activities.

Secondary data, which was not originally generated for the specific purpose of the study, were gathered and analysed for the purposes of the study. Such data included the census data, project maps, local histories, planning documentation such as the draft Integrated Development Plans (IDP) and Strategic Development Frameworks (SDF) of the TWK LM and Overberg District Municipality

Interviewing of 'key' persons formed part of the research process. For a list of those individuals consulted refer to the SIA report (**Appendix E-6**).

Information gathered and social issues identified and verified during the PPP (focused on the host community) undertaken as part of the Scoping and EIA Phases, also served as key input to the social assessment.

c) Profiling

Profiling serves to build on information generated during the Scoping phase. It involves a description of the social characteristics and history of the area being assessed, an analysis of demographic data, changes in the local population, and the land use pattern in the study area, as well as any other significant developments in the area and thus social character over time. The profiling process is a combination of secondary and primary research, site visits, and consultation. This could include information on:

- Historical background;
- Social characteristics;
- Culture, attitudes and socio-psychological conditions;
- Population characteristics;
- Community and institutional structures;
- Community resources; and
- Broad economic impacts.

The broad profiling will typically include descriptions regarding the following:

- The social trends and current conditions;
- The land use in the area;
- The demographical profile and social characteristics of the host community;
- Other potential developments in the area;

- The local and regional economy; and
- Potential economic links between the proposed project and its environs.

d) Projection and Estimation of Effects

A baseline assessment indicates the current reality in the social and related aspects of the affected environment. A baseline assessment is necessary to enable a logical and theoretically sound analysis of social impacts. It forms part of the process of identifying important cause-and-effect relationships and a comparative framework for anticipated changes and impacts. The output of this phase is the impact matrix and mitigation measures.

e) Variables

The following variables are typically assessed (Burdge, 1995) as part of the SIA:

- Population impacts;
- Community/institutional arrangements;
- Conflicts between local residents and newcomers;
- Individual and Family level impacts;
- Community infrastructure needs; and
- Intrusion impacts.

For assessing the impacts associated with the proposed project, the above variables were adapted to allow the assessment of the full range of social impacts relevant to the specific project. These variables would relate to the construction and operational phases of the proposed project.

f) Significance Criteria

During the EIA Phase, the anticipated social impacts were rated according to the rating approach specified by the EAP. The criteria used for the assessment of the potential impacts of the Asteria Eskom MTS project are described in detail in **Chapter 8**.

6.8.7 Terms of Reference: Town Planning Assessment

The Town Planning Assessment (**Appendix E-7**) was undertaken by Ms Nina Otto of AECOM SA. The methodology of the Town Planning Assessment is described in this section.

All the proposed site alternatives fall within the Integrated Zoning Scheme Regulations (2011) of the TWK LM, and would have to be rezoned to “Authority” zoning and “Utility” use as a primary use for the proposed Asteria Eskom MTS project. The rezoning process is described in detail in **Chapter 6.14.2**.

6.8.8 Terms of Reference: Visual Impact Assessment

The Visual Impact Assessment (VIA) (**Appendix E-8**) was undertaken by Mr Stephen Stead of VRM Africa. The methodology of the VIA is described in this section.

The process that VRM Africa follows when undertaking a VIA is based on the United States Bureau of Land Management‘s (BLM) Visual Resource Management method (**Figure 6-1**). This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using a standard assessment criteria and involves the measurement of contrast in the form, line, texture and colour of the proposed landscape

modification brought about by a project, against the same elements found in the existing natural landscape.

The first step in the VIA process is determining the existing landscape context. A regional landscape survey is undertaken, which identifies defining landscape features that surround the site of the Asteria Eskom MTS project, and sets the scene for the VIA process to follow. These features, also referred to as visual issues, are assessed for their scenic quality/ worth. A VIA also assesses to what degree people, who make use of these locations (e.g. a nearby holiday resort), would be sensitive to change(s) in their views, brought about by the Asteria Eskom MTS project. *(Assessment undertaken up to this point falls within the ambit of the field study.)*

These people are referred to as receptors and are identified early on in the VIA process. Only those sensitive receptors who qualify as Key Observation Points (KOPs) by applying certain criteria, are used to measure the amount of contrast generated by changes caused by project activities, against the existing landscape (i.e. visual impact).

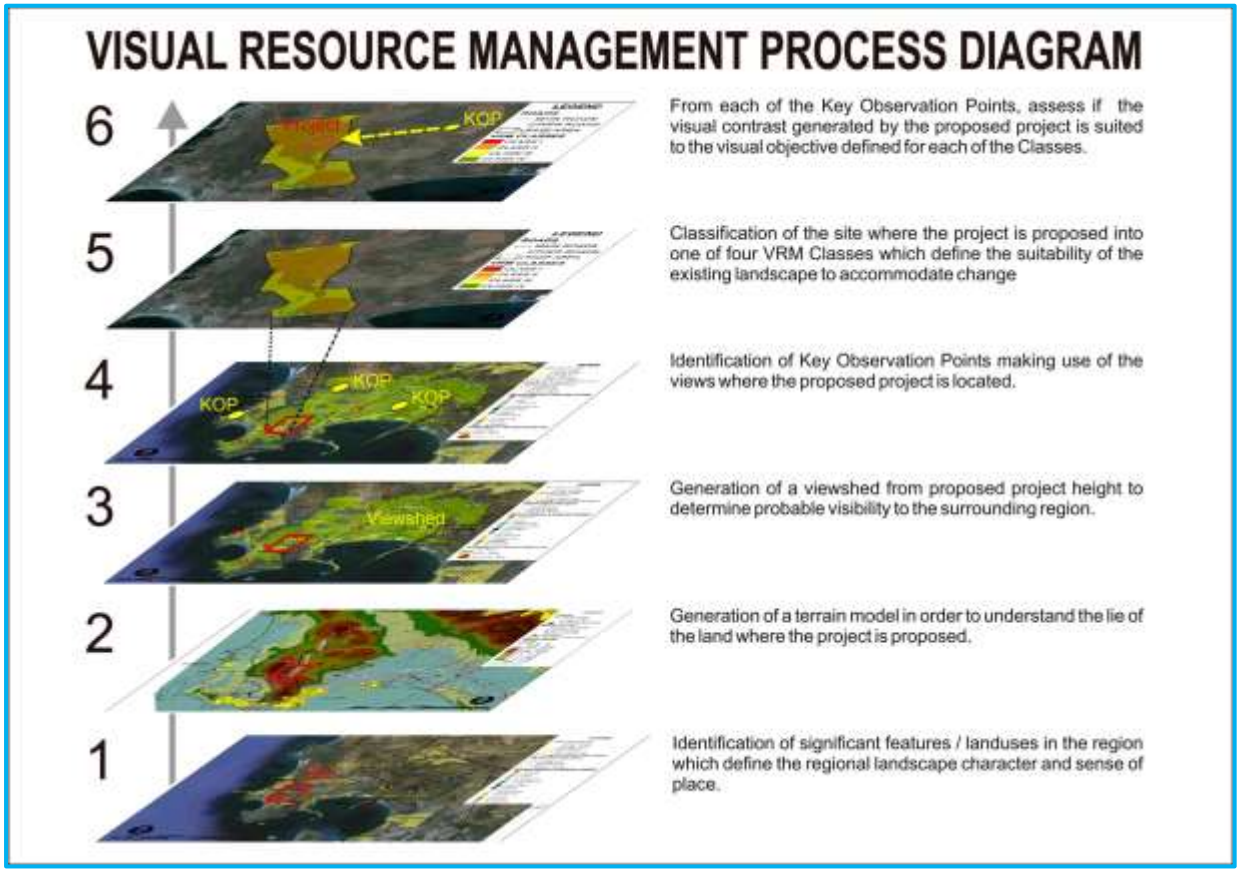


Figure 6-1: VRM Africa's Process Diagram

The landscape character of the Asteria Eskom MTS project site is then surveyed to identify areas of similar land use and landscape character. These areas are evaluated in terms of scenic quality (landscape significance) and receptor sensitivity to landscape change (of the site) in order to define the visual objective for the project site. The overall objective is to maintain a landscape's integrity, but this can be achieved at varying levels, called VRM Classes, depending on various factors, including the visual absorption capacity of a site (i.e., how much of the project would be "absorbed" or "disappear", into the landscape). The

areas identified on-site are categorised into these classes by using a matrix developed by BLM Visual Resource Management, which is then represented in a visual sensitivity map.

Landscapes are subdivided into three distance zones based on relative visibility from travel routes or observation points. Proximity to surrounding receptors is evaluated in terms of these distance buffers: foreground zone is less than 6km, background zone is from 6 to 24km, and seldom seen has no receptors. Viewshed maps are generated that indicate the overall area where the project activities would be visible, and in which distance buffer zone the receptors fall.

The Asteria Eskom MTS project activities are then finally assessed from the KOPs around the site to see whether the visual objectives (VRM Classes) defined for the site, are met in terms of measuring the potential change to the site's form, line, colour and texture visual elements, as a result of the Asteria Eskom MTS project(i.e. are the expected changes within acceptable parameters to ensure that the visual character of the landscape is kept intact and, if not, what can be done by the project to ensure that it is). Photo montages are generated to represent the expected change in the views, as seen from each KOP and, if class objectives are not met, to also show how proposed mitigation measures could improve the same views.

Using the impact assessment method provided by the EAP, each project activity is then assessed for its visual impact. This is based on the contrast rating which was undertaken from each of the surrounding receptors on whether the proposed activities meet the recommended visual objectives defined, to protect the landscape character of the area. Recommendations are made and mitigations are provided.

It is reaffirmed that a VIA will be undertaken to address the potential change to the landscape character. The following receptor points need to be included in the impact assessment as the proposed project is located in their close proximity and the potential exists for a change in landscape character:

- Houwhoek Nature Reserve.
- Adjacent farmsteads and tourist destinations i.e. the Bakenhoogte Olive Farm.
- The town of Botrivier.
- Travellers along the R43.
- Travellers along the N2.

The following issues will be considered in further studies on the project:

- **Impact Assessment:** The substation and power lines will be assessed in terms of the potential visual impact they could have on the surrounding sense of place and landscape character.
- **Cumulative Impacts:** A cumulative impact, in relation to an activity, is the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts arising from similar or other activities in the area. The possible cumulative impacts of this project will be considered as much as possible.

a) Contrast Rating and Photo Montages

The assessment of the Degree of Contrast (DoC) is a systematic process undertaken from Key Observation Points (KOPs) surrounding the project site, and is used to evaluate the potential visual impacts associated with the proposed landscape modifications.

The suitability of landscape modification is assessed by measuring the DoC of the proposed landscape modification to the existing contrast created by the existing landscape taking the visual objectives defined for the sites into consideration. This is done by evaluating the level of change to the existing landscape in terms of the line, colour, texture and form. The following criteria were used in defining the DoC for each KOP (Bureau of Land Management, 2004):

- None: The element contrast is not visible or perceived.
- Weak: The element contrast can be seen but does not attract attention.
- Moderate: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- Strong: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

As an example, in a Class I area, the visual objective is to preserve the existing character of the landscape, and the resultant contrast to the existing landscape should not be notable to the casual observer and cannot attract attention as seen from the KOP. In a Class IV area example, the objective is to provide for management activities which allow for major modifications of the existing character of the landscape. Based on whether the VRM objectives are met, mitigations (if required) are defined to avoid, reduce or mitigate the proposed landscape modifications so that the visual impact does not detract from the surrounding landscape character. The status of each of the proposed landscape modification achieving the predefined visual objective is used to inform the environmental impact rating criteria (**Chapter 8**).

As a component in this contrast rating process, visual representation, such as photo montages are vital in large-scale modifications, as this serves to inform I&APs and decision-making authorities of the nature and extent of the impact associated with the proposed Asteria Eskom MTS project. There is an ethical obligation in this process, as visualisation can be misleading if not undertaken ethically. In terms of adhering to standards for ethical representation of landscape modifications, VRM Africa subscribes to the Proposed Interim Code of Ethics for Landscape Visualisation developed by the Collaborative for Advanced Landscape Planning (CALP) (Sheppard, 2005). (See Annexure 3 in **Appendix E-8** for further details) This code states that professional presenters of realistic landscape visualisations are responsible for promoting full understanding of proposed landscape changes, providing an honest and neutral visual representation of the expected landscape, by seeking to avoid bias in responses and demonstrating the legitimacy of the visualisation process. Presenters of landscape visualisations should adhere to the principles of:

- Access to Information
- Accuracy
- Legitimacy

- Representativeness
- Visual Clarity
- Interest

To understand the 3D footprint of the proposed landscape modifications, VRMA makes use of Google Earth.

6.8.9 Terms of Reference: Heritage Impact Assessment

The Heritage Impact Assessment (HIA) (**Appendix E-9**) was undertaken by Mr Tim Hart from Archaeological Contracts Office of the University of Cape Town.

Site inspections were made to all three alternative substation sites at the scoping phase, while two further visits were made to inspect the proposed power line routes LILO 1-3 during the EIA phase of the project. Alternative substation sites 2 and 3 were eliminated during the scoping studies as being unsuitable for the proposed activity. Substation Site Alternative 1 (layouts 1 and 3) were assessed for purposes of the EIA. Published sources were utilised for background information. All the EIA team specialists had the opportunity to pool and compare their findings at a project integration workshop after completion of the scoping phase (**Chapter 6.4**).

In terms of impacts to cultural landscape, the study found that there were no significant historic receptors within range of impact of the proposed activity. Beyond the realm of heritage, visual impacts are a serious concern as the study area is crossed by an important tourist route and is the gateway to the scenic Overberg region. ACO has held joint site meetings with Mr Stead (visual consultant of VRM Africa) to exchange thoughts on this aspect of the work. Photomontages are presented in the VIA (**Appendix E-8**).

a) Landscape grading

The HWC requires the grading of landscapes as the NHRA protects areas that are considered aesthetically important to a community. The process for the grading of landscapes is as follows:

Landscapes are heritage resources of national or regional or local importance in terms of rarity and representivity. The UNESCO Operational Guidelines for the World Heritage Convention (1995) identified three main types of cultural landscapes derived from the following characteristics:

- The **clearly defined landscape** designed and created intentionally. This embraces garden and parkland landscapes constructed for aesthetic reasons.
- The **organically evolved landscape**. This results from an initial social, economic, administrative and/or religious imperative and has developed its present form by association with and in response to its natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories:
    - A **relict (or fossil) landscape** is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.

- A **continuing landscape** is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.

- The **associative cultural landscape** included by virtue of the powerful religious, artistic or cultural associations of the natural element rather than material cultural evidence which may be insignificant or even absent (Extract from paragraph 39 of the Landscape Operational Guidelines for the Implementation of the World Heritage Convention).

Also criteria that have been considered (Baumann, *et al.*, 2005) locally are:

- **Design quality:** The landscape should represent a particular artistic or creative achievement or represent a particular approach to landscape design.
- **Scenic quality:** The landscape should be of high scenic quality, with pleasing, dramatic or vivid patterns and combinations of landscape features, and important aesthetic or intangible qualities (vividness, intactness, unity).
- **Unspoilt character/authenticity/integrity:** The landscape should be unspoilt, without visually intrusive urban, agricultural or industrial development or infrastructure. It should thus reveal a degree of integrity and intactness.
- **Sense of place:** The landscape should have a distinctive and representative character, including topographic and visual unity and harmony.
- **Harmony with nature:** The landscape should demonstrate a good example of the harmonious interaction between people and nature, based on sustainable land use practices.
- **Cultural tradition:** The landscape should bear testimony to a cultural tradition which might have disappeared or which illustrates a significant stage in history or which is a good example of traditional human settlement or land use which is representative of a culture/s.
- **Living traditions:** The landscape should be directly and tangibly associated with events or living traditions with ideas or with beliefs, with artistic and literary works of high significance.

6.8.10 Terms of Reference: Traffic Impact Assessment

The Traffic Impact Assessment (TIA) (**Appendix E-10**) was undertaken by Mr Colin Tichauer from AECOM SA (Pty) Ltd. The methodology followed in the preparation of this report was:

- Obtain the future road network improvement planning
- Site visit
- Evaluation of each of the potential sites using the future road network improvements planning and observation from the site visit
- Preparation of the report

The DoT was already approached during the Scoping Phase to obtain information relating to the widening of the R43 and the upgrade/tolling of the N2. During the EIA phase, the future road network improvement planning was assessed as per the assessment methodology for the EIA process (**Chapter** 8).

6.9 EIA REPORT

Once the specialist investigations were completed and the findings and recommendations were integrated by the team, this EIA Report was compiled according to GN R543, Section 31(2) and includes:

- A description of the EAP that prepared the report.
- A detailed description of the proposed activity.
- A description of the properties affected by the Asteria Eskom MTS and the LILO route alignments of the respective power lines.
- A description of the environment that may be affected.
- A description of the PPP that was undertaken during the EIA Phase.
- A description of the need and desirability of the project and details of the alternatives that were investigated.
- Findings and recommendations of the specialist studies and EAP.
- An indication of the methodology used to identify the significance of impacts.
- A comparative assessment of all viable alternatives (including the no-go alternative).
- A summary of the findings and recommendations of each specialist study report.
- A description of all environmental issues that were identified, an assessment of the significance of each issue and an indication of the extent to which the issue could be mitigated.
- An assessment of each potentially significant impact identified in the Scoping Phase.
- An opinion on whether the activity should be authorised or not and, if it should be authorised, any conditions that should be made in respect of the authorisation.
- An Environmental Impact Statement.
- A Site-Specific Draft Environmental Management Programme (EMPr) for the construction, operation and maintenance of the proposed activity.

6.10 SITE-SPECIFIC ENVIRONMENTAL MANAGEMENT PROGRAMME

A Site-Specific Draft EMPr (**Appendix G**) is included as part of this EIA Report. The recommended layout for the Asteria Eskom MTS and the recommended LILO corridor will require that a thorough management plan be prepared, with a focus on the issues identified during the EIA process. The Site-Specific Draft EMPr was compiled for the location of the proposed Asteria Eskom MTS project. However, pylon positions have not been determined as yet for the LILO 400kV Transmission power lines and the 132kV Distribution power line. Therefore, these site-specific details would need to be included after the pylon positions are suggested by Eskom, following the profiling of these power lines, which normally occurs once an environmental authorisation has been issued. Thereafter, a team of specialists will need to evaluate Eskom's pylon positions before compiling these site-specific specifications which need to be included in the EMPr.

The Site-Specific Draft EMPr outlines the impacts and mitigation measures for the construction, operation and maintenance phases of the project. The Site-Specific Draft EMPr has been compiled according to according to Government Notice R543, regulation 33. This is outlined in further detail in **Chapter 12**.

6.11 PUBLIC PARTICIPATION PROCESS (EIA PHASE)

The objective of the PPP in the EIA phase of the project is to present the findings of the investigations to the stakeholders and to give them an opportunity to comment on these.

To achieve this, the following consultation process was undertaken, similar to the Scoping Phase, which is described in greater detail in **Appendix B**:

- The draft EIA Report was made available for review by registered I&APs for a period of **40 calendar days**, which will exclude the coastal school holidays (from 20 September to 1 October 2013) and public holidays (determined under the guidance of the DEA) **from 03 October to 11 November 2013**.
- A Public meeting was held on 10 October 2013 at ~~an identified location in the study area suitable to I&APs~~ the Botrivier Primary School to present the findings of the EIA Report to I&APs. Focus group meetings were also held with specific I&APs on 9-10 October 2013 and 26 February 2014.
- Correspondence with I&APs will include the **Xhosa** language in addition to **English** and **Afrikaans**, as requested by I&APs.

All of the registered I&APs on the I&AP database were notified in writing (via post/fax/ e-mail) of the abovementioned consultation process. Advertisements were also placed in the local newspapers, site notices were placed around the study area and flyers were handed out to the local community.

Comments and issues raised were noted in an updated version of the Issues and Responses Report (**Appendix C**). These comments were considered and incorporated into the Final EIA Report for submission to the DEA.

The Final EIA Report will be placed in the public domain at the same venues as the public review period for the Draft EIA Report, for a period of 30 days from **11 November 2014** to **10 December 2014**. Comments received on the Final EIA Report would then be incorporated into the report submitted to the DEA for the review and acceptance.

All registered I&APs (including the appellant) will be informed by e-mail, facsimile or post of the outcome of the DEA's decision. In addition, the registered I&APs will be informed of the procedure to lodge a further appeal, if they still wish to do so.

6.12 ENVIRO-LEGAL REVIEW

The enviro-legal review largely involved the review of responsibilities and advice on the EIA process. BKS has ensured that the EIA process is fully compliant with the legal requirements.

The specific input that was provided by the enviro-legal team (see **Chapter 2.8**) includes the review of the Draft SR and Plan of Study for EIA as well as of the Draft EIA Report and Draft EMPr with brief written comments on the legal process followed.

The Draft EIA Report was reviewed by the enviro-legal team before submission for public review.

6.13 PEER REVIEW OF DRAFT EIA REPORT

A peer review ~~will be~~ was undertaken **(Appendix F)** in order to ensure that the reports as generated from the EIA process are deemed to be:

- Unbiased.
- Comprehensive.
- Appropriate and compliant to the legislative framework (i.e. meeting the letter and spirit of the law).
- Meet the procedural requirements of the legislation.
- Are in line with best practice in South Africa.

The peer review was undertaken during the public review period of the Draft EIA Report.

~~Space has been allocated for the inclusion of the peer review in **Appendix F**. But, the peer review document will only be included in the Final EIA Report. Edits will be made according to the peer review document, the EIA Report then finalised (with changes highlighted in green), and the Final EIA Report submitted to the DEA for consideration.~~

6.14 POST-ENVIRONMENTAL AUTHORISATION PROCESSES

6.14.1 Servitude Negotiation Process

The PPP undertaken for the EIA does not include the final servitude negotiations with the landowners that will be directly affected by the final route alignment of the power lines and the location of the Asteria Eskom MTS. It is important that the aims of the EIA and servitude negotiation processes are seen as separate. They share a common cause (the construction and operation of the Asteria Eskom MTS project) and may share common landowner databases, but they have different aims.

The servitude negotiations task will be undertaken by a negotiator from Eskom, if environmental authorisation for the project is granted. The Eskom negotiator was, however, involved in the project team site visit of 26 June 2012. An extensive effort has been made to identify and involve all possibly affected landowners through representative organisations, such as the municipalities and farmers' organisations and as far as possible, with individual landowners.

The Negotiation Process

The negotiation process can be extensive, and often takes years on the longer lines. It is thus critical that it is correctly programmed into the planning of a new line. The negotiation process involves:

- Initial meeting with the landowner.
- The signing of an option to secure a servitude (indicates that the owner will accept that the line will cross his property, subject to conditions to be finalised in the negotiation of the servitude agreement). An option is valid for one year.
- Once the route is confirmed (i.e. options signed with the upstream and downstream landowners) the servitude agreement is finalised with the individual landowners. This agreement sets out the conditions for the establishment and operation of the servitude, and is site specific (different landowners may have different requirements). Compensation payments are made when the servitude is registered at the Deeds office.
- Once construction is complete and the land is rehabilitated to the landowner's satisfaction, the landowner signs a Final Release certificate. Until such time, Eskom Transmission remains liable for the condition of the land.
- Once the clearance certificate is signed, the responsibility for the line and servitude is handed over to the regional Eskom Transmission office. Prior to this, the Eskom national office is responsible for the process.

Source: Eskom Transmission, Gamma-Omega 765kV Transmission Line, Draft Environmental Impact Report, Main Report, March 2002

Servitude Negotiation and the EIA Process

Transmission power lines are constructed and operated within a servitude (up to 55m wide for a 400kV Transmission power line) that is established along its entire length. The servitude allows Eskom Transmission certain rights and controls that support the safe and effective operation of the line. The process of achieving the servitude agreement is referred to as the Servitude Negotiation Process, or the negotiation process, and is undertaken by Eskom Transmission. Important points relating to the EIA process are:

- Servitude negotiation is a private matter between Eskom Transmission and the landowner concerned.
- The negotiation process involves a number of stages (see text box below), and culminates in the signing of a servitude. Here, Eskom Transmission enters into a legal agreement with the landowner.
- The agreements detail aspects such as the exact location and extent of the servitude, access arrangements and maintenance responsibilities.
- Compensation measures are agreed in each case.
- It may take place at any time in the planning of a new line.
- It must be completed (i.e. the agreement must be signed) before construction starts on that property.
- The servitude negotiation process is independent of the EIA process.

The EIA process has become important in the initial planning and route selection of a new Transmission power line, and it is preferable that the negotiation process begins after the EIA has been completed. At this stage, there is greater confidence in the route alignment to be adopted, and it would be supported by an environmental authorisation.

However, the negotiation process may have to start earlier, and may begin before or run parallel to the EIA process due to tight timeframes, knowledge of local conditions and constraints, for example. Eskom Transmission has the right to engage with any landowner at any time, although it does so at risk if environmental authorisation has not been awarded.

Source: Eskom Transmission, Gamma-Omega 765kV Transmission Line, Draft Environmental Impact Report, Main Report, March 2002

6.14.2 Rezoning Process

The rezoning of properties that the servitude will cross occurs after the servitude has been negotiated. The rezoning process is independent of this EIA process for the substation site and the power lines. Further detail of the rezoning process is provided in **Appendix E-7**.

Site Alternative 1 (both layouts) is located on the remainder of Farm 820 Caledon RD. This property is zoned Agricultural Zone 1 in terms of Clause 14.1 of the TWK Municipality Integrated Zoning Scheme Regulations (2011). This zoning does not allow for the development of an MTS and would thus require rezoning, which was confirmed with the TWK LM.

Section 10 of the TWK Municipality Integrated Zoning Scheme Regulations (2011) makes provision for an "Authority Zone: Government (AU)" which allows for engineering and associated services such as water reservoirs, electricity substations and Transmission power lines etc. The AU in the Integrated Zoning Scheme Regulations permits the following primary uses: Authority Usage, Utility Usage, Rooftop Base Telecommunication Station and Freestanding Base Telecommunication Station. A footprint rezoning of the subject portion from "Agriculture Zone 1" to "Authority Zone: Government (AU)" to amend the TWK Integrated Zoning Scheme would therefore be required to be lodged.

Further, there are no title deed restrictions identified that are considered to be in conflict with the intended land use and new zoning (AU) thus far. The title deed refers to Deed of Transfer No. 183 (dated 11 July 1864), which could not be traced and it can therefore not conclusively be determined that there are no restrictive title conditions applicable that needs removal. Hence the removal of restrictive title conditions has been retained to acquire the necessary land use rights. If it can be ascertained that title deed restrictive conditions exist, then application of removal and/or amendment of Title Deed restrictions would have to be lodged in terms of Section 3(1) of the Removal of Restrictions Act (No. 84 of 1967).

It can be confirmed that the site may be considered as having a significant role in the DAFF' strategies and plans, and for this reason some consultation with the DAFF has been undertaken. However, no formal approval in terms of the Subdivision of Agricultural Land Act (No. 70 of 1970) is required from the DAFF to rezone the farm portion as the land is not envisaged to be subdivided as a footprint rezoning would be sought.

6.15 PROJECT PROCESS PROGRAMME

The key dates for the EIA process of the Asteria Eskom MTS project are presented in **Table 6-6** to follow.

Table 6-6: Key Dates in the EIA and Post-Authorisation Phases

ACTIVITY	DATE
Public Review of comprehensive Draft EIA Report	02 October 2013 – 11 November 2013
Public Review of comprehensive Final EIA Report	28 October 2014 – 27 November 2014
Submission of Final EIA Report to the DEA	04 December 2014
Authority Acceptance/Rejection of EIA Report	03 December 2014 – 7 February 2015
Environmental Authorisation Issued	10 February 2015
Appeal Notification Process	10 February 2015 – 28 February 2015
Servitude Negotiation Process (appeals dependent)	31 March 2015 onward
Rezoning Process	May 2015 – November 2015

7 DESCRIPTION OF AFFECTED ENVIRONMENT

This chapter provides a description of the known environment (encompassing the physical, biological, social, economic and cultural aspects) that may be affected by the proposed Asteria Eskom MTS project. Note that this information has been sourced from desktop studies, site visits, specialist studies and I&APs.

7.1 TOPOGRAPHY

The study area for **Site Alternative 1** slopes from the west to east with a gradient of approximately 4%-5%. The area earmarked for the proposed substation development occurs at heights varying between 137m and 160m above mean sea level. The Asteria Eskom MTS project footprint would be cut into the above slope.

The LILO corridors also slope from west to east with a gradient of approximately 4% (LILO 2 and LILO 3) to 8% (LILO 1). The LILO corridors occur at heights varying from between 100m and 220m above mean sea level. The visual environment (**Chapter 7.9**) addresses the topography of the site in further detail and the above data is also depicted in graphs in **Figure 7-17**.

7.2 CLIMATE

The information in this section was obtained from the Draft EIA Report of Langhoogte Wind Farm (located less than 5km from the proposed study area for this project) (Arcus Gibb, 2012).

“The study area is ±20 km from the nearest coastline (Walker Bay) and situated at the “entrance” to an inland valley surrounded by mountain ranges. The resulting climate is marginally continental with orographic rain induced by the mountains. The region experiences rainfall through the year, with the majority of rainfall concentrated in the winter months (May-August). The climate of the area is characterised by a rainfall pattern of all-year-round rainfall, with a definite peak in the winter months. Average long-term annual rainfall is between 384 mm in the lower areas, rising to around 534 mm in the higher areas.”

“The warmest temperatures occur during January and February with average maximums of 28.6°C and 28.9°C respectively. Maximums usually range from 35°C to 40°C; the temperature only rarely exceeds 40°C. The coldest temperatures are experienced during the winter months. July and August have average minimum temperatures of 5.5°C and 5.9°C. Highest wind speeds occur during the summer months from October to March with an average wind speed of 7.5 km/h.”

7.3 GEOLOGY

The Bokkeveld shales that underlie the Botrivier valley have weathered to form clays and loamy clay soils, with a strong ferricrete (koffieklip) element in certain areas. The ferricrete weathers to form the special iron-rich gravels characteristic of the area.

According to the available geological maps, 1:250 000 Geological Series 3319 WORCESTER map the regional geology of Site Alternative 1 comprises Light grey-thick bedded, coarser

grained Quartzitic Sandstone, cross-bedded with grit and pebble stringers and lanticles Quartzite, of Skurweberg formation, Nardouw Subgroup and Cape Supergroup (see **Figure 7-1** and **Figure 7-2** for further details about the regional geology).

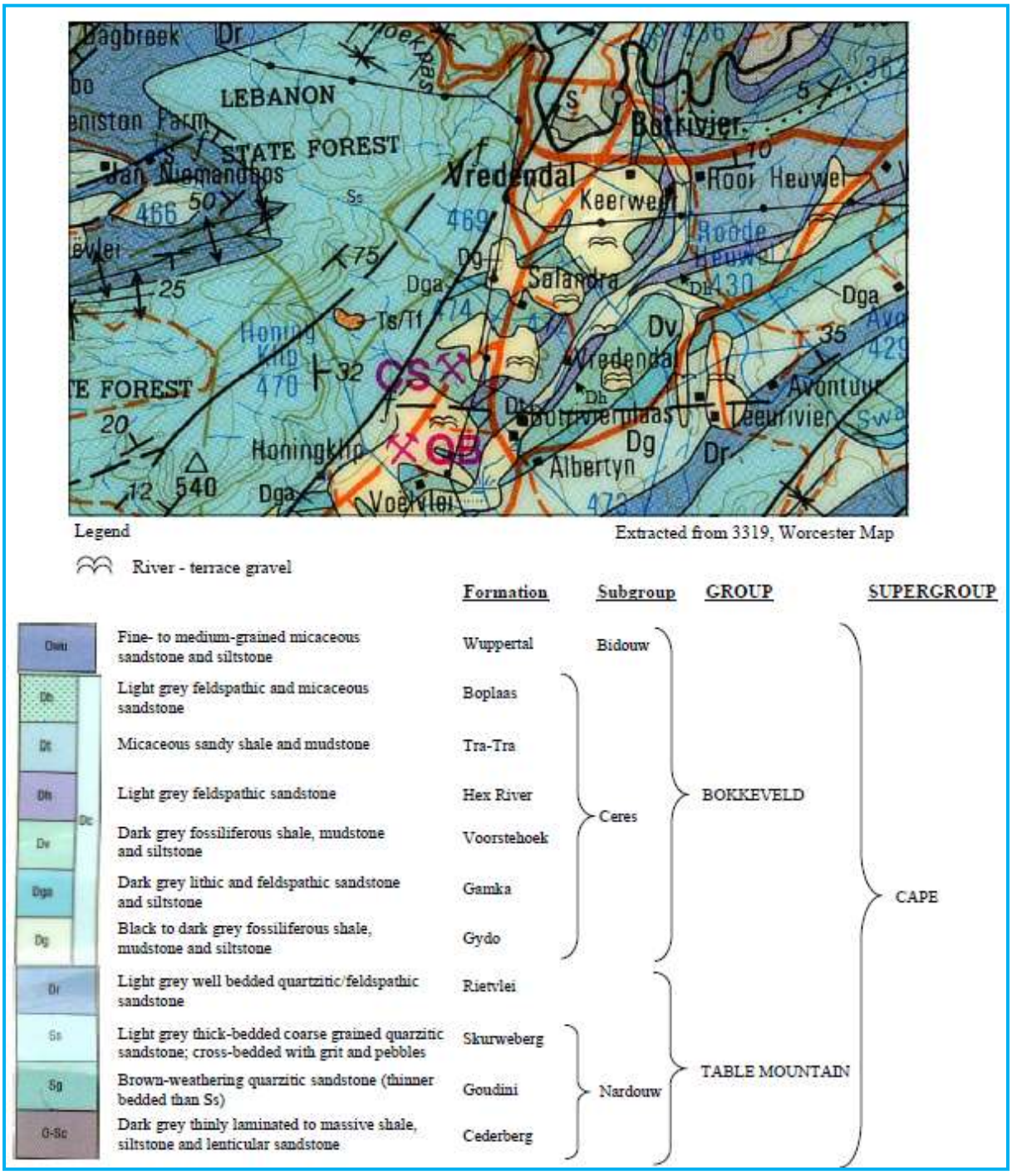


Figure 7-1: Regional Geology of Study Area and surrounds

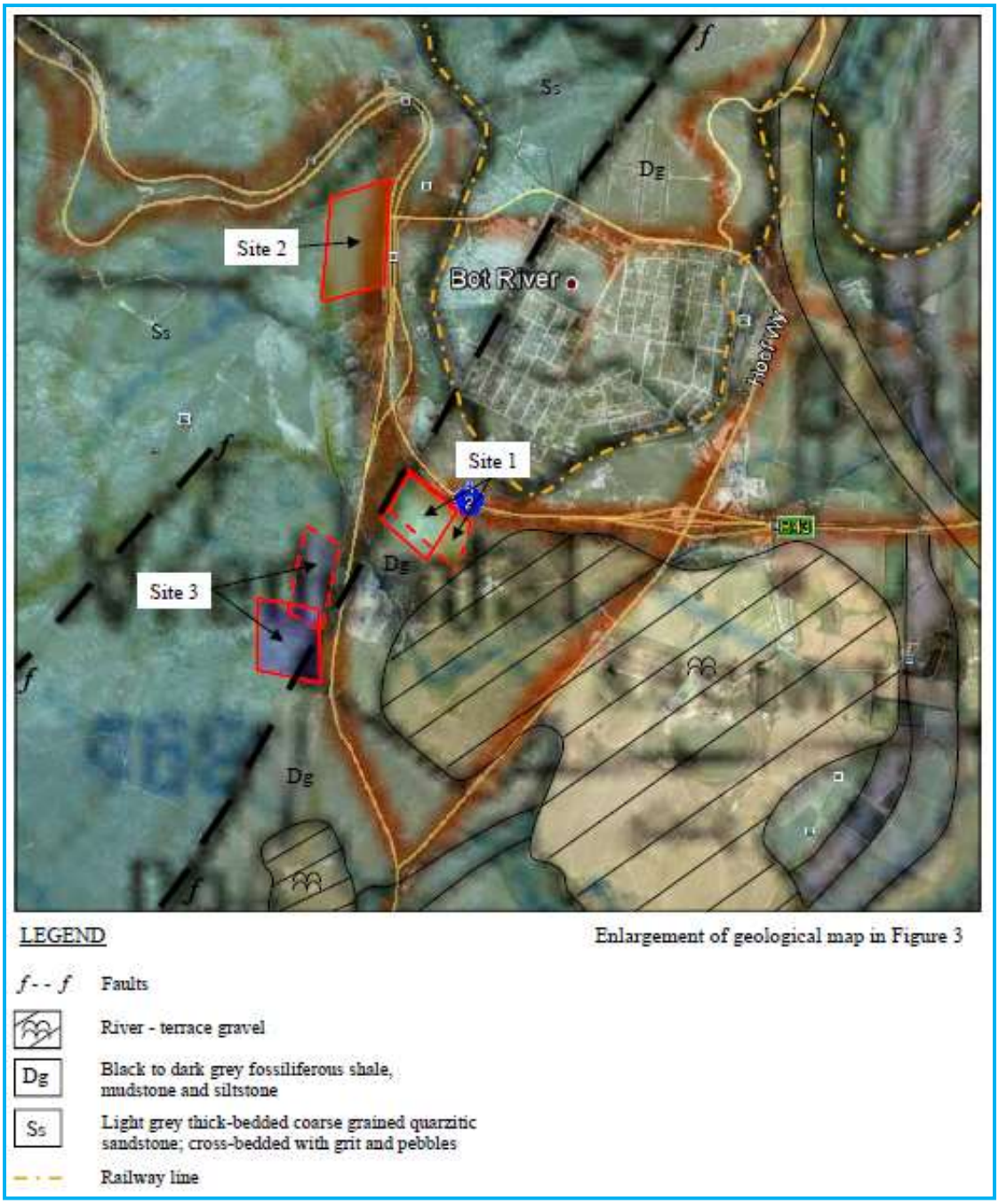


Figure 7-2: Geology Overlay of Study Area

7.3.1 Groundwater

In general, the permanent water table could occur within the fractured quartzite sandstone aquifer at depth and should be deep enough not to affect the Asteria Eskom MTS project.

7.3.2 Seismicity

The SANS code (Seismic actions and general requirements for buildings) (SANS-10160-4, 2011), shows that the site is situated in the area where the peak ground acceleration with a 10% probability of being exceeded in 50 year period is 98cm/sec^2 (**Figure 7-3**). Zone I is defined as “Regions of natural seismic activity”.

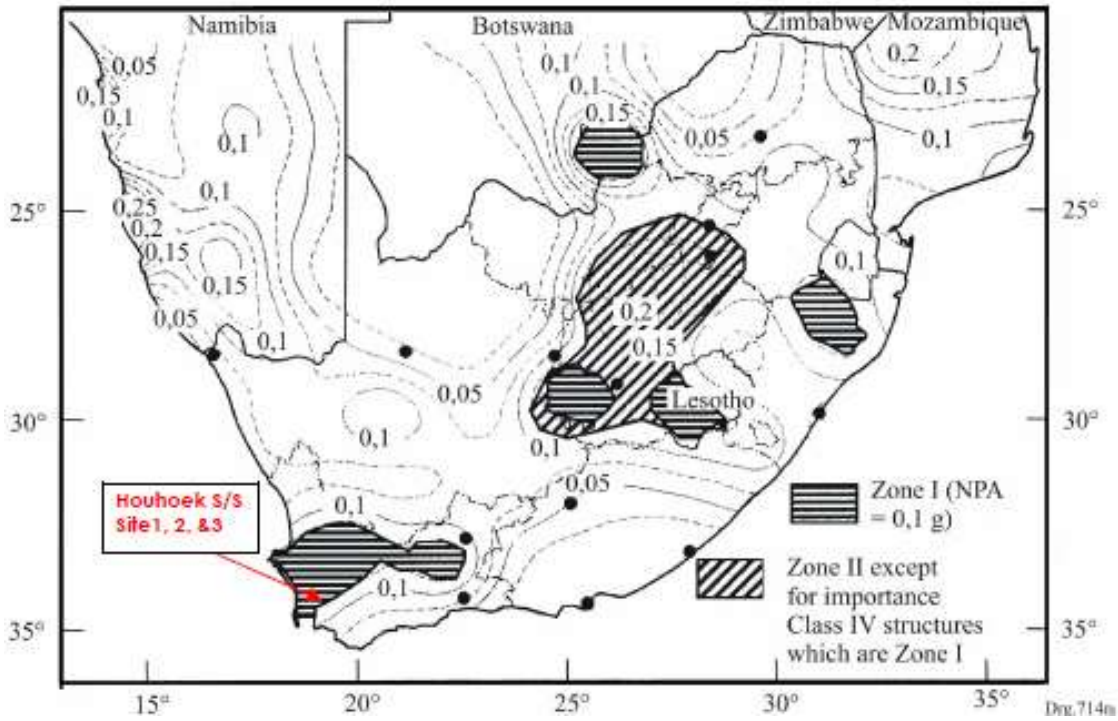


Figure 7-3: Seismic Hazard Map and Zones

A more recent data map produced by the Council of Geoscience is presented in **Figure 7-4**, showing peak ground accelerations with a 10% probability of being exceeded in 50 years. On this figure, the site is classified with ground accelerations of 0.15g (or 147cm/sec^2).

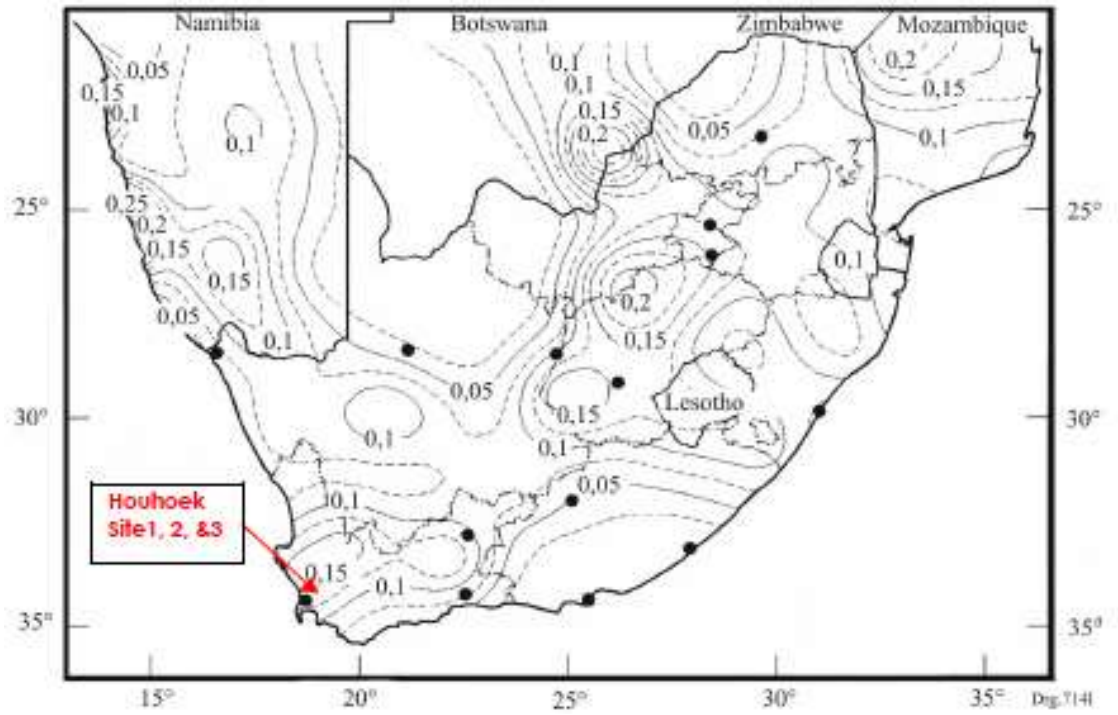


Figure 7-4: Recent Seismic Hazard Map (Council for Geoscience, 2003)

7.4 SOIL AND AGRICULTURAL POTENTIAL

The soils in the study areas are generally a mixture of coarse-grained sandy soils on rock, or duplex soils (sandy topsoil abruptly overlying a subsoil clay), and the agricultural potential varies from low to moderate at best.

The whole area is covered by locally derived sandy and gravelly colluvial deposits of variable thickness. Soils in the study area, north of the R43 that includes **Site Alternative 1**, are generally **deep acid sands or loamy sands** (overlying shales).

A fault, running in a south-westerly to north-easterly direction, results in a general division of the survey area into two parts with reference to the geology.

Site Alternative 1 (both layouts) and the LILO corridors are mainly underlain by quartzitic sandstone, cross-bedded with grit and pebble stringers of the Skurweberg Formation, Table Mountain Group. A broad soil description of seven (7) soil association groups is given in **Table 6-3** and represented on the map presented in **Figure 7-5** below.

The soils that have relatively sandy topsoil overlying a subsoil layer with more clay and a high degree of structure are classified as map units **Es1**, **Es2** and **Ss1**. The steeper sections on the western side of the study area have a coarse textured sandy material in the topsoil horizon and a classified as map units **Cf1** and **Cf2**.

The Wildekrans Trust currently operates vineyards on the eastern side of the R43, outside of the stuy area. The soils at that existing vineyard are structured, duplex soils (with relatively sandy topsoil overlying a structured, more clayey subsoil). This is predominantly **Db223**, as shown in **Figure 7-6**. The study area for Site Alternative 1 (both layouts) comprises deeper, sandy soils, either grey or yellow-brown, which occurs within land type **Ga14**.

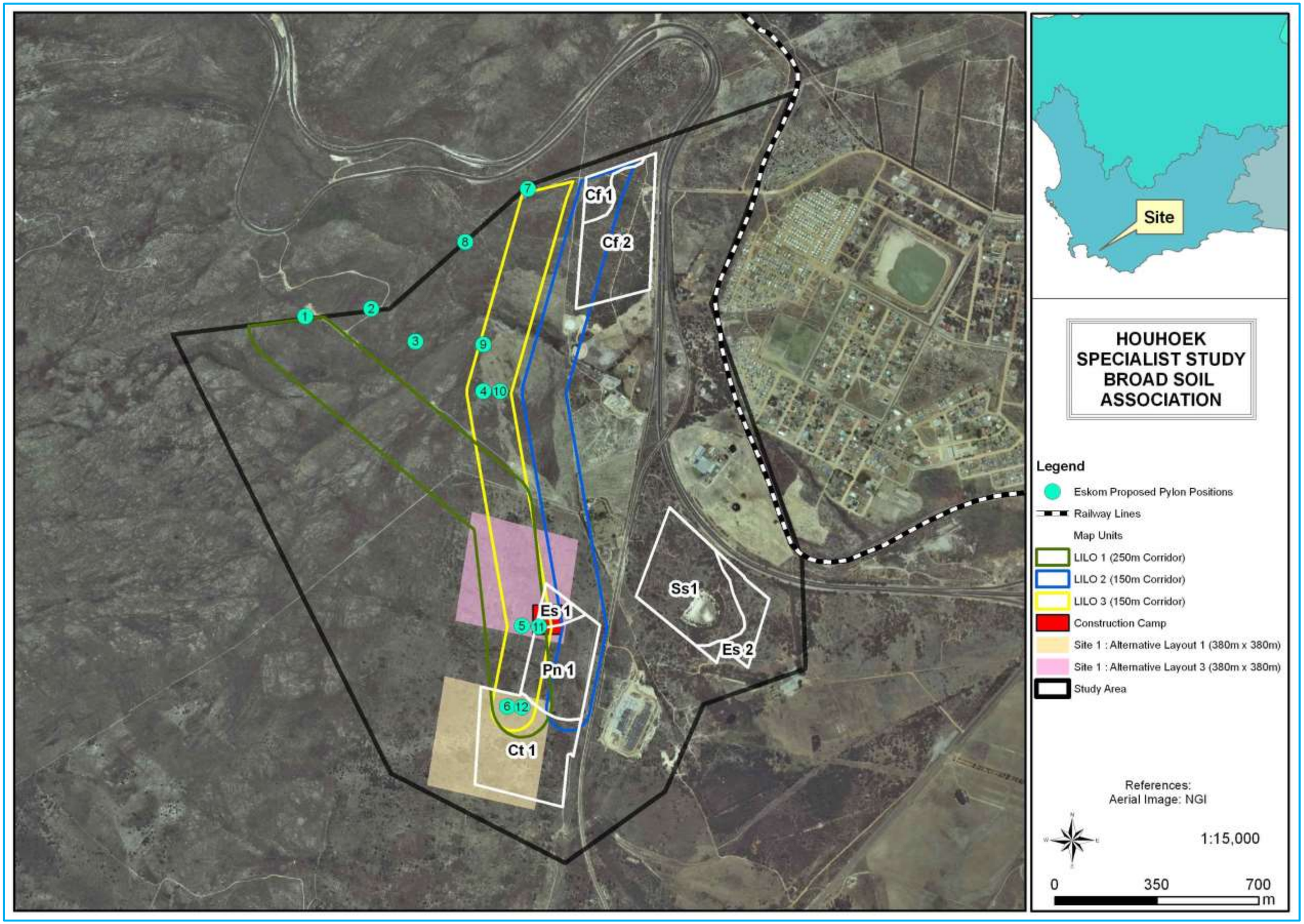


Figure 7-5: Broad soil association of the study site alternatives

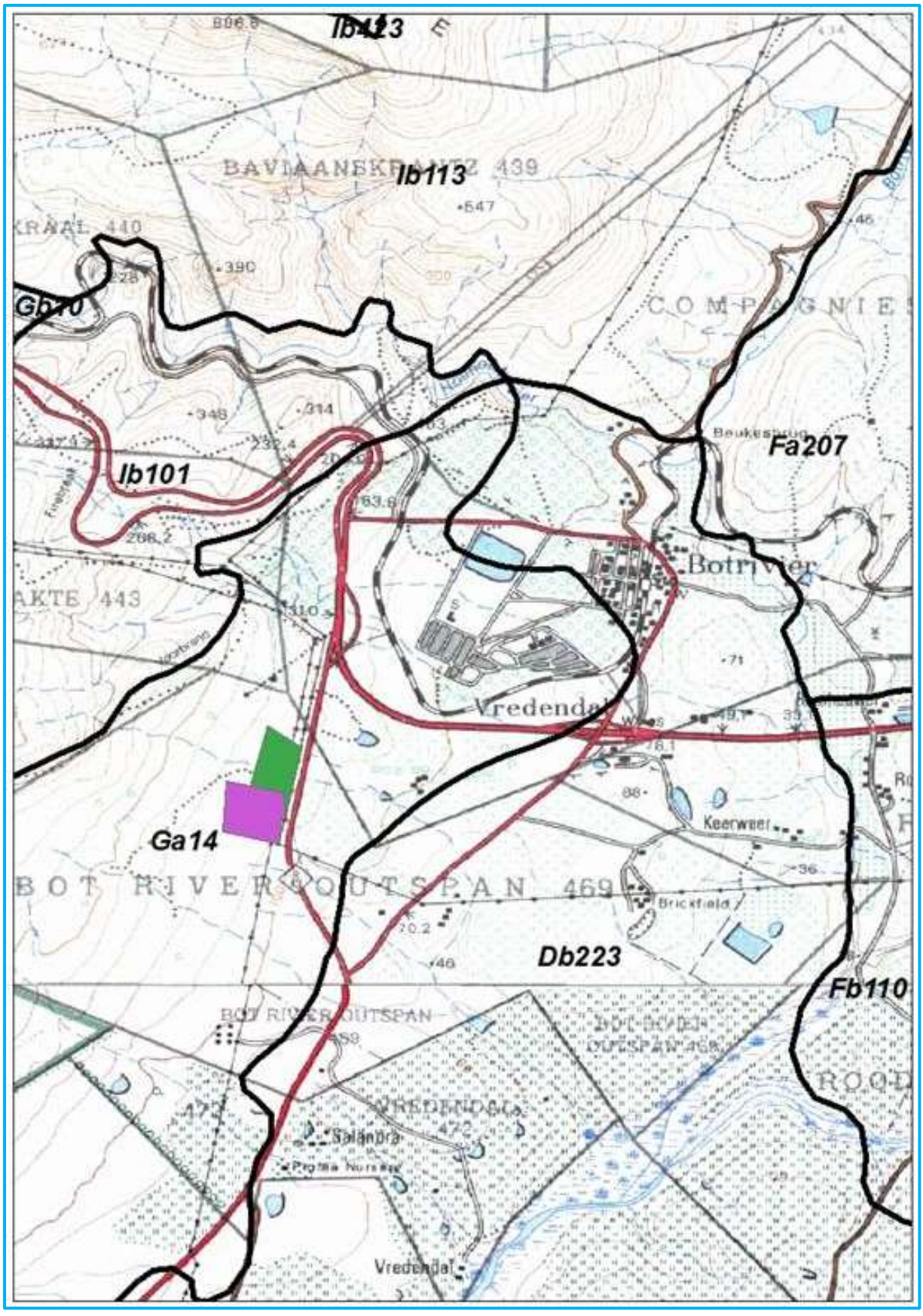


Figure 7-6: Land Type Map

7.5 FRESHWATER ECOSYSTEMS (WATERCOURSES, DAMS AND WETLANDS)

The entire study area falls within the Southern Folded Mountains aquatic ecoregion, as delineated by Kleynhans, *et al.* (2005) . This ecoregion is characterised by a highly diverse topography and a similarly diverse array of vegetation types, with Mountain Fynbos, Grassy Fynbos and Little Succulent Karoo being the most characteristic vegetation types.

The study area contains moderate and steep slopes that form the small valleys in which mostly non-perennial rivers and potentially also valley-bottom wetlands (SANBI, 2009) occur. The largest valley in the nearby area is the Bot River valley approximately 2km to the east of the site, through which the perennial Bot River flows in a north-south direction. The Bot River and its floodplain wetland are classified as a Freshwater Ecosystem Priority Areas (FEPA) river and wetland respectively. The **Bot River**, rising south of the Theewaterskloof Dam, runs more or less north-south, passing to the east of the town of Botrivier, and flowing into the Atlantic Ocean through the **Bot River Lagoon** that lies between Kleinmond and Hawston. The marshy Bot River Lagoon forms wetlands that are home to thousands of water fowl and South Africa's only herd of wild horses that roam a wetland habitat. The altitude of the proposed areas for the substation is generally low-lying (<200m), but the LILO Transmission power lines require routing over a relatively steep part of the Houhoekberg mountain range at an altitude of approximately 380m.

The surrounds of the study area includes several rivers and water features such as the **Theewaterskloof Dam** and **Hottentots-Holland Mountain Catchment Area**. The **Houwhoek River** joins the Bot River from the west, just north of the town of Botrivier, and the **Swart River** joins the Bot River a little further south.

The Overberg Wetland Map, which was compiled as the aquatic component for the Overberg CBA Map (Holness & Bradshaw, 2010), did not identify any natural wetlands within the study area (only one dam was mapped in the area). The FEPA project, which used the Overberg Wetland Map as an input layer, did not map any rivers or natural wetlands within the study area. The closest FEPAs identified by the NFEPA project are the Bot River and its associated floodplain wetland, but these freshwater ecosystems are unlikely to be affected by the proposed Asteria Eskom MTS project.

Figure 7-7 shows the freshwater ecosystems map produced for the study area. Several non-perennial rivers and four small dams were mapped in the study area. The rivers in the study area drain towards the perennial Bot River system to the east. No wetlands were mapped in the study area. To minimise potential impacts on river ecosystems, 50m wide 'no-go' buffer zones were demarcated along the rivers falling within the study area, but no buffers were recommended at this stage for artificial features such as dams and the drainage channel leading into the dam at the eastern part of the study area.

Four river sections would potentially be impacts by the proposed development (impact locations a – d, as shown in **Figure 7-7**). One of these river channels is located near to Site Alternative 1, in between Layout Alternative1 and Layout Alternative 3 (herein after referred to as **impact location 'a'**). Whilst this river section is likely to be minimally affected by the two layout alternatives, for the MTS, it may be potentially impacted by the three 400kV LILO Transmission power line route alternatives.

To the east of the R43 road, this river has already been impacted by the position of the existing Houhoek Eskom Distribution Substation, where its course appears to have been diverted slightly to the north of the substation. LILO 1 crosses a river in the mountainous western terrain of the study area at the confluence of two river channels (herein after referred to as **impact location 'b'**).

LILO 2 and LILO 3 both cross the same river system described for LILO 1, but at a point downstream of the confluence, to the east (herein after referred to as **impact location 'c'**).

Lastly, LILO 2 and LILO 3 cross over a small river channel at the northern end of the study area (herein after referred to as **impact location 'd'**). This channel is a tributary of the larger main channel crossed by LILO 2 and LILO 3 to the south, as described above.

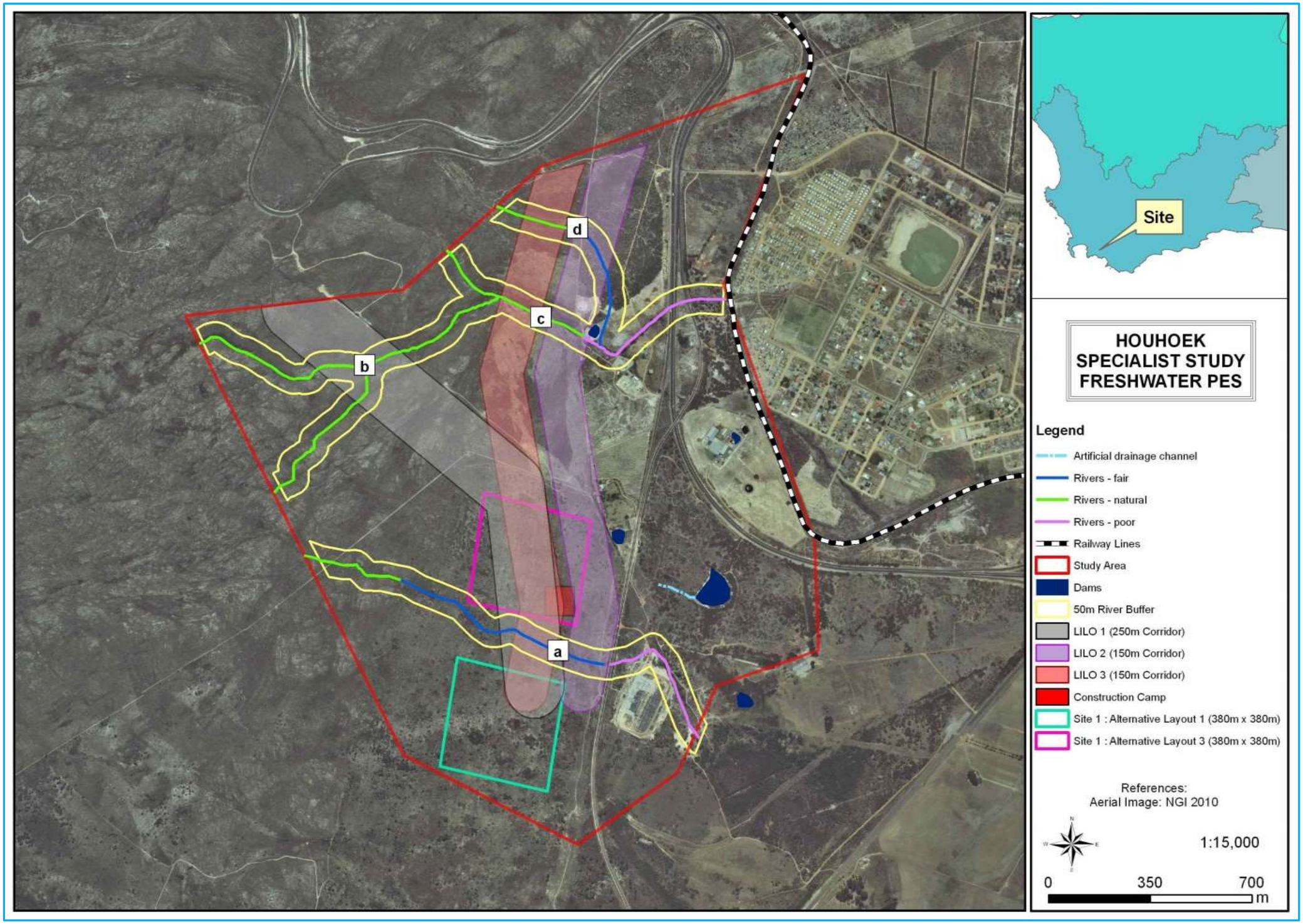


Figure 7-7: Freshwater Ecosystems in Study Area

7.6 ECOLOGY

7.6.1 National and Regional Context

The study area is located at the western edge of the Cape Overberg Region, which falls within the south-west coastal region of the Core Cape Subregion (CCR) of the Greater Cape Floristic Region (GCFR) (Manning & Goldblatt, 2012). The study area is part of the Fynbos biome. The GCFR is one of only six Floristic Regions in the world, and is the only one confined to a single country. It is also by far the smallest floristic region, occupying only 0.1% of the world's land surface, and supporting roughly 9,400 plant species. This is almost half of all the plant species in southern Africa and approximately 20% of the plant species in sub-Saharan Africa. Roughly 68% of all the species in the CCR do not occur elsewhere (also known as **endemics**), and many have very small home ranges (also known as **narrow endemics**). Many of the lowland habitats are under pressure from agriculture, urbanisation and alien plants, and thus many of the range restricted species are also under severe threat of extinction, as habitat is reduced to extremely small fragments. Data from the recent nationwide plant Red Listing process undertaken is that 67% of the threatened plant species in the country occur only in the south-western Cape, and these total over 1,800 species (Raimondo, *et al.*, 2009). It should thus be clear that the south-western Cape is a major national and global conservation priority, and is quite unlike anywhere else in the country in terms of the number of threatened plant species.

The Overberg CBA map for this area (Holness & Bradshaw, 2010) shows that all three sites are classified as CBA. This map is not copied into the current report as it is not particularly useful, nor is it based on any ground-truthing exercise, and typically includes any even partly natural (but badly degraded) habitat as a CBA (*pers. obs.* of Ecologist). The current report is regarded as a substantially more accurate assessment of the true ecological value of the sites, being based on actual ground-truthing.

The vegetation map of South Africa (Mucina & Rutherford, 2006) indicates that four different vegetation types would originally have been present in the greater study area, but in reality this can be simplified down to two extant vegetation types (Helme, *pers. obs.*). Essentially, all the vegetation in the study area north of the R43 and west of the road, can be considered as **Kogelberg Sandstone Fynbos**, and the vegetation east of the road can be considered **Western Rûens Shale Renosterveld** (with elements of Rûens Silcrete Renosterveld and Kogelberg Sandstone Fynbos). The coming together of four vegetation types in this fairly small area suggests that there would originally have been many ecotones (habitat transitions) in this area, and this is true. But, unfortunately these ecotones have been largely lost due to soil disturbance, cultivation, alien invasive vegetation and construction. These ecotones are not usually sharp boundaries, but typically span a couple of hundred metres, and thus putting a line on a map is somewhat arbitrary at anything finer than a regional scale. For this reason the actual SA vegetation map is not included in this report, as it is more distracting than helpful.

The National List of Threatened Ecosystems (DEA, 2011) has listed both Kogelberg Sandstone Fynbos and Western Rûens Shale Renosterveld as **Critically Endangered** vegetation types. The former is well conserved (75% of original extent) and approximately 83% of its original

extent still remains. But, it is listed on account of its exceptional species diversity and the very high number of rare, endemic or threatened plant species that are supported by this vegetation type (DEA, 2011). The Shale Renosterveld is listed because it has been significantly impacted by cultivation, having already lost at least 86% of its original extent, and nothing (0%) of this vegetation type is formally conserved, leaving it very vulnerable to further loss.

Nature reserves in the subregion around the project area include:

- Hottentots-Holland Nature Reserve
- Theewaters Nature Reserve
- Witdraai Private Nature Reserve
- Groenlandberg Nature Reserve
- Babilonstoring Nature Reserve
- Kogelberg Nature Reserve
- Houwhoek Nature Reserve

7.6.2 Vegetation within Substation Site

Both layout alternatives of Site Alternative 1 have been previously cultivated, probably for cereals, but this cultivation probably ceased more than 20 years ago, and there has been partial natural rehabilitation since. This disturbance can be seen in the aerial imagery, where characteristic lines caused by ploughing are evident, and on-site, where the plant species present are typical of a previously disturbed area that has undergone partial passive rehabilitation (see **Figure 7-8** and **Figure 7-9**).

Figure 7-8: View of vegetation in Site Alternative 1: Layout Alternative 1 area; the trees in the background are alien invasive *Acacia mearnsii* (black wattle)

Figure 7-9: View of vegetation in Site Alternative 1: Layout Alternative 3 area; the trees in the background are mostly alien invasive *Pinus radiata* (cluster pine)

Indigenous species typical of a disturbed habitat in this area include:

- *Cynodon dactylon* (fynkweek)
- *Carpobrotus edulis* (suurvy)
- *Stoebe plumosa* (slangbos)
- *Passerina corymbosa* (gonna)
- *Aristida junciformis*
- *Merxmuellera stricta* (wiregrass)
- *Athanasia trifurcata* (kouterbos)
- *Moraea flaccida* (tulp)
- *Osteospermum moniliferum* (bietou)
- *Chrysocoma ciliata* (bitterbos)
- *Helichrysum patulum* (kooigoed)
- *Senecio burchelli* (hongerblom)
- *Anthospermum spathulatum*
- *Hyparrhenia hirta* (thatching grass; Southern Cape invasive)

Alien invasive species tend to be patchy, and woody invasive species generally cover less than 5% of each alternative. The most prominent woody invasive species are:

- *Acacia saligna* (Port Jackson)
- *A. longifolia* (longleaf wattle)
- *A. mearnsii* (black wattle)
- *A. pycnantha* (golden wattle)
- *Pinus radiata* (cluster pine)
- *Hakea sericea*

Additional indigenous species recorded, not necessarily indicative of disturbance, included:

- *Amphithalea imbricata*
- *Aristea africana*
- *Restio capensis*
- *Ursinia anthemoides*
- *Metalasia inverse*
- *Helichrysum moeserianum*
- *Restio viminea*
- *Ehrharta calycina*
- *Ficinia secunda*
- *Cliffortia juniperina*
- *Trichogyne stipularis*
- *Muraltia rhamnoides*
- *Erica anguliger*
- *E. imbricata*
- *Ornithogalum thyrsoides* (tjienks)
- *Serruria inconspicua*
- *Berkheya armata*
- *Pelargonium chamaedryfolium* (burnt areas, see **Figure 7-10**)
- *Restio monanthos*
- *Lachenalia* sp.
- *Trachyandra flexifolia*

Figure 7-10: View of recently burnt vegetation in the upper parts of Site Alternative 1: Layout Alternative 1 area

About 20% of the two study areas was burnt about four months prior to the 2012 site visit, and few indigenous species were evident in these areas, although a number of common and widespread bulbs were already noted in flower (*Moraea flaccida*, *Oxalis purpurea*, *Oxalis pescaprae*).

The river channel between the two layout alternatives does not support any wetland specific vegetation, which is indicative of the fact that it holds water for only very short periods. This technically means that this narrow drainage line may not be defined as a wetland as presence of obligate wetland vegetation is part of the formal wetland definition. The Freshwater Assessment (**Appendix E-3**) also indicates that there are no wetlands within the study area. See **Chapter 7.5** for further details.

The only plant Species of Conservation Concern (SCC)[4] (*sensu* (Raimondo, *et al.*, 2009)) recorded on-site was *Serruria inconspicua*, which is Red Listed as Vulnerable (Raimondo, *et al.*, 2009). Only a single plant was found, in the south-eastern corner of Site Alternative 1: Layout Alternative 1 study area. Its presence here is not considered particularly significant and it was observed outside the proposed development area as well, in low numbers. There is deemed to be a low likelihood of viable populations of other SCC occurring in either of the proposed development areas, primarily as a result of the previous cultivation.

The **Critically Endangered *Erica rhodopis*** (see **Figure 7-11**) has been recorded in similar habitat (although less disturbed) next to the existing Houhoek Eskom Distribution Substation site (Helme, 2004), and there is thus a chance that it may still be present in low numbers in either of the site alternative study areas on this site. If this species occurs in viable numbers in any of the sites it would be significant, and would be a potential Red Flag to the development of that area.

Figure 7-11: Critically Endangered *Erica rhodopis*

4 The Red List of South African Plants (Raimondo, *et al.*, 2009), and its online update, has assessed all plant species in South Africa, and **all** indigenous species are now technically Red Listed or Red Data Book species, and thus it is preferable to use the term Species of Conservation Concern to refer to species that are listed as either Threatened or Rare.

7.6.3 Vegetation within Power Line Corridors

The corridors for the 400kV LILO Transmission power line span Kogelberg Sandstone Fynbos, or remnants thereof. About 70% of each corridor can be regarded as relatively pristine, with the remainder being disturbed or degraded.

Figure 7-12: View of existing power lines on northern edge of LILO 1 corridor, with LILO 2 and LILO 3 corridors below the reservoir

Indigenous plant diversity is very high in the pristine areas (over 200 species are likely to occur), and is low to medium in the degraded areas. Some of the indigenous species noted in the lower parts of the corridors include:

- *Wachendorfia paniculata*
- *Lichtensteinia lacera*
- *Restio vimineus*
- *R. triticeus*
- *R. capensis*
- *Gladiolus hyalinus*
- *Leucadendron salignum*
- *Roella* sp.
- *Hypodiscus aristatus*
- *H. argenteus*
- *Cannomois parviflora*
- *Erica anguliger*
- *Willdenowia glomerata*
- *Carpobrotus edulis*
- *Elytropappus scaber*
- *Berkheya armata*
- *B. glabrata*
- *Crassula capensis*
- *Romulea tabularis*
- *Oxalis luteola*

Numerous plant SCC (*sensu* Raimondo *et al.*, 2009) are likely to be present within each of the 150m wide corridors, with more in the LILO 1 and LILO 2 corridors than in the LILO 3 corridor, simply because the former are less disturbed and also because LILO 1 covers a

larger area and wider range of altitudes and habitats. Potential SCC within the corridors includes:

- *Serruria flagellifolia* (Vulnerable)
- *S. bolusii* (Near Threatened)
- *Protea longifolia* (Vulnerable)
- *P. compacta* (Near Threatened)
- *P. scabra* (Near Threatened)
- *Nivenia stokoei* (Rare)
- *Ni. levynsiae* (Rare)
- *Phylica diosmoides* (Endangered)
- *Leucospermum prostratum* (Vulnerable)
- *L. cordifolium* (Near Threatened)
- *Disa atrorubens* (Vulnerable)
- *D. pygmaea* (Rare)
- *Podalyria cordata* (Vulnerable)
- *Xiphotheca reflexa* (Endangered)
- *Liparia splendens* ssp. *splendens* (vulnerable)
- *Cyrtanthus leucanthus* (Endangered)

7.6.4 Faunal Overview

From a faunal perspective, the study area has not been identified in any regional or national level studies (Cape Action for People and the Environment (CAPE), Reptile Atlas Project, Butterfly Atlas Project etc.) as an area of particular importance or diversity.

Approximately 15 species of reptile have been recorded from the overall grid square (3418AA), most of which are probably also present in the greater study area. Fewer than seven of these species are likely to be present within the development footprints. This can be regarded as a low level of reptile diversity on a national basis.

The only Red Listed reptile currently known from this grid square (3418AA) is the Cape Dwarf Chameleon (*Bradypodion pumilum*) (Animal Demography Unit, 2013), and the species is Red Listed as Vulnerable (Bates, *et al.*, in press). The species is in fact unlikely to be present within the actual study area, as the species tends to prefer areas with denser cover (including vineyards), and does not usually inhabit areas dominated by alien invasive vegetation (C. Dorse – *pers. comm.*).

No mammals were directly observed on-site during fieldwork, but the greater site is likely to support a representative sample of the local fauna, including Grysbok, Duiker, Chacma Baboon, Cape Grey and Slender Mongoose, Porcupine, Striped Field Mouse and Cape Gerbils.

Two species of frogs were heard calling on-site. The Cape Mountain Rain Frog (*Breviceps montanus*) was heard calling in the upper areas above Site Alternative 1, and Clicking Stream Frog (*Stronglyopus grayii*) was present in the excavated dam east of the R43. Both are regionally common, and the latter is particularly varied in its habitat requirements, and occurs throughout the southern and eastern parts of the country.

No threatened amphibians or mammals are expected to occur in significant or viable numbers in the **Site Alternative 1** study areas ((Minter, *et al.*, 2004); (EWT, 2004); (Measy, 2011)), and none of the study areas are thought to be exceptional in any regard in terms of these animals. However, the watercourses in the upper section of the LILO Transmission power line corridor alternatives may support:

- *Capensibufo rosei* (Rose's Mountain Toadlet) – Vulnerable
- *Arthroleptella landdrosia* (Landdroskop Moss Frog) – Near Threatened
- *Poyntonia paludicola* (Montane Marsh Frog) – Near Threatened

There are only nine species records for this grid square (3418AA) in the Butterfly Virtual Museum (Animal Demography Unit, 2013), and none of these are regarded as SCC. The partly degraded nature of much of the study area means that overall butterfly diversity is probably low on a regional and national basis.

The absence of suitable roosting areas such as large rocks, caves and cliffs on-site suggests that bat diversity is unlikely to be exceptional in this area, and the primary roosting sites are in fact likely to be alien invasive trees. No observations on bats were made, but no records of threatened bat species could be traced to this area (Monadjem, *et al.*, 2010). Bat diversity is likely to be higher in the rocky, upper parts of the study area, notably in the western, higher altitude parts of the LILO 1 corridor.

7.6.5 Ecological Conservation Value

The ecological conservation value of a site is a product of plant and animal species diversity, plant and animal community composition, rarity of habitat, degree of habitat degradation, rarity of species, ecological viability (functionality) and connectivity, vulnerability to impacts, and reversibility of threats (rehabilitation potential). Maps of the regional botanical conservation value are included as **Figure 7-13**.

Both layout alternatives of **Site Alternative 1** are deemed to have a Low to Medium regional ecological conservation value, with a medium ecological conservation value watercourse and associated buffer between the layout alternatives. LILO 1 and LILO 3 have approximately two thirds of its corridors as high ecological conservation value and one third as low-medium ecological conservation value. LILO 2 has a mixture of high, medium and low-medium ecological conservation values.

Areas of high ecological conservation value support mostly undisturbed Kogelberg Sandstone Fynbos (Critically Endangered). These areas are very likely to support significant numbers of, and the bulk of the site populations of rare, localised or threatened plant species. In addition, the seepage areas and watercourses within the upper parts of the study area are likely to support various SCC of frogs.

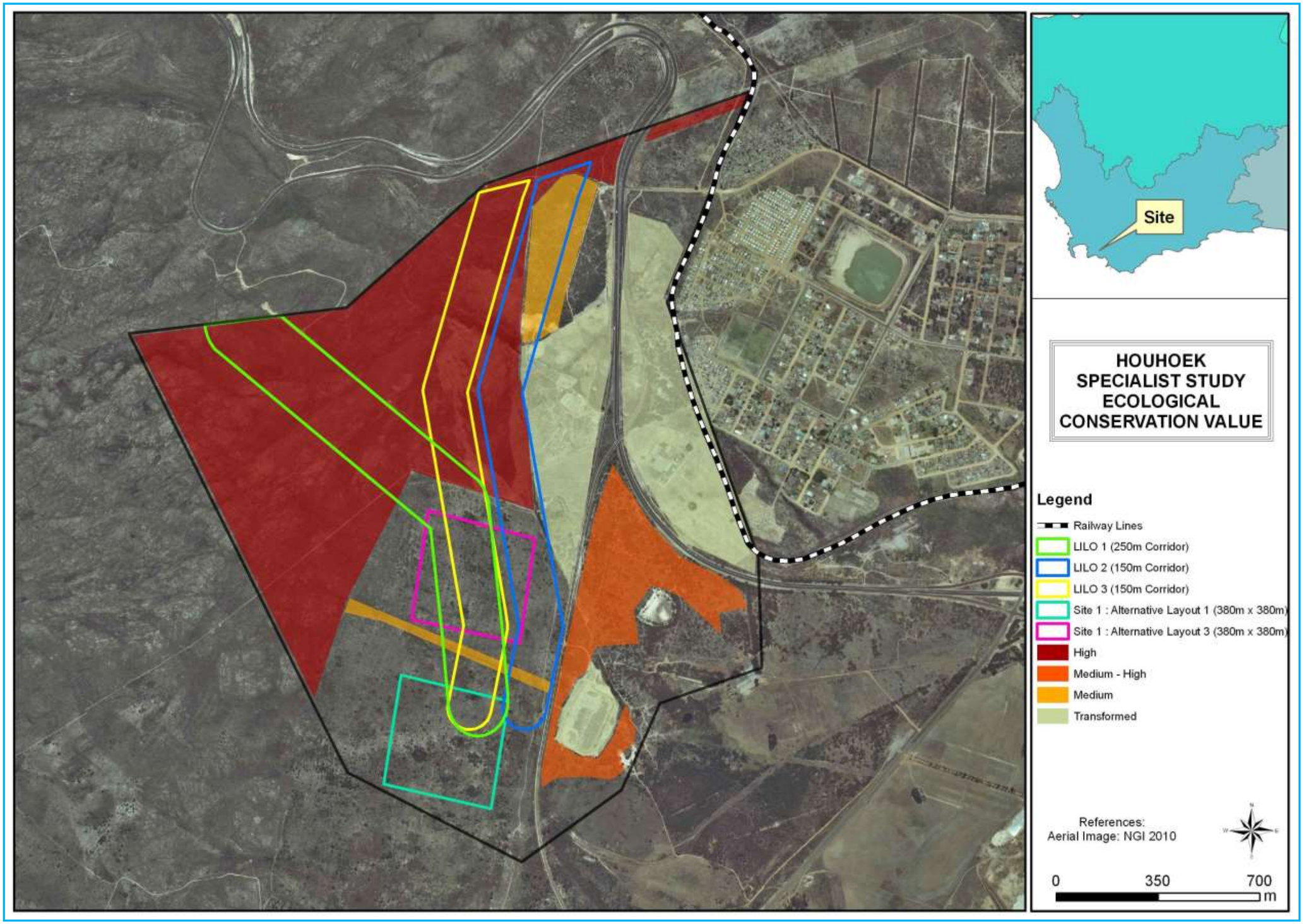


Figure 7-13: Ecological Conservation Value of study area

7.7 AVIFAUNA

7.7.1 Regional Vegetation in Avifauna Context

The study area is wedged between the Fynbos-covered Eastern False Bay Mountains Important Bird Areas (IBA) (Barnes, 1998) and the Overberg mosaic of grain fields interspersed with pastures, which starts just east of Botrivier (see **Figure 7-14**). The Eastern False Bay Mountains IBA is located at the western extremity of the Cape fold belt and encompasses a continuous chain of mountains consisting of several State Forests, Mountain Catchment Areas and Nature Reserves. The IBA runs north from the Kogelberg State Forest for 120km to the Kluitjieskraal State Forest, southwest of Tulbagh. The mesic mountain Fynbos, which occurs on the mountain slopes of the Cape fold belt, is dominated by a multitude of communities, with the primary constituents being *Proteaceae*, *Ericaceae* and *Restionaceae* (Barnes, 1998). The natural vegetation at the proposed site is Kogelberg Sandstone Fynbos, which occurs on high mountains, with steep to gentle slopes and undulating plains and hills of varied aspect. General appearance of vegetation is low, closed, shrubland, with scattered emergent tall shrubs. Numerous seeps and seasonally started mountain plateau wetlands are common (Mucina & Rutherford, 2006).

Figure 7-14: Location of False Bay Mountains IBA (green shaded) relative to the study area

a) Structurally Untransformed Areas

It is widely accepted that vegetation structure is more critical in determining bird habitat, than the actual plant species composition (Harrison, *et al.*, 1997). The criteria used, by the Southern African Bird Atlas Project (SABAP) 1 authors to amalgamate botanically defined vegetation units, or to keep them separate, were:

- The existence of clear differences in vegetation structure, **likely to be relevant to birds**.
- The results of published community studies on **bird/vegetation associations**.

SABAP1 classifies the natural untransformed vegetation in 3419AA as Fynbos vegetation (Harrison, *et al.*, 1997). Fynbos can be divided into two categories, Fynbos proper and Renosterveld. Despite having a high diversity of plant species, Fynbos and Renosterveld have

a relatively low diversity of bird species. Structurally untransformed Fynbos scrub occurs mostly on the western side of the study area against the mountain slopes, which form part of the Eastern False Bay Mountains IBA. None of the proposed substations site alternatives fall within structurally untransformed habitat (**Figure 7-15**).

Red data species that could potentially occur in structurally untransformed areas on the site are:

- Black Harrier (*Circus maurus*)
- Secretarybird (*Sagittarius serpentarius*)
- Martial Eagle (*Polemaetus bellicosus*)
- Lanner Falcon (*Falco biarmicus*)
- Peregrine Falcon (*Falco peregrinus*)

Non-Red Data power line sensitive species include:

- Jackal Buzzard (*Buteo rufofuscus*)
- Booted Eagle (*Aquila pennatus*)
- Verreaux's Eagle (*Auila verreauxii*)
- Cape Eagle Owl (*Bubo capensis*)

b) Structurally Semi-Transformed Areas

The study area contains areas where the Fynbos was cleared for agricultural activity in the past, which is now in a state of natural rehabilitation. These areas have previously been cultivated, probably for cereals, but this cultivation probably ceased more than twenty years ago, and there has been partial natural rehabilitation since then. This disturbance can be seen in the aerial imagery, where characteristic lines caused by ploughing are evident, and on-site, where the plant species present are typical of a previously disturbed area that has undergone partial passive rehabilitation (**Chapter 7.6**). Structurally this area is mainly scrub with a few scattered alien trees. These areas could occasionally be utilised by a limited number of Red Data species, mostly raptors such as Peregrine Falcon, Lanner Falcon and Martial Eagle, for foraging. Non-Red Data power line sensitive species that could also utilise this habitat include:

- Black-shouldered Kite (*Elanus caeruleus*)
- Jackal Buzzard (*Buteo rufofuscus*)
- Spotted Eagle Owl (*Bubo africanus*)
- Steppe Buzzard (*Buteo vulpinus*)
- Booted Eagle (*Aquila pennatus*)

Site Alternative 1 falls within the semi-transformed habitat (**Figure 7-15**).

c) Structurally Highly Transformed Areas

The study area has been heavily transformed in places, mostly through industrial infrastructure and alien tree infestation, which has formed dense stands in places. The most prominent woody invasive species are listed in **Chapter 7.6** above. This habitat is generally not very attractive to Red data species, but raptors such as Martial Eagle may occasionally use the trees for perching. There are several non-Red Data power line sensitive species that

could utilise this habitat, and depending on the height and density of the trees, even breed in them. This includes:

- Black-shouldered Kite (*Elanus caeruleus*)
- Jackal Buzzard (*Buteo rufofuscus*)
- Spotted Eagle Owl (*Bubo africanus*)
- Steppe Buzzard (*Buteo vulpinus*)
- Black Sparrowhawk (*Accipiter melanoleucus*)
- Rufous-chested Sparrowhawk (*Accipiter rufiventris*)
- African Fish-Eagle (*Haliaeetus vocifer*)
- African Harrier-Hawk (*Polyboroides typus*)

The trees in the structurally highly transformed areas are generally not tall enough for the aforementioned species to use them for breeding purposes, except perhaps Black-shouldered Kite.

d) Dams

There is a man-made dam located to the east of the study area (34°14'8.90"S; 19°11'21.42"E), which is surrounded by dense stands of alien trees. The dam is located approximately 260m from the eastern edge of LILO 2. Refer to **Chapter 7.5** for a detailed description of additional dams located within the region.

Although the dam is an artificial feature, which is understood to be fed by groundwater extracted via a nearby borehole, the site visit revealed that this dam does have some ecological value given that it is well vegetated by aquatic/wetland plants (mainly *Eleocharis limosa*, c.f. *Isolepis prolifera* and *Aponogeton* sp.) and thus provide wetland habitat suitable for habitation by invertebrates, amphibians and therefore may also attract water birds. The terrestrial area surrounding this dam is, however, highly disturbed by alien plant invasion and general transformation of the landscape for human activities (as stated in **Chapter 7.5**). During the site visit in February 2013, the dam was practically dry and therefore did not support any water birds. This situation is likely to change in the winter rainy season when the water levels should be higher. Waterbirds that could be attracted to the dams in the study area include several non-Red Data species such as:

- African Snipe (*Gallinago nigripennis*)
- Common Moorhen (*Gallinula chloropus*)
- Red-knobbed Coot (*Fulica cristata*)
- Yellow-billed Duck (*Anas undulate*)
- Yellow-billed Egret (*Mesophoyx intermedia*)
- African Spoonbill (*Platalea alba*)
- Three-banded Plover (*Charadrius tricollaris*)

It is unlikely that any Red Data power line sensitive species will be specifically attracted to the dams.

e) Agriculture

Approximately 1km to the east of the existing Houhoek Eskom Distribution Substation, the typical Overberg mosaic of grain fields interspersed with pastures, known as the Overberg

Wheatbelt, starts and continues eastwards for about 200km. This habitat is of specific importance to Blue Crane and Denham's Bustard (Young, *et al.*, 2003). It is unlikely that the latter two species will regularly occur in the study area, except as vagrants, as the habitat is not suitable.

Figure 7-15 shows the habitat composition in the study area. Appendix 1 contains photographic records of the avifaunal habitat at the site.

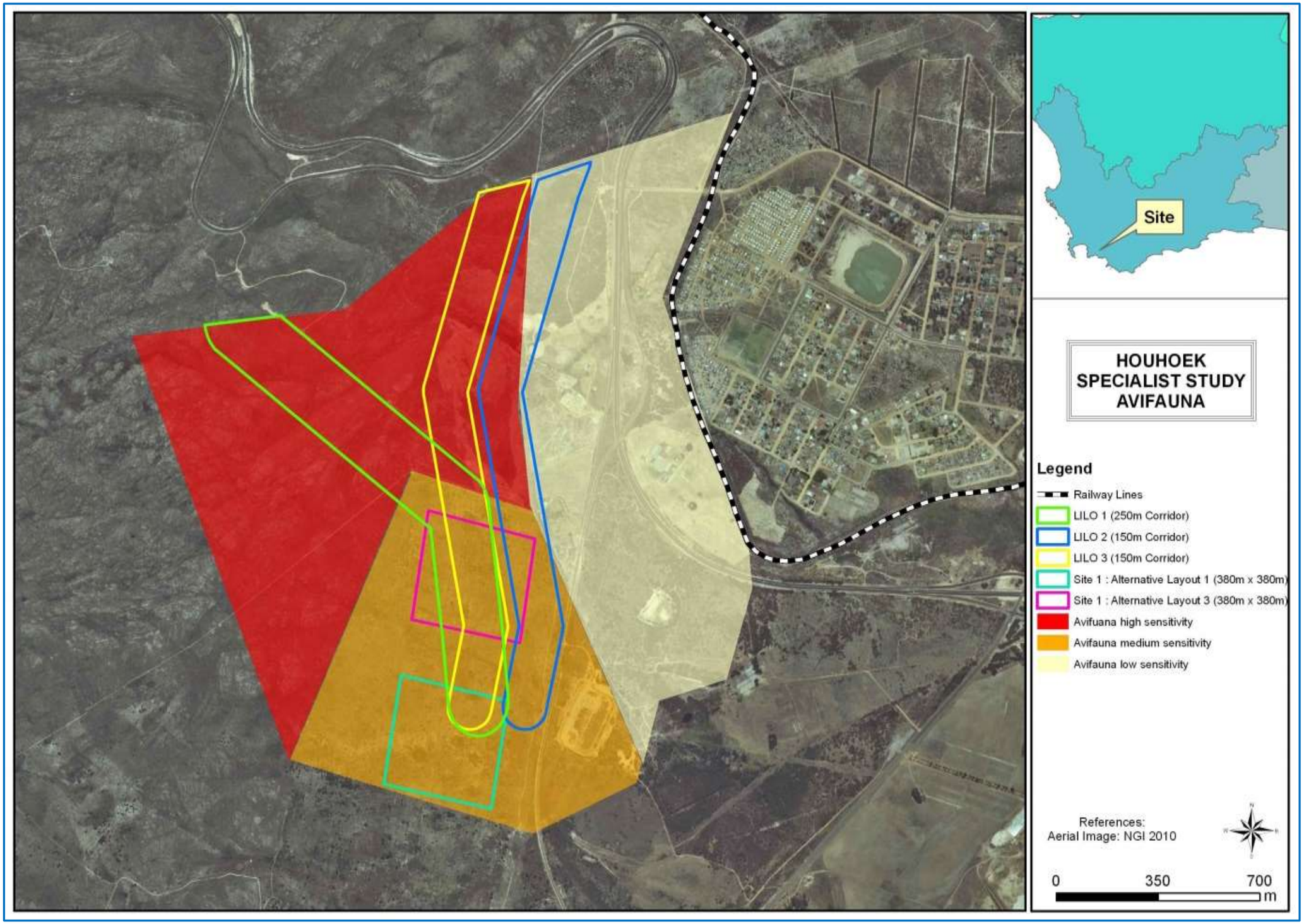


Figure 7-15: Bird Habitat in the Study Area (red = structurally untransformed, orange = structurally semi-transformed, white = structurally highly transformed)

7.7.2 Relevant Bird Populations

SABAP2 recorded a total of 187 species (13 Red Data) in the 3419AA Quarter-Degree Grid Cell (QDGC) (Barnes, 2000). Reporting rates are an indication of the relative density of a species on the ground in that it reflects the number of times that a species was recorded relative to the total amount of cards that were completed for the QDGC. In this instance, due to the relatively ample amount of checklists that have been completed, the reporting rate was regarded as a reliable reflection of densities on the ground.

Table 7-1 provides a guideline of the power line sensitive Red Data species that could potentially be encountered anywhere within the QDGC where suitable habitat is available. It also contains an assessment of the potential for a species to occur at the site, and the potential impact that could be associated with the species at the site. Species with a negligible potential to occur at the study area are excluded (e.g. coastal species).

Table 7-1: Species of Conservation Concern Recorded in 3419AA by SABAP2 (excluding coastal species and vagrants)

Species	Conservation Status (Barnes, 2000)	Preferred Habitat ((Harrison, *et al.*, 1997), (Barnes, 2000), (Hockey, *et al.*, 2005), personal observations)	SABAP2 Reporting Rate 3419AA (%)
Peregrine Falcon (*Falco peregrinus*)	Near Threatened	Mostly restricted to mountainous, riparian or coastal habitats, where high cliffs provide breeding and roosting sites. Breeding pairs prefer habitats that favour specialised, high-speed, aerial hunting, e.g. high cliffs overlooking vegetation with raised and/or discontinuous canopy (e.g. forest, Fynbos, woodland), or expanses of open water. Also uses quarries and dam walls, and frequents city centres where tall buildings substitute for rock faces.	2.6
Black Harrier (*Circus maurus*)	Vulnerable	In Western Cape mostly in Fynbos, especially Strandveld and Mountain Fynbos; less common in dry Restios and Renosterveld remnants.	2.1
Secretarybird (*Sagittarius serpentarius*)	Near Threatened	Grassland, open shrubland and agricultural fields.	1.1
Lanner Falcon (*Falco biarmicus*)	Near Threatened	Most frequent in open grassland, open or cleared woodland, and agricultural areas. Breeding pairs generally favour habitats where cliffs available as nest and roost sites, but will use alternative sites (e.g. trees, electricity pylons, buildings) if cliffs absent.	1.1
Blue Crane (*Anthropoides paradiseus*)	Vulnerable	In Western Cape, confined to cereal crop fields and planted pastures. In Overberg, switches seasonally between harvested cereal croplands (Nov-May), recently germinated cereals (Jun), and planted pastures (Jul-Sept); ploughed fields used year-round.	44.4
Martial Eagle (*Polemaetus bellicosus*)	Vulnerable	In the Western Cape in open shrubland with drainage line woodland or high-tension pylons, and open farmland with clumps of trees.	1.1

Species	Conservation Status (Barnes, 2000)	Preferred Habitat ((Harrison, *et al.*, 1997), (Barnes, 2000), (Hockey, *et al.*, 2005), personal observations)	SABAP2 Reporting Rate 3419AA (%)
Denham's Bustard (*Neotis denhamii*)	Vulnerable	In the Western Cape, inhabits mosaic of cultivated dry-land pastures, incl. grasses, lucerne, clovers (*Medicago* spp), crop fields (mainly cereals) and natural vegetation (short Fynbos, Renosterveld and Strandveld shrublands). Pastures favoured during winter (Apr-Aug), and harvested crop fields during summer (Nov-Mar). Avoids recently ploughed lands and fields with growing crops. Natural vegetation favoured during breeding season (Sept-Dec) but avoided at other times of year; use of artificial habitats exceeds that of natural vegetation year-round (typically < 10%; 45% Sept-Dec).	3.2

** As at 15 October 2012*

7.8 SOCIAL ENVIRONMENT

7.8.1 General Description of the Study Area

The study area falls within the jurisdiction of the TWK LM, which is the largest local authority within the Overberg District. It includes Villiersdorp, Grabouw, Botrivier, Caledon/Myddleton, Genadendal, Greyton and Riviersonderend. During 2007 it was estimated that the population total for the TWK reached approximately 86 000 individuals, with Botrivier having a population of approximately 4 000 residents. The 2011 statistics, however, indicated the population within TWK at 108 790 individuals.

The TWK LM is a rural area with various open spaces and numerous farming activities. The majority of the land is thus occupied by agriculture, small holdings and similar land uses. Botrivier, which falls within Ward 7 is mainly characterised by tourism-based activities with some manufacturing. There is a potential for expansion of its light manufacturing sectors.

7.8.2 Economic Sectors

Agricultural production in the area contributes to 36% of the local economy, with the manufacturing sector accounting for 12% of the local economy. The TWK LM can thus be described as an agricultural region due to its large tracts of agricultural land with only few small centres spread throughout the area. The economy is primarily agrarian (almost 50% including the agro-processing activities in the region) with a growing regional tourism, construction, financial and business services sectors. Grabouw is the largest economic centre, followed by Caledon. The area has a wealth of natural resources and excellent agri-tourism offerings.

Even though the agricultural sector in the area performed well (e.g. fruit production), the sector's limited expansion potential is of concern. A multi-pronged strategy that that could diversify and stimulate the local economy was recently agreed to. However, this is a long-term programme, and will require increased bulk infrastructure capacity to be implemented and land to be released.

The area is, however, also under pressure from the large pool of unskilled migrants from the Eastern Cape who flock into the area in search of work and a better life. Consequently, the number of unemployed people has grown.

7.8.3 Tourism Industry

At this stage tourism in and around the town of Botrivier is focused on the Botrivier Hotel (recently renovated), and local events such as the Barrels and Beards Harvest Celebration Festival and the Botriviera Spring Festival. Adventure tourism in the form of mountain bike races and trail running events in the area is growing and seeming to become more popular. Visitors to the local area can also partake in horse riding trails, quad biking, hiking trails and visits to the local wine farms. Scattered accommodation facilities for tourists are also on the increase.

Botrivier lies just off the Whale Route to Hermanus and the fact that the town forms part of the Cape Country Meander Route, and is also situated in the first Biodiversity and Wine Route in the world, adds to the viability of efforts to encourage tourism in the area. The town is also close to various popular coastal towns such as Kleinmond, Onrus, Sandbaai and Hermanus, as well as the internationally known Arabella Golf Estate. Botrivier furthermore borders the Kogelberg Biosphere, the 700 hectare nature reserve, which is famous for its fynbos and a UNESCO (United Nations Educational, Scientific and Cultural Organisation) declared World Heritage Site.

The development of the tourism sector, that contributes 13% to the local TWK LM economy, also offers a secondary income base for the local farming community. It aims to attract investment into the restaurants, retail and services sectors, all of which could improve the attractiveness of the greater area as a residential destination for people seeking a quieter and better quality life.

7.8.4 Demographic and Socio-Economic Characteristics

According to StatsSA (Community Survey of 2007) the TWK had a total population of 86 719 individuals with 23 464 households. A decline in the population was seen based on the previous total population figure of 93 276 individuals during the statistical survey of 2001 . Contradictory to the decline, the TWK IDP, however, estimated the total population within the area at 105 875 in 2008 and at 106 172 in 2009. The 2011 statistics, however, indicated the population within TWK at 108 790 individuals.

The TWK is thus the most populous municipality in the Overberg District, as it hosts 44% of the total district population. Botrivier falls within Ward 7 and is said to have approximately 1 085 households with an additional 412 households forming part of the informal settlement, New Frans.

As part of the TWK Spatial Development Framework (SDF), the population of Botrivier was estimated at approximately 5 266 individuals.

The unemployment rate in the municipal area was estimated at 39% with 31% of the households not having any income. According to the statistics gathered as part of the 2011 Census, the unemployment rate within the TWK was indicated as 15% and the youth

unemployment rate (15-34 years) at 20%. The SDF also estimated the poverty rate as high as it indicated that 74% of the population earned less than R3 500 per month.

Ward 7 has one primary health care clinic with the main water source being groundwater. Most of the erven in Botrivier is served by a waterborne sanitation system while the remainder of the households make use of conservancy tanks or a septic tank / soak away system.

7.8.5 Employment Figures

As part of the TWK SDF, Urban Econ stated that in 2010, "42.48% of the labour force (population falling between the economically active age groups of 15-64 years) are employed in either the formal or informal sectors of the economy, with 17.95% of the population (according to the narrow definition of unemployment) being unemployed and 39.93% being regarded as not economically active or have temporarily or permanently exited the labour market. Of the individuals employed in the economy the largest percentage of these (88.81%) are employed within the formal sector of the economy with only 11.19% being employed within the informal sector".

For this study one should thus consider those that are unemployed as well as those being regarded as not economically active. The 2011 figures (Unemployment Rate: 14.90% and Youth (15-34 years) Unemployment Rate: 19.80%) again emphasises the need for employment creation in the TWK area. One should further note that a large sector of the semi-skilled or unskilled workforce is seasonal employees due to the nature of the farming activities in the area (apple and pear production).

7.8.6 Skills Profile

The TWK profile of the skills levels in the local economy indicated that 50.62% of the work force can be categorised as being semi- or unskilled. 38.77% of the workforce is considered to be skilled workers having expertise within a limited economic field. A small percentage (10.62%) of the population is considered to be highly skilled, being employed in managerial or other high level positions.

7.8.7 Infrastructure and Services

Botrivier has a subsidized housing backlog of 353 units. The lack of adequate water sources and bulk infrastructure to handle the capacity is also seen as a hamper to development. Various households also do not have access to water borne sanitation and 177 residential erven was listed on the municipal indigent list.

7.8.8 Land use Profile

The study area is characterised by the town of Botrivier and the Vredendal settlement, including the more informal area New Frans. The rural landscape includes farmland (wine farms e.g. Wildekrans Wine Estate and the production of wheat), fynbos and natural mountainous areas.

From the Houwhoek Pass the N2 passes the town to the west, whereafter it turns in an easterly direction to the south of the town. The R43 splits from the N2 linking Botrivier with the R44 and towns such as Kleinmond and Hermanus. A railway line linking Cape Town and Caledon is situated to the north of the study area and the N2. On the eastern side of the

study area, the railway line passes the town of Botrivier to the west, with the Botrivier station situated in town.

As part of the SDF of the TWK LM, Botrivier is seen as rural node and agricultural service centre. The spatial vision of the TWK LM for Botrivier, however, is to promote the town as one of the N2 transport corridor "anchor" nodes and to stimulate growth through rail and road based transport-linked industrial and associated development.

7.9 VISUAL ENVIRONMENT

Landscape character is defined by the U.K. Institute of Environmental Management and Assessment as the 'distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, land form, soils, vegetation, land use and human settlement'. It creates the specific sense of place or essential character and 'spirit of the place' (Spon Press, 2002). The first step in the VIA process is determining the existing landscape context of the region and of the site(s) where the project is proposed.

The Overberg District is well known for the tourist value of its historical and natural features. Natural features include several rivers and water features such as the Theewaterskloof dam, Hottentots-Holland Mountain Catchment Area, Houwhoek River, Swart River, the Bot River and the Bot River Lagoon, to mention but a few. The Bot River, rising south of the Theewaterskloof dam, runs more or less north-south, passing to the east of the town of Botrivier, and flowing into the Atlantic Ocean through the Bot River Lagoon that lies between Kleinmond and Hawston. The marshy Bot River Lagoon forms wetlands that are home to thousands of waterfowl and South Africa's only herd of wild horses that roam a wetland habitat. The Houwhoek River joins the Bot River from the west, just north of the town of Botrivier, and the Swart River joins the Bot River a little further south. The Bot River is associated with a wide valley that is encompassed by mountains on either side which form a prominent natural feature within the region.

The study area falls within the southwest coastal region of the Core Cape Subregion (CCR) of the Greater Cape Floristic Region. The study area is part of the Fynbos biome. (Helme. 2013) Nature reserves in the subregion around the project area include: Hottentots-Holland Nature Reserve, Theewaters Nature Reserve, Witdraai Private Nature Reserve, Groenlandberg Nature Reserve, Babilonstoring Nature Reserve and Kogelberg and Houwhoek Nature Reserves.

There are future developments proposed within this region, which are described in further detail in **Chapter 3.3.4**. These developments include the proposed Caledon WEF and the Langhoogte WEF.

Vegetation in the region is characterised by typical fynbos plant species. Fynbos is a fragile resource and is very sensitive to threats, both natural and human-induced. Invasion of introduced alien plants is one of the chief threats to fynbos, covering some 15% of the natural habitats on the Agulhas Plain (excluding farmlands). These plants compete with fynbos and reduce the natural diversity, increase the threat of untimely fires, extract large quantities of water and are regarded as aesthetically unattractive. Other threats include the ploughing of marginal lands, insensitive and inappropriate developments, uncontrolled

harvesting of wildflowers, damage to vegetation caused by off-road vehicles and surface-mining activities.

7.9.1 Local Landscape Context

a) Houwhoek Nature Reserve

Houwhoek Nature Reserve makes up part of the Kogelberg Nature Reserve Complex (KNRC) and covers 970 ha. The KNRC falls within a biodiversity hotspot, the Cape Floristic Kingdom (CFK), and under the strategic Cape Action for People and the Environment (CAPE), which is focused on minimising key threats and root causes to biodiversity losses. From a biodiversity perspective, the nature reserve lies at a convergence between the north-south and west-east fynbos and marine corridors. The vegetation type is largely Kogelberg sandstone fynbos and is home to many rare and noteworthy plant species.

b) Botrivier Town

The small, picturesque village of Botrivier lies in the foothills of the Houwhoek Mountains, en route to Hermanus. The Bot River, after which the hamlet is named, meanders its way through a fertile valley surrounded by mountains covered in fynbos, historical wine farms and fields of wheat. This place of crossing in the Bot River originally served as a spot where early European settlers bartered butter with the Khoi-Khoi tribes, and the river was attributed with the name 'butter' from both sides - the Afrikaans word for butter is 'botter' and the Khoi-Khoi called it 'Couga', which means 'lots of butter'. (http://www.sa-venues.com/attractionswc/botrivier.php) Botrivier, which falls within Ward 7 is mainly characterised by tourism-based activities with some manufacturing. Botrivier lies just off the Whale Route to Hermanus and the fact that the town forms part of the Cape Country Meander Route, and is also situated in the first Biodiversity and Wine Route in the world, adds to the viability of efforts to encourage tourism in the area.

c) Existing Eskom Substation and Power Line Infrastructure

The existing Houhoek Eskom Distribution Substation is located to the south of the town of Botrivier. As a result of the substation, the area is strongly associated with existing transmission line infrastructure which can clearly be seen in the panoramic photograph The N2 Highway between Cape Town and Caledon borders the northern and eastern sides of the study area, whilst the R43 provincial road to Hermanus bisects the study area through the middle in a north-south direction. There is a railway line, also running between Cape Town and Caledon that is situated just outside the north and eastern border of the study area.

d) Routes and View Corridors

The town of Botrivier is prominently placed in clear view of the N2 and R43 scenic routes. The area is strongly associated with tourism and the N2 is a main tourist scenic corridor through the area between Cape Town and along the Garden Route.

e) Proposed Toll Road

SANRAL proposes to build a toll gate on the N2 adjacent to Site Alternative 1. They have already submitted the offer to purchase a portion of land from Wildekrans. There is a commercial/ industrial township to be constructed close to Wildekrans (i.e. south of Botrivier, in the triangle formed by the N2 and the arms of the R43) which has been

approved and will be commencing soon. Subdivision, and other related town planning requirements for the development, has also been approved.

f) Vegetation

Both Eskom MTS alternative sites have been previously cultivated, probably for cereals, however, there has been partial natural rehabilitation since then. Alien invasive species tend to be patchy, and woody invasive species generally cover less than 5 % of each alternative. The power line corridors both span Kogelberg Sandstone Fynbos, or remnants thereof. About 70 % of each corridor can be regarded as relatively pristine, with the remainder being disturbed or degraded (Ecological Assessment in **Appendix E-4**).

g) Agriculture / Viniculture

The areas surrounding Botrivier are rural in character with various open spaces and numerous farming activities. The majority of the land is thus occupied by agriculture, small holdings and similar land uses. This area hosts a variety of working farms that produce flowers, wine, lavender, olive oil, apples, and milk, as well as stud farms with mountain lodges, guest farms and cottages. Adjacent farmsteads and tourist destinations include the Theewaterskloof Wine Route featuring Luddite Wines, Beaumont Wine Cellar and Gabriëlskloof Wine Estate.

7.9.2 Site Landscape Character and Visibility Survey

In terms of the VRM methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and the distance of the proposed landscape modification from key receptor points.

In terms of the VRM methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and distance of the proposed landscape modification from key receptor points. The scenic quality is determined using seven key factors:

- Land Form: Topography becomes more interesting as it gets steeper, or more massive, or more severely or universally sculptured.
- Vegetation: Primary consideration given to the variety of patterns, forms, and textures created by plant life.
- Water: That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration.
- Colour: The overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) are considered as they appear during seasons or periods of high use.
- Scarcity: This factor provides an opportunity to give added importance to one, or all, of the scenic features that appear to be relatively unique or rare within one physiographic region.
- Adjacent Land Use: Degree to which scenery and distance enhance, or start to influence, the overall impression of the scenery within the rating unit.
- Cultural Modifications: Cultural modifications should be considered, and may detract from the scenery, or complement or improve the scenic quality, of a unit.

Sensitivity levels are a measure of public concern for scenic quality. Receptor sensitivity to landscape change is determined using the following factors:

- Type of Users: Visual sensitivity will vary with the type of users, e.g. recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
- Amount of Use: Areas seen or used by large numbers of people are potentially more sensitive.
- Public Interest: The visual quality of an area may be of concern to local, or regional, groups. Indicators of this concern are usually expressed via public controversy created in response to proposed activities.
- Adjacent Land Uses: The interrelationship with land uses in adjacent lands. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be as visually sensitive.
- Special Areas: Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas, Scenic Roads or Trails, and Critical Biodiversity Areas frequently require special consideration for the protection of their visual values.
- Other Factors: Consider any other information such as research or studies that include indicators of visual sensitivity.

Table 7-2 is used to define the VRM Classes that represent the relative value of the visual resources of an area:

- Classes I and II are the most valued.
- Class III represents a moderate value. If adjacent areas are Class III or lower, assign Class III, if higher, assign Class IV.
- Class IV is of least value.

This is undertaken making use of the matrix below developed by BLM Visual Resource Management method as seen below, which is then represented in a visual sensitivity map. Sensitivity level A has a scenic quality rating of ≥19. Sensitivity level B has a scenic quality rating of 12 – 18, Sensitivity level C has a scenic quality rating of ≤11.

Table 7-2: Visual sensitivity levels

		VISUAL SENSITIVITY LEVELS								
		High			Medium			Low		
SCENIC QUALITY	A	II	II	II	II	II	II	II	II	II
	B	II	III	III/IV	III	IV	IV	IV	IV	IV
	C	III	IV	IV	IV	IV	IV	IV	IV	IV
DISTANCE ZONES		Fore/middle ground	Background	Seldom Seen	Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen

Six locations, which are associated with the various proposed project activities, were surveyed during the field study to determine scenic quality, receptor sensitivity to landscape change and distance from nearest receptors. Making use of the ASTGTM survey data, a terrain model was generated for the area around the proposed project activity and using the viewshed the receptors for each activity were identified. The extent of the viewshed analysis was restricted to six kilometres from the site due to the higher visual absorption capacities of the landscape where changes to the landscape character would mainly be associated with the six kilometre foreground / middle ground distance zones.

Key Observation Points (KOPs) are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations are important in terms of the VRM methodology, which requires that the Degree of Contrast (DoC) that the proposed landscape modifications will make to the existing landscape is measured from these most critical locations, or receptors, surrounding the property. The DoC generated by the proposed landscape modifications is measured against the existing landscape context in terms of the elements of form, line, colour and texture. Each alternative activity is then assessed in terms of whether it meets the objectives of the established class category, and whether mitigation is possible (Bureau of Land Management, 2004).

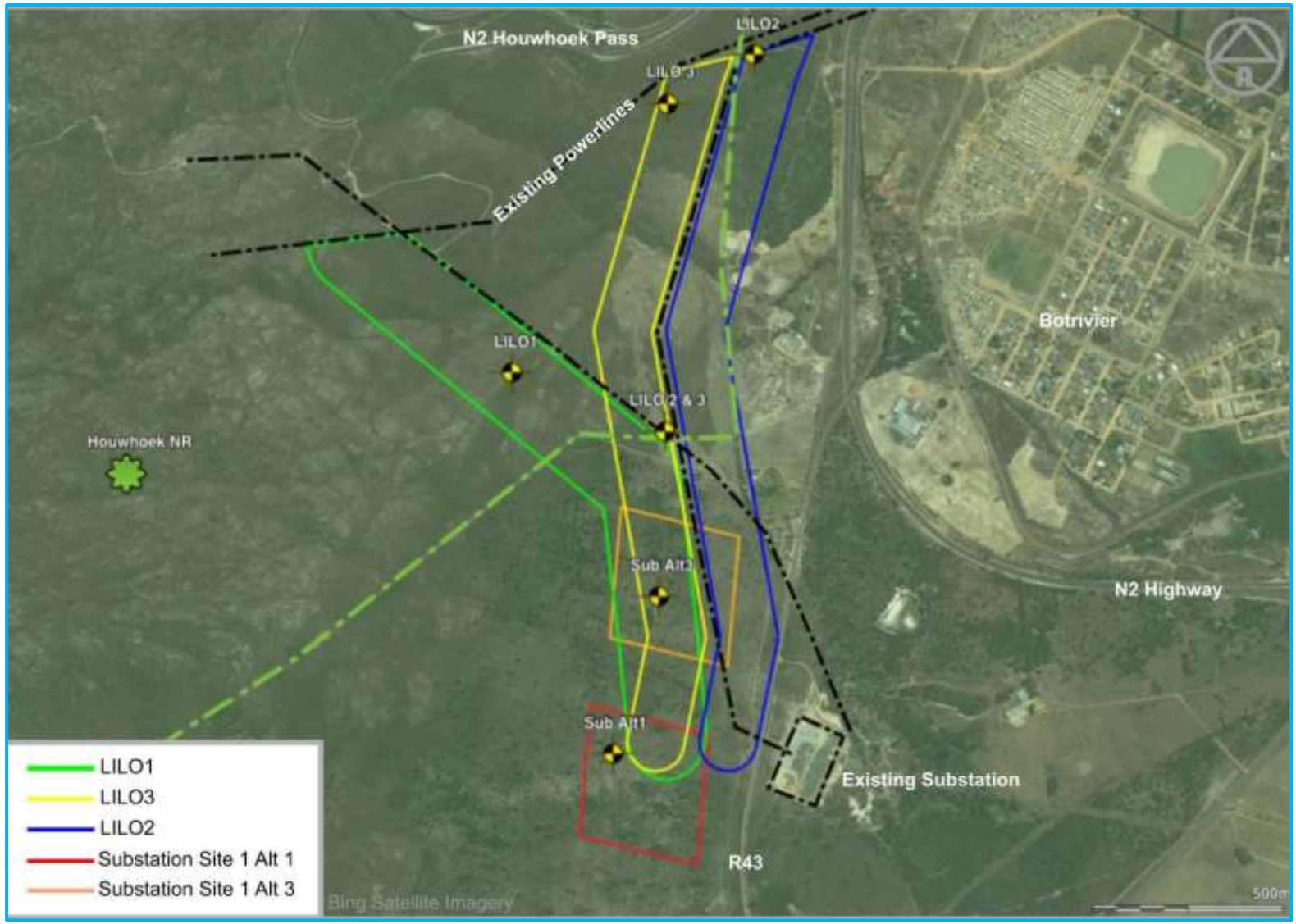


Figure 7-16: Survey Point Locality Map

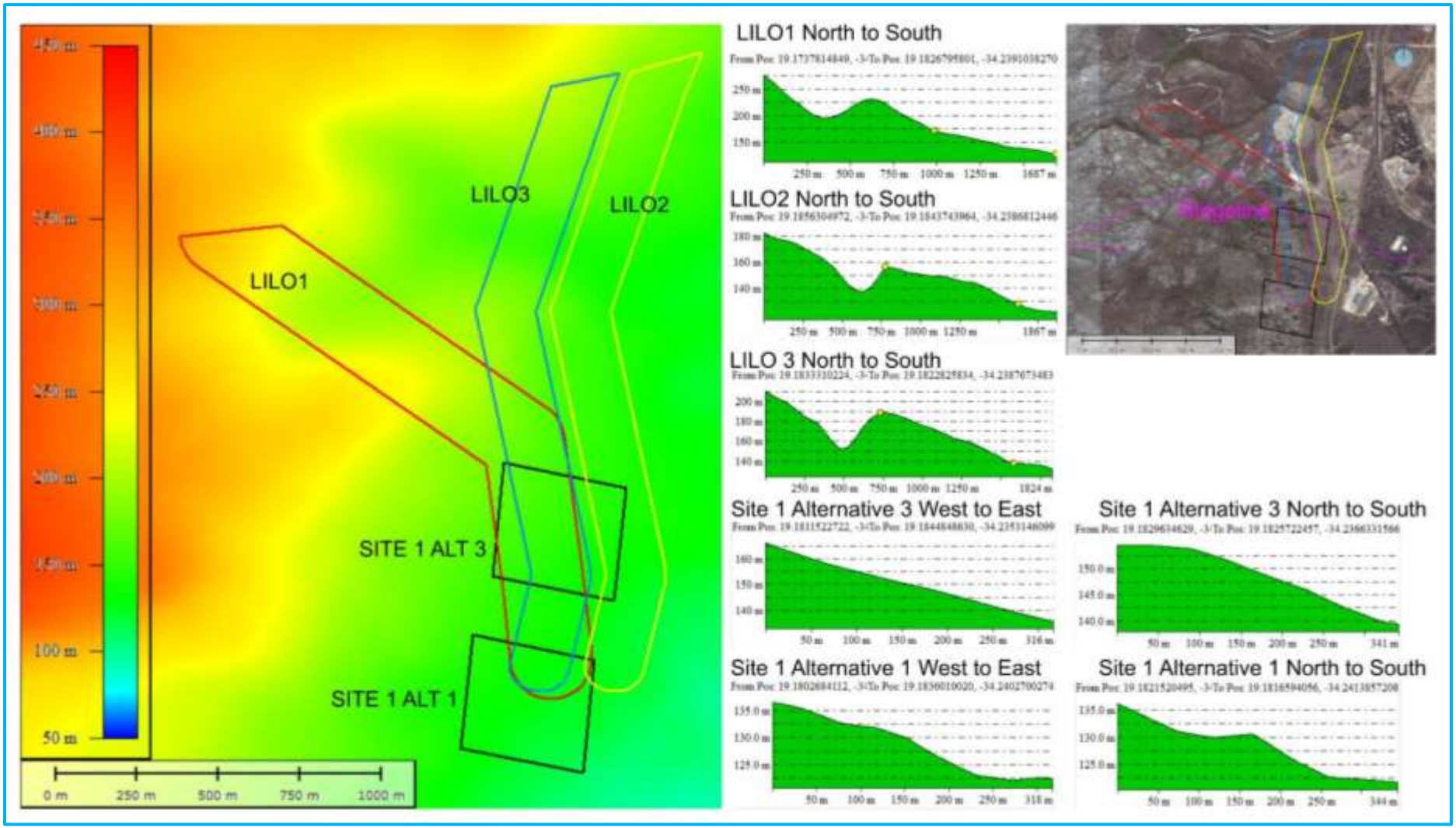


Figure 7-17: Substation Site Elevation Maps (North Up)

Table 7-3: Site visibility, Zone of Visual Influence and Exposure Table

Project component	Approximate Height	Dominant Land Use On-Site	Visibility	Visual Absorption Capacity	Zone of Visual Influence
Layout Alternative 1	20m	Vacant private land with agricultural zoning	High	Low	High
Layout Alternative 3	20m	Vacant private land with agricultural zoning	High	Low	High
LILO 1	40m	Nature reserve and power line corridor	High	Medium	High
LILO 2	40m	Vacant private land and power line corridor	Medium	High	High
LILO 3	40m	Vacant private land and power line corridor	Medium	High	Medium

Table 7-4: Site Scenic Quality

Project component	Landform	Vegetation	Water	Colour	Adj. Scenery	Scarcity	Cultural Modifications	Total	VRM Scenic Quality Category	Scenic Quality Rating
Layout Alternative 1	2	1	1	1	3	2	0	10	C	Medium to Low
Layout Alternative 3	2	1	1	1	1	2	-2	6	C	Low
LILO 1	4	5	1	3	2	4	-2	17	B	Medium to High
LILO 2	3	1	1	2	1	2	-3	7	C	Low
LILO 3	3	2	1	3	1	2	-2	10	C	Medium to Low

Table 7-5: Receptor Sensitivity to Landscape Change Table

Project component	Receptors	Exposure	Type Users	Amount of use	Public interest	Adj. land users	Special areas	Receptor sensitivity to landscape change
Layout Alternative 1	R43 & N2 westbound at distance	High	High	High	Medium	High	Low	Moderate to High
Layout Alternative 3	R43 & N2 westbound at distance	High	High	High	Medium	High	Low	Moderate to High
LILO 1	N2 Houwhoek pass, Botriver residents, N2 westbound	Medium	High	High	High	High	High	High
LILO 2	N2 and Botrivier residents	High	High	Medium	Medium	High	Low	Moderate to High
LILO 3	N2 and Botrivier residents	High	High	Medium	Medium	High	High	Moderate to High

Table 7-6: VRM Management Classes and Key Observation Points Table

Project Component	VRM Scenic Quality	Receptor Sensitivity	Visual Inventory	Visual Resource	KOP
Layout Alternative 1	C	Moderate to High	Class III	Class III	R43 and N2 westbound
Layout Alternative 3	C	Moderate to High	Class III	Class III	R43 and N2 westbound
LILO 1	B	High	Class II	Class II	N2 Houwhoek Pass and N2 westbound 2
LILO 2	C	Moderate to High	Class III	Class III	N2 eastbound
LILO 3	C	Moderate to High	Class III	Class III	N2 eastbound

7.9.3 Photomontages

The main view as seen from the N2 westbound was generated as a photomontage (see **Figure 7-19**, **Figure 7-20** and **Figure 7-21**). The KOP and a view line map are shown in **Figure 7-18**, whilst the points of visual concern map are shown in **Figure 7-22**.

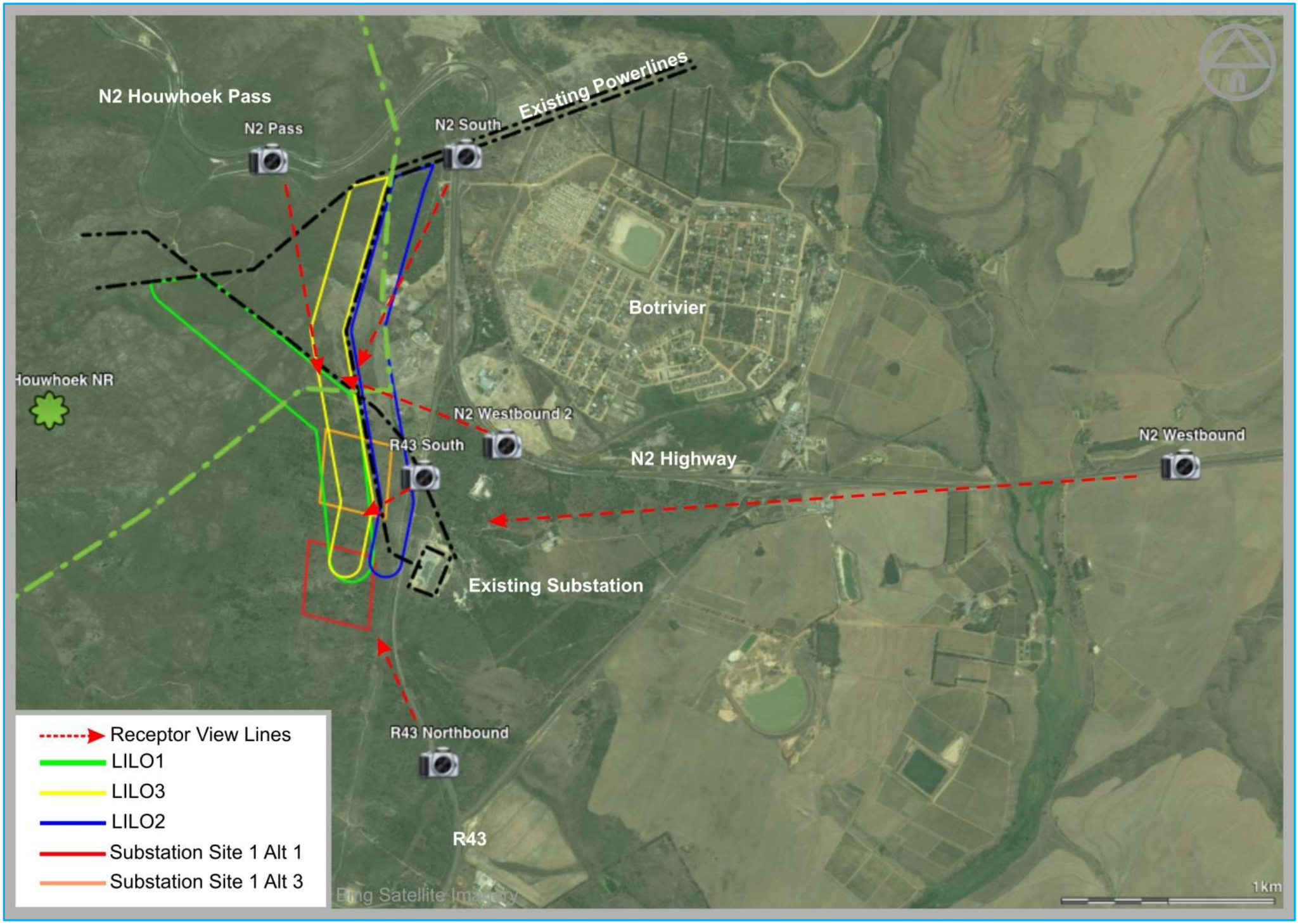
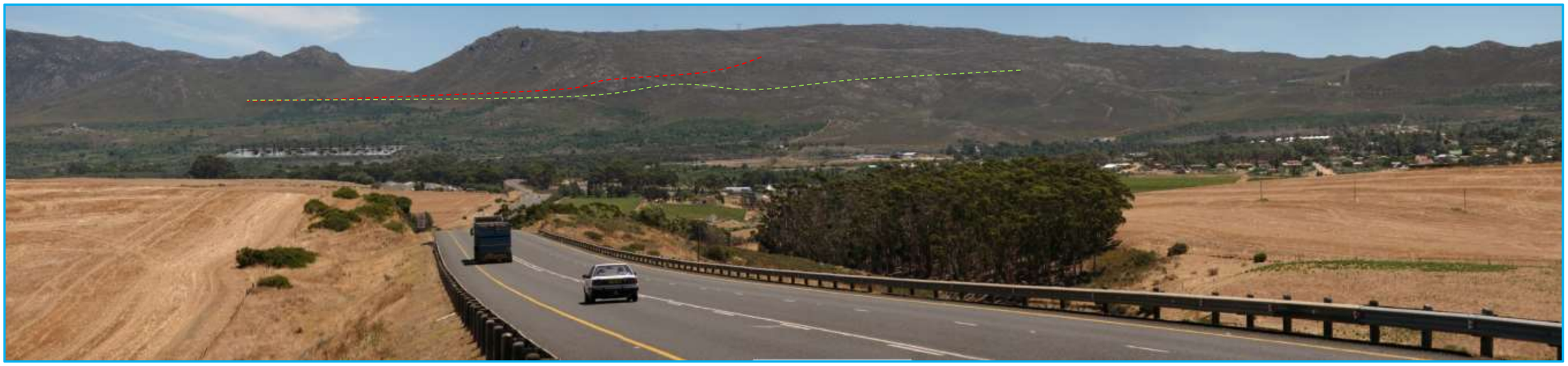


Figure 7-18: Key Observation Point and View Line Map

Existing view from N2 Highway Westbound



Photomontage of proposed development at distance of 3.4 kilometres *(Red line LILO1, Green line – LILO3)*

For illustrative purposes only

Figure 7-19: Photomontage of Site Alternative 1: Layout 1 – View from N2 Highway Westbound

Existing view from N2 Highway Westbound

Photomontage of proposed development at distance of 3.4 kilometres *(Red line LILO1, Green line – LILO3)*

For illustrative purposes only

Figure 7-20: Photomontage of Site Alternative 1: Layout 3 – View from N2 Highway Westbound

N2 Highway Westbound 2 indicating approximate LILO 1 routing in red and LILO 2 & 3 routing in green

N2 Houwhoek Pass view towards LILO 1 approximate routing

For illustrative purposes only

Figure 7-21: Views of LILO Alternatives as seen from the N2 Highway

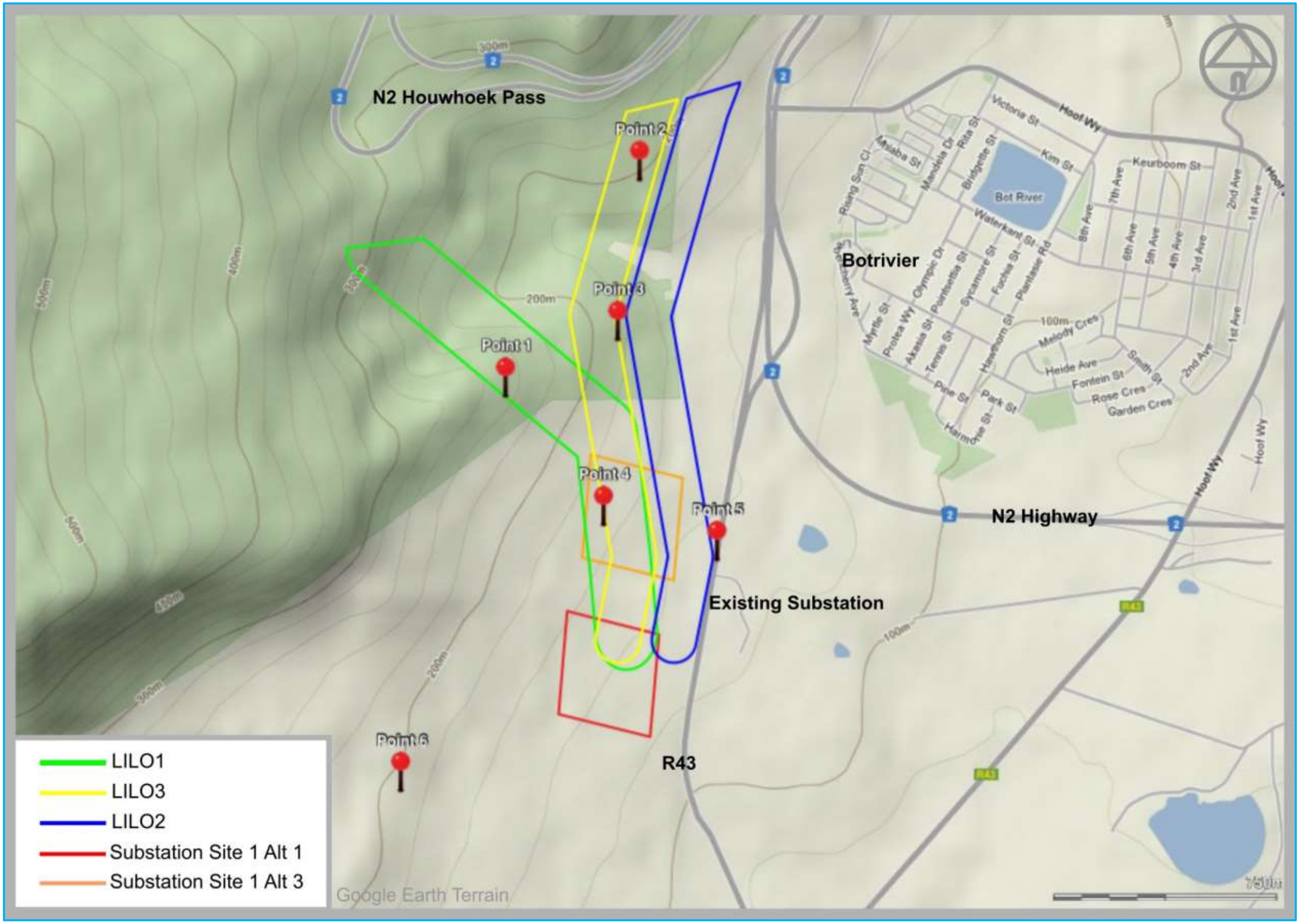


Figure 7-22: Points of Visual Concern Map, N2 Houwhoek Pass view towards LILO 1 approximate routing

7.10 HERITAGE ENVIRONMENT

Prior to the arrival of the first Dutch freeburgers, the land was settled by the Khoekhoen, who moved across the landscape, following a trans-human cycle with their livestock. It was the attraction of trade with the Khoekhoen, which prompted the establishment of a VOC outpost at Compagnies Drift (the present Beaumont Wine Estate at Botrivier) prior to 1745.

This area has been subject to generations of agriculture. The farm Botrivier, for example, was one of the earliest farms in the Overberg to obtain a licence for the sowing of wheat dating back to 1708 (Du Toit, 2004) and merino sheep were bring grazed on the farm of Boontjieskraal (midway between Botrivier and Caledon) by 1803.

There are many historic farms in the broader region, some with buildings dating back to the 18th Century. Botrivier and the hinterland was accessed by a historic pass, which descended down the mountain towards Botrivier – this pass survived in part to this day, while the lower reaches are still driveable in an off-road vehicle. Within the study area there are no historic structures. The property known as the Bakenhoogte Olive Farm does not contain any historic elements – the existing dwelling house is a gabled revivalist building of late 20th century origin.

The entire surrounding area is rural in character, with wheat and stock farming and some viticulture (wine-making) being the primary activities. This landscape has been transformed by generations of farming and represents an agricultural landscape (also termed "Rural Farmland Landscape") of cultural significance. The study area consists mainly of old re-vegetated agricultural land on the lower slopes of the Kogelberg.

Existing electrical infrastructures (132kV Houhoek Eskom Distribution Substation, 132kV and 400kV power lines) traverse the study area. The broader area is also considered to have aesthetic value with high tourism potential being situated adjacent to the N2 Highway and on the route to a number of important tourist towns such as Greyton, Genadendal and Hermanus. See **Chapter 7.9** for further details of the visual environment and **Chapter 7.6** for further details of the vegetation.

7.10.1 Palaeontology

The Bokkeveld Group formations that underlie the Botrivier area are known to be richly fossiliferous elsewhere in the Western Cape (Almond, 2012). However, in the Botrivier-Caledon region, their original fossil content appears to have been almost completely destroyed by a combination of intense tectonic deformation (folding, faulting, cleavage development) and deep chemical weathering. The Table Mountain Group formations represented extreme west of the study area (Houhoekberge) are only sparsely fossiliferous, and have also suffered intense chemical weathering. The effective palaeontological sensitivity of all the rock units represented within the study area is consequently low to very low.

7.10.2 Pre-Colonial and Colonial Archaeology

The study area will contain scattered Stone Age archaeological material dating from the Early, Middle and Late Stone Age periods. The survey of the Caledon WEF (Webley & Halkett, 2011) and the Langhoogte WEF identified at least nine scatters of Early Stone Age material on ploughed lands. The stone tools included quartzite flakes, flaked cobbles, cores including discoid cores and some crude bifaces (hand axes). In the survey on the farms Klipheuwel and Dassiesfontein to the south of the N2 Highway, some scatters of Early Stone Age material was also identified (Hart, 2010). Another consultant (Kaplan, 2006) has also undertaken surveys around the Botrivier area and found a number of Early Stone Age artefact scatters.

The small, picturesque village of Botrivier lies in the foothills of the Houwhoek Mountains, *en route* to Hermanus. The Bot River, after which the hamlet is named, meanders its way through a fertile valley surrounded by mountains covered in Fynbos, historical wine farms and fields of wheat. A place of crossing in the Bot River originally served as a spot where early European settlers bartered butter with the Khoi-Khoi tribes, and the river was attributed with the name 'butter' from both sides – the Afrikaans word for butter is 'botter' and the Khoi-Khoi called it 'Couga', which means 'lots of butter' (Net-Focus Interactive, 2012).

7.10.3 Cultural Landscape

The general historic context of the study area is significant (Overstrand Heritage Landscape Group, 2009). However the cultural landscape at the actual study area has already been heavily impacted by Transmission and Distribution power lines, the N2 and the existing Houhoek Eskom Distribution Substation. There are some historic buildings on properties in the study area, such as Wildekraans Wine Estate to the east, and Compagnies Drift (now Beaumont Wine Estate) to the west, next to the village of Botrivier. These however are too far from the study area to be affected by the proposed project. The study area is very localised and situated well clear of any known historic properties. There is no evidence of any historical structures or ruins on any of the proposed alternative sites.

While the N2 highway is not strictly an historic route, it is a potentially sensitive visual receptor, which will need to be considered in terms of the placement of facilities (see the visual landscape in **Chapter 7.9**).

7.11 TRANSPORTATION NETWORK

7.11.1 Existing Transportation Network

The main roads within the study area are the N2 national highway and the R43 provincial road. From the town of Botrivier along the N2, Somerset West can be accessed to the west, and Caledon can be accessed to the east. Hermanus can be accessed along the R43 to the south of Botrivier and the study area. The R42 is also linked in a Y-shape and intersects the N2 at two off-ramps within 2km of each other (**Figure 3-9**).

Hoof Way is located along the northern boundary of Botrivier. The western connection of Hoof Way is with the N2, which is directly opposite Site Alternative 2. Hoof Way continues as a boundary around Botrivier and intersects with the N2 again to the south-west of Botrivier.

This is the same intersection as described in the paragraph above. Hoof Way then continues in a south-easterly direction and is named the R43.

There is an access road from the N2 Highway that leads to the existing Houhoek Eskom Distribution Substation. Under the present circumstances, Site Alternative 3 may also be accessed via this road.

The Botrivier Train Station is located at the north-eastern corner of the town. The associated railway line enters Botrivier from the north-western corner and forms the boundary around the existing residential area of Botrivier.

7.11.2 Planned Road Network Improvements

The following road network improvements are planned for the study area:

- **Upgrading/Widening of the R43:** The Western Cape: Department of Transport and Public Works (WC:DoT) was approached to obtain its planning for the upgrading/widening of the R43. It was established that although it is the WC:DoT's intention to upgrade the R43, conceptual planning to identify the geometric alignment and ultimate cross-section has not yet been undertaken. The Department is, therefore, not in a position to provide guidance in this respect.
- **Upgrading/Tolling of the N2 Freeway:**
    - A meeting was held with HHO Africa, the transportation consultant for the N2 Toll Consortium, and plans were obtained showing the extent of road improvements and the location of the tolling facilities in the vicinity of the potential sites for the proposed Asteria Eskom MTS. The improvements are summarised in the plan in **Figure 7-25**.
    - As part of the upgrading of both the R43 and the N2, access to adjacent properties will be rationalised and many of the properties that presently obtain access directly off either of these two roads will have their existing access closed and an alternative access provided.
    - The planning for the tolling of the N2 freeway shows that the preliminary design for the proposed Toll Plaza on the R43 incorporates the access to the existing 132kV Houhoek Eskom Distribution Substation.

These planned road infrastructure improvements are shown in **Figure 7-23** (Layout Alternative 1) and **Figure 7-24** (Layout Alternative 3).

Figure 7-23: Planned Road Infrastructure Improvements at Site Alternative 1: Layout Alternative 1

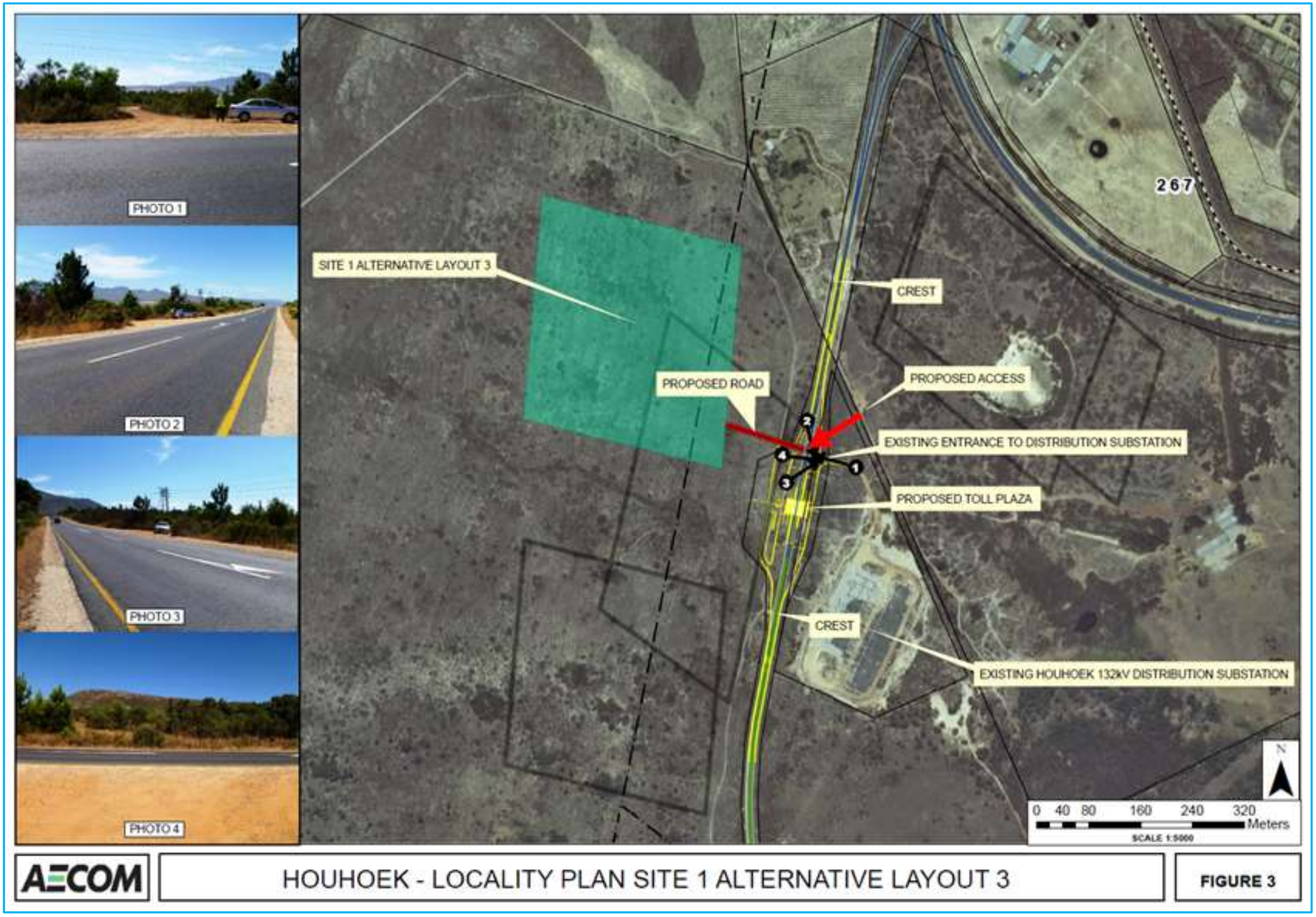


Figure 7-24: Planned Road Infrastructure Improvements at Site Alternative 1: Layout Alternative 3

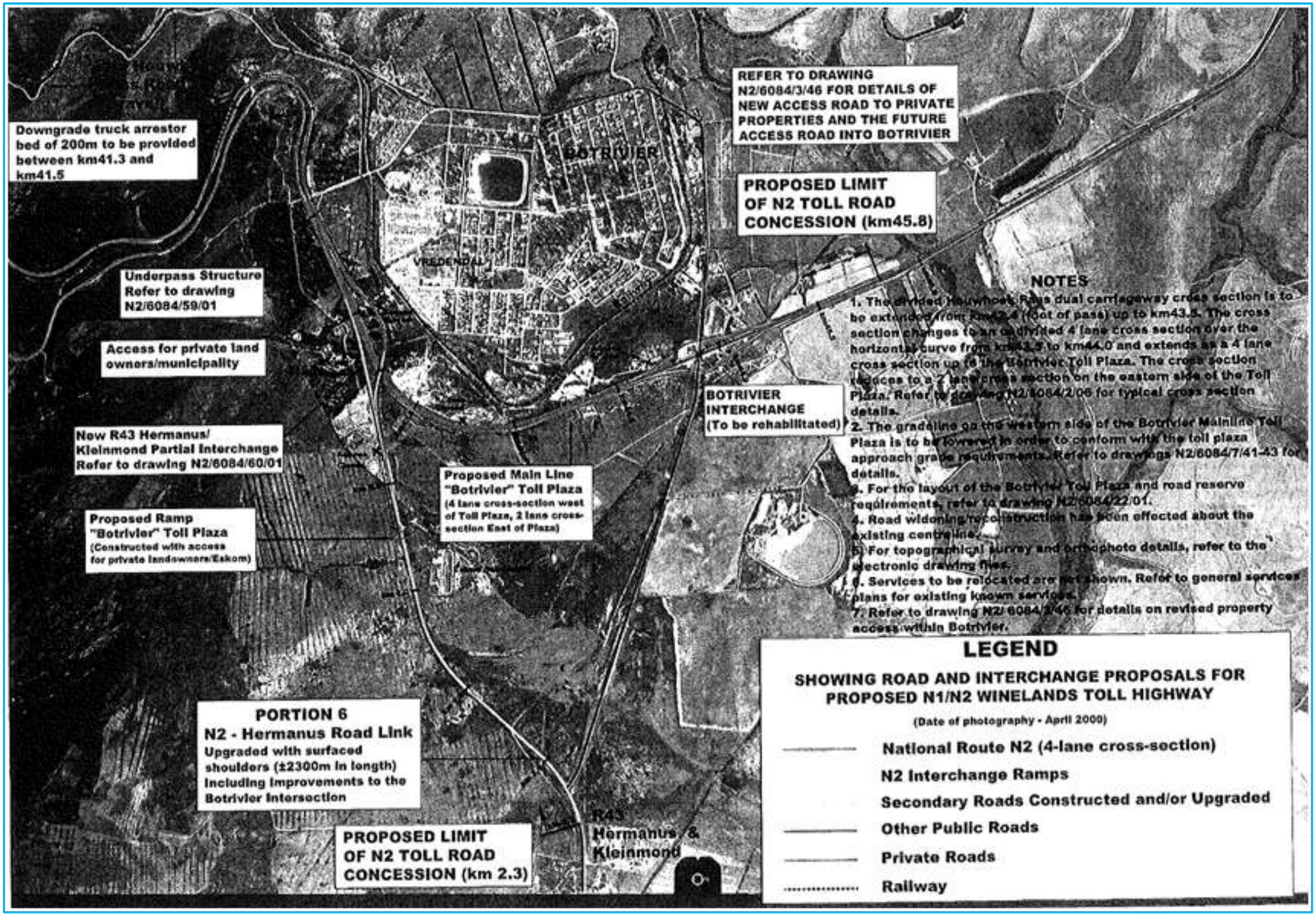


Figure 7-25: Planned Road Network Improvements (N2 Toll Consortium)

8 ASSESSMENT METHODOLOGY

8.1 ASSESSMENT METHODOLOGY

8.1.1 Impact Assessment Criteria

The criteria used for the assessment of the potential impacts of the Asteria Eskom MTS projectare described in **Table 8-1**. In addition, cumulative impacts will be included as part of the Impact Assessment Process.

Table 8-1: Impact Assessment Criteria

Criteria	Description
Nature	Includes a description of what causes the effect, what will be affected and how it will be affected.
Extent	Physical and spatial scale of the impact.
Duration	Lifetime of the impact is measured in relation to the lifetime of the Asteria Eskom MTS project.
Intensity	Examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment.
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.
Status	Description of the impact as positive, negative or neutral, and direct or indirect.
Significance	Synthesis of the characteristics described above and assessed as low, medium or high. Distinction will be made for the significance rating without the implementation of mitigation measures and with the implementation of mitigation measures.

8.1.2 Extent

The physical and spatial scale of the impact is classified below.

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

8.1.3 Duration

The lifetime of the impact is measured in relation to the lifetime of the Asteria Eskom MTS project, as shown in the following table.

Description	Explanation	Scoring
Short-term	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-medium term	Impact will be relevant through to the end of the construction phase.	2
Medium-term	Impact will last up to the end of the development phases, where after it will be entirely negated.	3
Long-term	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

Description	Explanation	Scoring
Permanent	The only impact class that is non-transitory. Mitigation by man or natural process will not occur in such a way or time span that the impact can be considered transient.	5

8.1.4 Intensity

The assessment of the intensity of the impact will be a relative evaluation within the context of all the activities and the other impacts within the framework of the project. The intensity will be measured using the criteria listed in the following table.

Description	Explanation	Scoring
Low	Impact alters the affected environment in such a way that the natural processes or functions are not affected.	2
Low-Medium	Impact alters the affected environment in such a way that the natural processes or functions are slightly affected.	4
Medium	Affected environment is altered, but functions and processes continue, albeit in a modified way.	6
Medium-High	Affected environment is altered, and the functions and processes are modified immensely.	8
High	Function or process of the affected environment is disturbed to the extent where the function or process temporarily or permanently ceases.	10

8.1.5 Probability

Probability describes the likelihood of the impact(s) occurring for any length of time during the lifecycle of the activity, and not at any given time. The following table shows the classes.

Description	Explanation	Scoring
Improbable	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	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
Definite	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

8.1.6 Confidence

The level of knowledge or information that the EAP or a specialist had in their judgement is rated as shown in the following table.

Description	Explanation
Low	Judgement is based on intuition and not on knowledge or information.
Medium	Judgement is based on common sense and general knowledge.
High	Judgement is based on scientific and/or proven information.

8.1.7 Reversibility

Reversibility is the ability of the affected environment to recover from the impact, with or without mitigation.

Description*	Explanation
Yes	The affected environment will be able to recover from the impact.
No	The affected environment will be unable to recover from the impact, that is, permanently modified.

* Note that this criterion is not given a numerical value.

8.1.8 Replaceability

Replaceability is an indication of the scarcity of the specific set of parameters that make up the affected environment. That is, if lost can the affected environment be (a) recreated, or (b) is it a common set of characteristics and thus if lost is not considered a significant loss.

Description*	Explanation
Yes	Affected environment is replaceable, that is, an irreplaceable resource is not damaged, or the resource is not irreplaceable (not scarce).
No	Affected environment is irreplaceable.

* Note that this criterion is not given a numerical value.

8.1.9 Level of Significance

Based on the criteria in **Chapter 8.1.2** to **8.1.6**, the significance of issues was determined using the following formula, which is the importance of the impact in terms of physical extent and time scale, and is rated as per **Table 8-2**:

Significance = (Scale + Duration + Intensity) × Probability

Table 8-2: Impact Assessment Significance Rating

Significance	Description	Scoring
No Impact	There is no impact.	0 – 10
Low	Impacts are less important. Some mitigation is required to reduce the negative impacts.	11 – 30
Medium	Impacts are important and require attention. Mitigation is required to reduce the negative impacts.	31 – 60
High	Impacts are of high importance. Mitigation is essential to reduce the negative impacts.	61 – 89
Fatal Flaw	Impacts present a fatal flaw, and alternatives must be considered.	90 – 100

8.2 MITIGATION

Section 24(4)(b)(ii) of the EIA Regulations (2010) requires an investigation of mitigation measures. The purpose of mitigation measures is to reduce the significance level of the anticipated impact. Therefore, the reduction in the significance level after mitigation is directly related to the scores used in the impact assessment criteria.

Mitigation for significant issues will be incorporated into the EMPr. The level of significance after mitigation will indicate whether an impact can be reversed or cause irreplaceable loss of resources.

8.3 CUMULATIVE IMPACTS

A cumulative impact, in relation to an activity, is the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts arising from similar or other activities in the area. The possible cumulative impacts of this project will be considered.

9 ASSESSMENT OF IDENTIFIED ENVIRONMENTAL IMPACTS

The purpose of this section is to provide a description of all environmental (biophysical, social, cultural-historic and economic) issues that were identified as potential impacts during the scoping phase of the EIA process, an assessment of the significance of each issue and an indication of the extent to which the impact could be addressed by the adoption of mitigation. This is undertaken in accordance with Section 28(1)(g) of the EIA Regulations (2010). This enables the EIA Report to be clearly focused and provides a framework for the impact assessment of the Asteria Eskom MTS projecton the environment, and of the environment on the Asteria Eskom MTS project.

9.1 IDENTIFIED IMPACTS

The impacts identified in the SR for the study area were as follows:

- Climatology
- Air Quality
- Geotechnical Impacts
- Soil and agricultural potential impacts
- Impacts on freshwater ecosystems
- Ecological impacts
- Avifauna impacts
- Socio-economic impacts
- Visual impacts
- Heritage impacts
- Traffic impacts
- Town planning impacts

9.2 CLIMATOLOGICAL IMPACT ON ESKOM INFRASTRUCTURE

The vertical sag of a Transmission power line is the distance between the highest point of the power line and the lowest point at the horizontal curve of the power line. The vertical sag is thus dependent on the ambient temperature due to thermal expansion of the power line. It is understood that the larger the vertical sag, the less efficient the power line capabilities. Taking the temperature variations in the Cape Region into consideration, the power lines cannot be placed more than 500m apart. **Figure 9-1** shows the vertical sag in relation to a typical power line.

In addition to the vertical sag, the climate has an impact on the power line in the form of the wind conditions. The average wind speed is 7.5m/s, which means that the vertical sag (as explained above) will cause the power line to swing in a horizontal direction, which will increase risk within the servitude area. It has thus been considered as part of the requested servitude width of 110m. The shorter the distance between towers, the shorter the horizontal swinging will be.

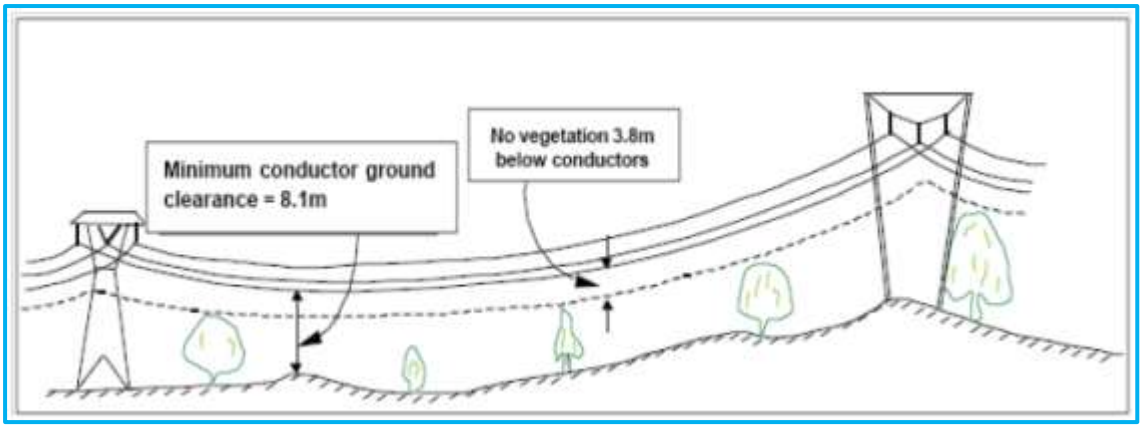


Figure 9-1: Vertical sag for power lines

9.3 AIR QUALITY

Air pollution in the study area is mostly caused by veld fires created by lightning, planned fires to burn Fynbos or agricultural lands, and the burning of fuel wood for heating and cooking purposes in the residential areas. The addition of diesel fumes during the construction period is considered to be negligible and does not warrant an air quality specialist study.

According to Roberge (2011), the coastal regions extending some 4-5 km inland tend to be most corrosive due to the effect of windswept chlorides. High humidity levels tend to exacerbate the detrimental effects of such chlorides. In addition to industrial pollution, low level atmospheric pollution often results from coal combustion in stoves, as well as coal-heated boilers that are found in hospitals and factories. However, the study area is located more than 15km from the coastal region. Hence, corrosion impacts on the Eskom infrastructure are reduced in significance.

THEME	AIR QUALITY	
Impact focal point	**The impact of the ambient air quality levels on Eskom infrastructure**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Corrosive properties of the air pollution within the study area could affect Eskom infrastructure	
Status of impact	Negative, direct	Negative, direct
Extent of impact	Footprint (1)	Site (2)
Duration of impact	Short-Medium-term (2)	Long-term (4)
Intensity of impact	Low (2)	Low (2)
Probability	Possible (2)	Possible (2)
Calculation	(1+2+2) × 2 = 10	(2+4+2) × 2 = 16
Level of significance before mitigation	**No impact**	**Low**
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	Vehicles and machinery will be maintained in good running condition. Stockpiles (e.g. soil) should be maintained for as short a time as possible and should be enclosed by windbreak enclosures of a similar height to the stockpile. Stockpiles should be situated away from the site boundary, water resources and nearby receptors, and should consider the predominant wind direction.	

THEME	AIR QUALITY	
Impact focal point	**The impact of the ambient air quality levels on Eskom infrastructure**	
Phase	**Construction Phase**	**Operational Phase**
	During the transfer of material to stockpiles, the drop heights should be minimised to control the dispersion of materials. The Contractor will be solely responsible for the management and mitigation of dust generation. The Contractor shall routinely spray all dust-generating surfaces with water, a dust suppressing agent or similar substance to prevent dust generation. Potable water will not be used as a dust suppressing agent and only recycled and/or rainwater is to be used, when available. All vehicles transporting material that can be blown off (e.g. soil and rubble) must be covered with a tarpaulin. Handling of soils is not to be conducted during high winds.	
Level of significance after mitigation	**No Impact**	**Low**

THEME	AIR QUALITY DUE TO VELD FIRES	
Impact focal point	**The impact of the ambient air quality levels due to veld fires in the region on Eskom infrastructure**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Corrosive properties of the air pollution due to the veld fires within the study area could affect Eskom infrastructure	
Status of impact	Negative, direct	Negative, direct
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Short-term (1)	Short-term (1)
Intensity of impact	Low-Medium (4)	Medium (6)
Probability	Likely (3)	Likely (3)
Calculation	(3+1+4) × 3 = 24	(3+1+6) × 3 = 30
Level of significance before mitigation	**Low**	**Low**
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	• All natural veld outside the development footprint should be marked as no-go areas during the construction. • The fire management plan must be approved by the DAFF in terms of the applicable legislation and by-laws of TWK LM. • Monitor and maintain fire break requirements in terms of construction activities on an ongoing basis. • Care must be taken during the alien vegetation removal process to ensure that no unnecessary fires are created through the stacking of biomass. • Identified ecologically sensitive areas should not be brushcut, as this encourages alien vegetation and damages the remaining Fynbos, effectively increasing the fire threat rather than reducing it. Brushcutting in areas that have no sensitive wetlands or natural vegetation should not be a problem. • Refer to fire management plan as specified in the Site-Specific Draft EMPr (**Appendix G**).	
Level of significance after mitigation	**Low**	**Low**

9.4 GEOTECHNICAL IMPACTS

The following geotechnical impacts were assessed for the study area and are shown in **Figure 9-2**.

- **Clearing and Grading:** Clearing operations on this site will entail the removal of the alien vegetation, patches of grass and Fynbos, including a thin layer of humified soil at the surface. ~~Cut-and-fill balance can only be determined once the design and layout of the proposed structures is known.~~ The longest length of the cut platform required for the site is 270 m. The proposed cut height is approximately 20m and the fill height is approximately 15 m. However, the cutting of terraces should be possible without resorting to blasting. Heavy ripping may be necessary in deep cuttings at the top end of the site.
- **Trenching and Sidewall Stability:**
  - Excavation of services trenches to depths of approximately 1,5m should be possible throughout this site. Heavy ripping and the use of pneumatic rock splitting plant, however, may be required towards the west end (steeper terrain) of the site, where shallower bedrock conditions are likely to be encountered.
  - Trenches formed in the loose surface sand will be unstable, particularly in its dry state. Battering of the sides would therefore be necessary to prevent the laying of services from being hampered by loose sand flowing into these excavations.
- **Groundwater and Drainage:**
  - The slope on this site appears to be well drained. However, concentrated runoff along the drainage path crossing it would have to be formalised by constructing a lined drainage channel to prevent stormwater from flooding the proposed substation site. Alternatively, the substation must be sited away from this feature.
  - Runoff from the site should be discharged into catch-pits and lead away from the building platform(s). Water should not be permitted to collect and pond on the platform. It is important therefore that positive drainage be provided to direct rainwater away from the proposed structures.
  - The permanent water table is expected to be deep. However, it is possible that a seasonal perched water table may develop on top of the bedrock surface. This water may seep into deep excavations in which the interface between the transported horizon and the bedrock is exposed, particularly on the steeper slopes where shallow rock conditions are expected. Drainage measures would have to be implemented to intercept this seepage water at the toe of the cut embankments.
- **Construction Materials:**
  - Experience has shown that the predominantly fine and medium sand covering this site normally classifies as a G7 material in terms of the TRH14 Classification, Ref 2. This material is expected to become more gravelly with depth, which would improve its engineering properties and TRH 14 rating to G6. Categorisation of these materials would nonetheless have to be confirmed through laboratory testing during the detailed investigation phase.

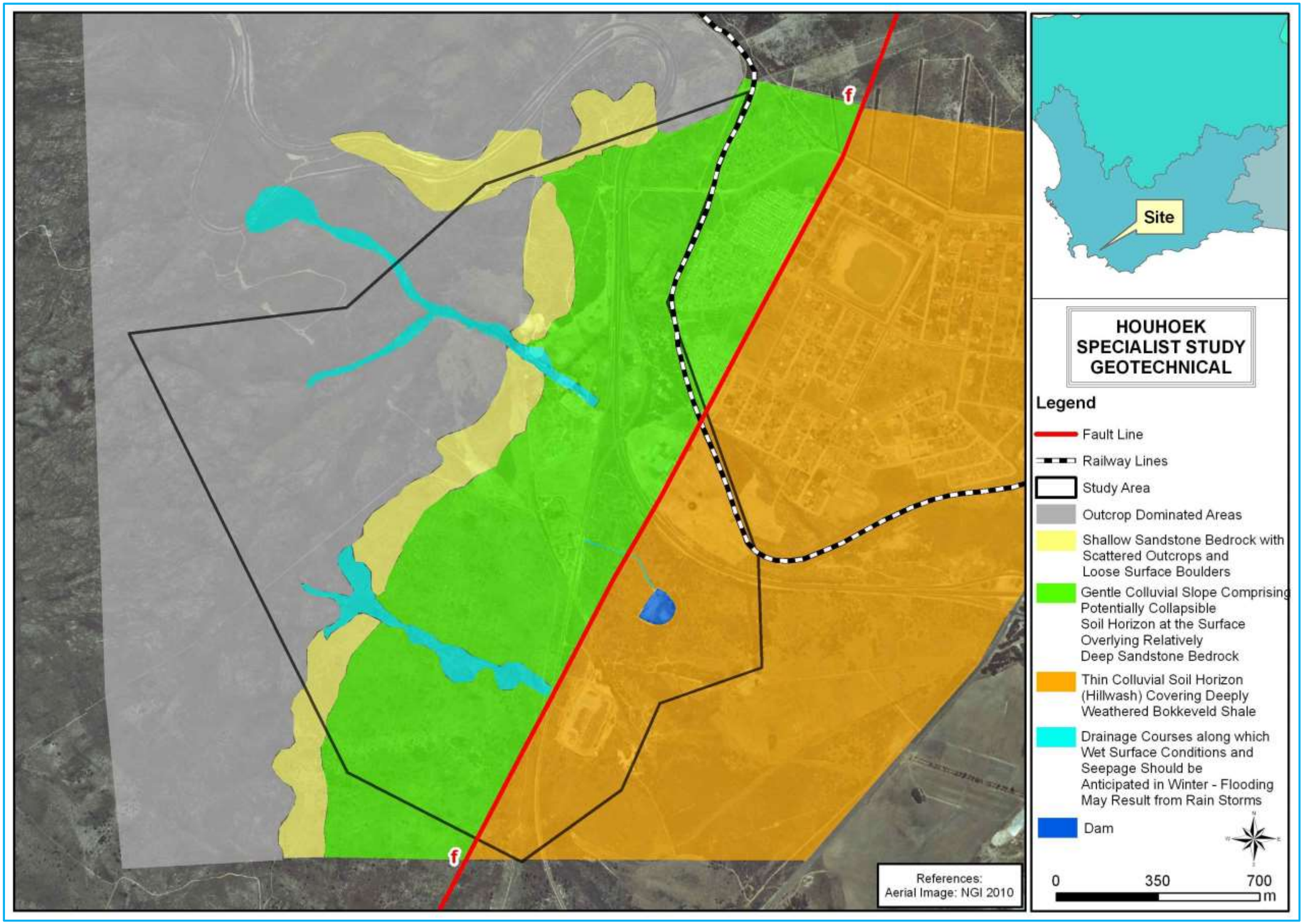


Figure 9-2: Geotechnical Impacts for Study Area

This section will outline the geotechnical impacts anticipated for the construction of the proposed Asteria Eskom MTS project.

9.4.1 Excess Material Derived from Areas In-Cut

Any excess material removed from deep cuttings on Site Alternative 1, would be mainly of colluvial origin, and sandy or gravelly in nature. This material should be stockpiled as a source of general fill. If all the material is not used up, it could be disposed of, or used in the following areas:-

- Create a soil berm along the eastern boundaries of Site Alternative 1.
- Carting the soil off the site to the nearby Steyns Sand Mine or Bot River Brickworks, where the soil could be dumped in the depleted excavations and used in the rehabilitation process of these open pit mines.

THEME	GEOTECHNICAL IMPACT
Impact focal point	**Excess material derived from areas in-cut**
Phase	**Construction Phase**
Nature of impact	Excess material derived from areas in-cut
Status of impact	Negative
Extent of impact	Site (2)
Duration of impact	Short-Medium-term (2)
Intensity of impact	Medium (6)
Probability	Highly Likely (4)
Calculation	(2+2+6) × 4 = 40
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	Yes
Mitigation measures	If all the material is not used up, it could be disposed of, or used as follows: • Create a soil berm along the eastern boundaries of Site Alternative 1. • Carting the soil off the site to the nearby Steyns Sand Mine or Bot River Brickworks, where the soil could be dumped in the depleted excavations and used in the rehabilitation process of these open pit mines.
Level of significance after mitigation	**Low**

9.4.2 Founding Conditions

The transported soil horizon on this site is expected to be potentially collapsible since the fines have been leached from this predominantly silty sandy material. Measures would therefore have to be taken to prevent or minimise the risk of differential settlement occurring, particularly where terraces extend from rock in areas of cut, to potentially collapsible colluviums at the cut-to-fill line at approximately natural ground level, to an increasing thickness of fill on the down slope side of these terraces.

It is understood that self-supporting pylons will be used to support the power lines crossing the LILO corridor demarcated in **Figure 3-9.** The areas of shallow sandstone bedrock and outcropping sandstone will provide adequate shallow founding conditions to support the proposed pylons.

Site-specific investigations would need to be undertaken in areas of thick colluvium to determine the depths to a suitable founding stratum with sufficient bearing capacity to support the pylon footings in the soil cover or, alternatively to place them to the underlying bedrock.

THEME	GEOTECHNICAL IMPACT	
Impact focal point	**Founding conditions for the Asteria Eskom MTS project**	
Description	Site Alternative 1	LILO Corridors
Nature of impact	Minimise the risk of differential settling occurring	Depths to founding stratum to confirm satisfactory bearing capacities for pylon foundations
Status of impact	Negative	Negative
Extent of impact	Site (2)	Site (2)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Medium (6)	Medium (6)
Probability	Highly Likely (4)	Highly Likely (4)
Calculation	(2+2+6) × 4 = 40	(2+2+6) × 4 = 40
Level of significance before mitigation	**Medium**	**Medium**
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	• The design of the terraces must take this phenomenon of differential settling into consideration. • If the stratum is proven to possess a high collapse potential and it is of significant thickness, it would have to be treated to destroy its open grain structure by either over-excavating the material and replacing it in compacted layers, or creating a soil mattresses to provide a uniform founding stratum beneath the proposed structures supported on these terraces. • Laboratory tests should be conducted to determine the soil's collapse potential and the measures required to counter unacceptable differential settlements. • It is recommended that standard, or the same procedures to those adopted to support the existing pylons where they traverse the Houhoek mountain range and related hills, be followed.	
Level of significance after mitigation	**Low**	**Low**

9.5 SOIL & AGRICULTURE IMPACTS

Due to the limited detailed soil information, only a broad soil description of seven soil association groups was provided in **Table 6-3**. The soils were classified according to the Soil Classification Working Group (1991).

9.5.1 Loss of Agricultural Potential Soils

No high potential agricultural soils were identified and no arable agriculture is taking place on any of the alternative sites. The increased size of the substation site will not constitute any significant loss of unique or prime agricultural land in the vicinity, especially as the whole area surrounding the proposed development (west of the R43 road) is currently undeveloped and is covered by natural vegetation.

Perennial crops with a medium to high area suitability were taken into consideration. These included grape vines, deciduous fruit (peaches), citrus and olives (Department van Landbou

en Waterwese, 1989). Annual dry-land winter growing crops that were taken into consideration include medics, clover, lucerne and small grain.

It must be kept in mind that this is a very broad agricultural potential rating because of the limited soil information.

THEME	LOSS OF AGRICULTURAL SOIL
Impact focal point	**Loss of agricultural soil resources**
Phase	**Construction Phase**
Nature of impact	Loss of low to medium agricultural potential soils
Status of impact	Negative, direct
Extent of impact	Site (2)
Duration of impact	Long-term (4)
Intensity of impact	Low (2)
Probability	Likely (3)
Calculation	(2+4+2) × 4 = 32
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	Yes
Mitigation measures	Sensitive areas such as wetland soils along watercourses should be avoided by the power lines and any new access roads.
Level of significance after mitigation	**Low**

The soils occurring within the Ga14 land type are suited for agriculture, including vineyards. However, viticulture (the farming of grapes for wine making) is a variable activity. Small changes in soil, climate or topography could have considerable consequences on the quantity and/or quality of grape production. No viticulture currently takes place at the proposed location of the substation. The potential effect of the loss of land for viticulture would need to be considered by an agricultural economist during the landowner negotiation process.

THEME	LOSS OF AGRICULTURAL SOIL
Impact focal point	**Loss of land for viticulture (farming of grapes for wine making)**
Nature of impact	Loss of land that could be used for viticulture
Status of impact	Negative, direct
Extent of impact	Site (2)
Duration of impact	Long-term (4)
Intensity of impact	Medium-High (8)
Probability	Likely (3)
Calculation	(2+4+8) × 4 = 54
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	Yes
Mitigation measures	The potential effect of the loss of land for viticulture would need to be considered by an agricultural economist during the landowner negotiation process.
Level of significance after mitigation	**Low**

9.5.2 Soil Erosion

The soils in the study area generally have a relatively sandy topsoil overlying (often abruptly) a subsoil layer that has more clay and a higher degree of structure. There were no apparent natural erosion dongas on the colluvial slope on or around Site Alternative 1. This can be ascribed to the relatively free-draining nature of the sandy colluvium. The map units where this situation is most critical will include the Es1, Es2 and Ss1 map units. Cultivation of these areas is not recommended, and care should be taken if any surface vegetation is removed, as water erosion can easily remove the sandy topsoil if correct protection measures are not taken.

The steeper parts of the landscape, where the topsoil horizon is also often a coarse textured sandy material, will also be susceptible to erosion if the vegetation is disturbed, due mainly to a combination of the soil and terrain characteristics.

THEME	SOIL EROSION
Impact focal point	**Increased soil erosion**
Phase	**Construction Phase**
Nature of impact	Increased soil erosion due to construction activities
Status of impact	Negative, direct
Extent of impact	Site (2)
Duration of impact	Long-term (4)
Intensity of impact	Low (2)
Probability	Likely (3)
Calculation	(2+4+2) × 4 = 32
Level of significance before mitigation	**Medium**
Confidence	High
Reversibility	Yes
Replaceability	Yes
Mitigation measures	Care should be taken on steep slopes to avoid any soil erosion (including cut-off trenches and contouring) to prvent escessive surface water flow on bare soils. Sensitive areas such as wetland soils along watercourses should be avoided by the power lines and any new access roads. Steeply cut embankments would have to be investigated in detail and closely examined during the bulk earthworks stage to detect conditions that could be conducive to erosion. Nonetheless, all embankments should at least be covered with vegetation.
Level of significance after mitigation	**Low**

9.6 IMPACTS ON FRESHWATER ECOSYSTEMS

The *status quo* of freshwater ecosystems on-site, given the position of the existing substation, power lines and other infrastructure in the area, is the baseline against which the significance of potential impacts on freshwater ecosystems was assessed. In other words, the significance of potential impacts associated with development of the Asteria Eskom MTS projecthas been determined by comparison with the "no-go alternative" (**Chapter 4.2.1**) of not undertaking the proposed activities, as opposed to comparison against the presumed pristine state of the study area in the absence of existing impacts (as recommended in terms of DEA&DP's 2010 Guideline on Alternatives).

9.6.1 Design Phase Impacts

Asteria Eskom MTS: Both the Asteria Eskom MTS layout alternatives occur outside of the nearby river channel and the recommended 50m buffer area for this river at impact location 'a' (refer to **Figure 7-7** above). No footprint-related impacts on the river are thus anticipated for either of the two MTS layout alternatives. Therefore, there is no impact assessment table for the MTSs. The proposed development of a road crossing over/through the small river channel to allow access to the MTS, which would be necessary if the main entrance to the area from the R43 is to be situated on the opposite side of the river to the preferred MTS location, would result in some encroachment of infrastructure into the river ecosystem. There is already an existing gravel road crossing over this river channel (the channel is directed under the road via a culvert), which is presumed sufficient for the purposes of access to the MTS. If no new crossing of the river channel is to be built, there would be no infrastructural footprint-related impact on the river. If a new access road over the river is required, it should be designed in such a way as to not impede the flow of water in the channel and to minimise the loss of any indigenous riparian vegetation that is present, and the existing road crossing should be removed and the affected portion of the river should be rehabilitated.

LILO Power Lines: The potentially negative impact of encroachment of the proposed LILO power lines into river corridors, without mitigation, was rated to be of medium significance for all three LILO routes, whilst no impacts are foreseeable for all three routes if the recommended mitigation measures are taken into account during the design phase.

The proposed LILO alternatives have four main points of potential impact on the river systems at Houhoek (i.e. impact locations a to d – refer to **Figure 7-7** above). These are points where the LILO power lines cross river channels and their associated riparian areas. If the mitigation measures for the footprint-related impacts (i.e. encroachment into freshwater ecosystems) are adhered to in the design of the power lines, then these impacts should be non-existent/negligible. In this regard, support towers for the power lines should be positioned outside of the river channels and their recommended 50m buffer areas (see **Figure 7-7**). The design is considered relatively straightforward to mitigate in terms of keeping power line towers outside of riverine areas because of the perpendicular angle at which the power lines cross most of the rivers within the study area.

To ensure that footprint-related impacts on freshwater ecosystems potentially associated with the proposed LILO power lines are minimised, in addition to keeping tower structures outside of rivers and their recommended buffer areas, no new temporary access tracks should be established that enter/cross river channels or buffer areas. Instead, existing access tracks should be used, wherever possible (see **Figure 3-11**). If these recommended mitigation measures are not adhered to and access tracks and/or power line towers are located within rivers or river buffer areas, then it is anticipated that the footprint-related impacts of the proposed development would increase to medium significance.

THEME	FRESHWATER ECOSYSTEMS		
Impact focal point	**The design phase impact of the LILO power line on freshwater ecosystems**		
Description	**LILO 1**	**LILO 2**	**LILO 3**
Nature of impact	Direct physical disturbance	Direct physical disturbance	Direct physical disturbance

THEME	FRESHWATER ECOSYSTEMS		
Impact focal point	**The design phase impact of the LILO power line on freshwater ecosystems**		
Description	**LILO 1**	**LILO 2**	**LILO 3**
	of river ecosystems from power line towers and/or development of access roads	of river ecosystems from power line towers and/or development of access roads	of river ecosystems from power line towers and/or development of access roads
Status of impact	Negative, direct	Negative, direct	Negative, direct
Extent of impact	Site (2)	Site (2)	Site (2)
Duration of impact	Long-term (4)	Long-term (4)	Long-term (4)
Intensity of impact	Low-Medium (4)	Low (2)	Low-Medium (4)
Probability	Highly Likely (4)	Highly Likely (4)	Highly Likely (4)
Calculation	(2+4+4) × 4 = 40	(2+4+2) × 4 = 32	(2+4+4) × 4 = 40
Level of significance before mitigation	**Medium**	**Medium**	**Medium**
Confidence	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes
Replaceability	No	Yes	No
Mitigation measures	Ensure power line tower placement outside river channels and their 50m buffer areas. No new access tracks to be built within river channels or their 50m buffer areas.		
Level of significance after mitigation	**No Impact**	**No Impact**	**No Impact**

The proposed temporary by-pass power line at the point where the LILO power line joins the existing Bacchus-Palmiet 400kV Transmission power line is not expected to have any impacts on freshwater ecosystems due to it being constructed entirely within the existing 55m servitude of the Bacchus-Palmiet 400kV power line and outside the buffer zone of any river channel. It is thus, not considered further as a potential impact on freshwater ecosystems. In addition, it is not anticipated that the linking of the proposed Asteria Eskom MTS with the existing Houhoek Eskom Distribution Substation on the east side of the R43 road by means of a 132kV Distribution power line would have any potentially negative impacts on freshwater ecosystems, provided no infrastructure associated with the 132kV Distribution power line encroaches into the recommended 50m buffer area of the river flowing past the proposed Asteria Eskom MTS site.

9.6.2 Construction Phase Impacts

Although the potential construction phase impacts on freshwater ecosystems were rated to be of medium or low significance without mitigation, it is predicted that the impacts would be reduced to being of low or negligible significance (i.e. no discernible impact) if the recommended mitigation measures were to be effectively implemented.

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Destruction/damage of river and riparian areas through construction-related activities**
Nature of impact	Physical destruction or damage of rivers and/or riparian vegetation through the storage of building materials, the temporary lay down of equipment (sand, soil, bricks, steel, pipes, etc.), and/or the establishment of temporary access tracks in or adjacent to rivers and/or riparian areas.
Status of impact	Negative, direct
Extent of impact	Footprint (1)

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Destruction/damage of river and riparian areas through construction-related activities**
Duration of impact	Medium-term (3)
Intensity of impact	Medium (6)
Probability	Highly likely (4)
Calculation	(1+3+6) × 4 = 40
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	No
Mitigation measures	• Construction camps should be located inside the proposed Asteria Eskom MTS site but at least 50m from freshwater ecosystems. • Rivers and riparian areas should be treated as "no-go" areas and appropriately demarcated as such. No vehicles, machinery, personnel, construction material, fuel, oil, bitumen or waste should be allowed into these areas without the express permission of and supervision by the ECO. • Workers should be made aware of the importance of not destroying or damaging the vegetation along rivers, and this awareness should be promoted throughout the construction phase. • Freshwater ecosystems located close to the construction areas should be inspected on a regular basis by the ECO for signs of disturbance from construction activities. If signs of disturbance are noted, immediate action should be taken to remedy the situation and, if necessary, a freshwater ecologist should be consulted for advice on the most suitable remediation measures.
Level of significance after mitigation	**No Impact**

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Pollution of freshwater ecosystems resulting from the runoff of fuel and oil from vehicles and machinery, and from construction-related activities**
Nature of impact	Pollution of rivers through: • leakage of fuel, oils etc. from construction machinery; • from washing equipment; • flushing concrete mixers and other vehicles; or • sediments from de-watering of excavations.
Status of impact	Negative, direct
Extent of impact	Site (2)
Duration of impact	Medium-term (3)
Intensity of impact	Medium (6)
Probability	Highly likely (4)
Calculation	(2+3+6) × 4 = 40
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	No
Mitigation measures	• Toilets must be located at least 50m from the freshwater ecosystems. • No fuel storage, refuelling, vehicle maintenance or vehicle depots should be allowed within 50m of freshwater ecosystems. • Refuelling and fuel storage areas, and areas used for the servicing or parking of vehicles and machinery, should be located on impervious bases and should have bunds around them. Bunds should be sufficiently high to ensure that all the fuel kept in the area will be captured in the event of a major spillage.

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Pollution of freshwater ecosystems resulting from the runoff of fuel and oil from vehicles and machinery, and from construction-related activities**
	• Vehicles and machinery should not be washed within 50m of freshwater ecosystems. • No discharge of effluents or polluted water should be allowed into any rivers. • If construction areas are to be pumped of water (e.g. after rains), this water should be pumped into an appropriate settlement area, and not allowed to flow into any rivers. • No spoil material, including stripped topsoil, should be temporarily stockpiled within 50m of freshwater ecosystems. • There should be little disturbance to surrounding vegetation as possible when construction activities are undertaken, as intact vegetation adjacent to construction areas will assist in the control of sediment dispersal from exposed areas. • Workers should be made aware of no the importance of not polluting rivers and of not undertaking activities that could result in such pollution and this awareness should be promoted throughout the construction phase. • Freshwater ecosystems located close to the site should be inspected on a regular basis (but especially after rainfall) by the ECO for signs of sedimentation and pollution. If signs of sedimentation or pollution are noted, immediate action should be taken to remedy the situation, and if necessary, a freshwater ecologist should be consulted for advice on the most suitable remediation measures.
Level of significance after mitigation	**Low**

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Increased disturbance to aquatic and semi-aquatic fauna**
Nature of impact	Increased disturbance of aquatic and semi-aquatic fauna – the presence of construction teams and their machinery will lead to noise pollution in the area, which will disturb aquatic and terrestrial fauna, and potentially disrupt breeding cycles for some species.
Status of impact	Negative, direct
Extent of impact	Footprint (1)
Duration of impact	Short-Medium-term (2)
Intensity of impact	Medium (6)
Probability	likely (3)
Calculation	(1+2+6) × 3 = 27
Level of significance before mitigation	**Low**
Confidence	Medium
Reversibility	Yes
Replaceability	No
Mitigation measures	• Construction camps and temporary laydown areas inside the existing Houhoek Eskom Distribution Substation site should be located at least 50m away from freshwater ecosystems. • Rivers and riparian areas should be treated as “no-go” areas and appropriately demarcated as such. No vehicles, machinery, personnel, construction material, fuel, oil, bitumen or waste should be allowed into these areas without the express permission of and supervision by the ECO. • Workers should be made aware of the importance of not killing or harming any animals that they encounter and this awareness should be promoted throughout the construction phase.
Level of significance after mitigation	**Low**

9.6.3 Operational Phase Impacts

The potential operational impacts associated with road crossings over freshwater ecosystems and stormwater runoff/pollutant leakage from the proposed Asteria Eskom MTS were assessed to be of medium significance without mitigation, which would reduce to low significance if the recommended mitigation measures are effectively implemented. As such, the implementation of the recommended mitigation measures is of prime importance to ensure the adequate protection of freshwater ecosystems during the operational phase of the proposed Asteria Eskom MTS project.

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Hydrological alteration of rivers at points where access roads cross rivers**
Nature of impact	Alteration of the hydrology of rivers at road crossings associated with the Asteria Eskom MTS project
Status of impact	Negative, direct
Extent of impact	Site (2)
Duration of impact	Long-term (4)
Intensity of impact	Medium (6)
Probability	Highly likely (4)
Calculation	(2+4+6) × 4 = 48
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	No
Mitigation measures	Formalisation of road crossings using structures that minimise the alteration of flows (e.g. box culverts with a wide span), for unavoidable road crossings of rivers. Preferably, the establishment of new access roads across rivers or within the recommended 50m buffer area of rivers should be avoided altogether, where practically possible.
Level of significance after mitigation	**Low**

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Stormwater runoff-related impacts**
Nature of impact	Stormwater runoff-related impacts from the proposed Asteria Eskom MTS
Status of impact	Negative, direct
Extent of impact	Footprint (1)
Duration of impact	Long-term (4)
Intensity of impact	Low-Medium (4)
Probability	Highly likely (4)
Calculation	(1+4+4) × 4 = 36
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	No
Mitigation measures	Employ a stormwater management system that follows the principles of a sustainable urban drainage system, with input from a freshwater ecologist on the design.
Level of significance after mitigation	**Low**

THEME	FRESHWATER ECOSYSTEMS
Impact focal point	**Leakage of pollutants into rivers**
Nature of impact	Leakage of pollutants from the proposed Asteria Eskom MTS into freshwater ecosystems
Status of impact	Negative, direct
Extent of impact	Footprint (1)
Duration of impact	Long-term (4)
Intensity of impact	Medium (6)
Probability	likely (3)
Calculation	(1+4+6) × 3 = 33
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	No
Mitigation measures	A cut-off drain with sumps should be constructed around the proposed Asteria Eskom MTS facility and regular maintenance inspections of the facility should be undertaken to ensure that machinery containing liquid contaminants (e.g. oil and fuel) is free of leakage.
Level of significance after mitigation	**Low**

Another possible operational phase impact on rivers located along the proposed LILO routes would be the trimming/clearing of riparian vegetation within the servitude below the power line, as part of Eskom's routine maintenance measures. Refer to **Chapter 9.7** below for assessment of the vegetation impacts for further detail.

9.6.4 Cumulative Impacts

No cumulative impacts of any significance to freshwater ecosystems are anticipated to arise from the proposed activities.

9.7 Ecological Impacts

The ecological specialist did not make use of the EAP's impact significance calculation, but instead used his experience to determine the significance of ecological impacts. It is important to note that the EAP's significance is stricter than the specialist's significance because the EAP has doubled the rating of intensity in its significance calculation.

9.7.1 Vegetation Impacts

The construction of the proposed Asteria Eskom MTS would effectively result in the permanent loss of all existing natural or partly natural vegetation in the development footprint. This would mean loss of at least 11.2ha (the extent of the built Asteria Eskom MTS) but as high as 14.4ha (to include construction clearance and disturbance) of currently natural or partly natural vegetation (of a critically endangered vegetation type). Construction of the new LILO 400kV Transmission power lines would also require new access roads, and new servitudes, which would probably be brushcut in order to reduce fire risk. As can be seen in **Figure 3-11**, the construction and use of Eskom access roads and pylon footprints has previously led to significant local habitat degradation and possibly loss of habitat in this steep area with shallow, rocky soils that are prone to erosion. The habitat degradation and

loss of habitat is prevalent even within the designated Houwhoek Nature Reserve, which is managed by Cape Nature. Construction of the pylon footings (towers) for these power lines would also have a direct negative impact on any vegetation present, which could range in significance from low to high depending on the congruence of plant SCC. The LILO 1 corridor traverses similar terrain.

Pylon 3 is approximately 180 m south of the nearest access road (near Pylon 2). **The construction of an access road to Pylon 3 is not recommended.** Therefore, the Pylon 3 should be constructed using a helicopter, with no access road. At least five plant SCC are likely to be present in the combined pylon and access road area for Pylon 3. The south-facing soils around Pylon 3 have a high erosion potential.

Indirect botanical impacts will take effect as soon as the construction phase has started, and in some cases will persist as long as the infrastructure is in place. Indirect impacts include:

- Loss of current ecological connectivity across the site (likely to be of significance).
- Habitat fragmentation (of significance).
- Disruption of optimal natural fire regime in adjacent areas of natural vegetation (of significance).
- Possible introduction or facilitated spread of alien invasive plant species (of minor significance, and easily mitigated).

THEME	VEGETATION IMPACTS	
Impact focal point	**Direct botanical impacts of the proposed Asteria Eskom MTS**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Total loss of existing vegetation habitat within site	
Status of impact	Negative	Negative
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	High (10)	High (10)
Probability	Definite (5)	Definite (5)
Calculation	(3+4+10) × 5 = 85	(3+4+10) × 5 = 85
Level of significance before mitigation	**High**	**High**
Confidence	High	High
Reversibility	No	No
Replaceability	Yes	Yes
Mitigation measures	• Alien vegetation management in vicinity of the Asteria Eskom MTS. • Search and rescue for translocatable plant species. • Placement of pylon 3 with a helicopter. • Botanical input to be provided during walk down stage, prior to construction, especially for pylons 3, 4, 9 and 10.	Ongoing alien vegetation management in vicinity of the Asteria Eskom MTS.
Level of significance after mitigation	**Medium**	**Medium**

Indirect impacts will take effect as soon as the construction phase has started, and will usually persist as long as the infrastructure is in place (operational phase). The primary indirect impacts include:

- Loss of current ecological connectivity across the proposed Asteria Eskom MTS (likely to be of low to medium regional significance).
- Habitat fragmentation associated with the proposed Asteria Eskom MTS (of low to medium regional significance).
- Disruption of optimal fynbos fire regime in vicinity of infrastructure (medium significance).
- Inappropriate brushcutting of servitudes (potentially medium significance).
- Possible introduction or facilitated spread of alien invasive plant species (very low significance).

THEME	**VEGETATION IMPACTS**	
Impact focal point	**Indirect botanical impacts of the proposed Asteria Eskom MTS**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	• Further fragmentation of habitat in the region. • Loss of ecological connectivity across the site with associated ecological impacts, such as overall reduction in viability of remnant habitats. • Possible facilitated spread of invasive aliens.	• Further fragmentation of habitat in the region. • Loss of ecological connectivity across the site with associated ecological impacts, such as overall reduction in viability of remnant habitats. • Possible suboptimal fire regimes have negative impacts on Fynbos functioning. • Possible facilitated spread of invasive aliens.
Status of impact	Negative	Negative
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	Medium (6)	Medium (6)
Probability	Highly Likely (4)	Highly Likely (4)
Calculation	(3+4+6) × 4 = 52	(3+4+6) × 4 = 52
Level of significance before mitigation	**Medium**	**Medium**
Confidence	High	High
Reversibility	No	Yes
Replaceability	Yes	Yes
Mitigation measures	• Habitat fragmentation and loss of ecological connectivity across and in the vicinity of the site will remain an issue, and cannot be offset or mitigated in any significant way whilst the facility remains in place. • Alien plant invasion can be mitigated by appropriate management.	• Habitat fragmentation and loss of ecological connectivity across and in the vicinity of the site will remain an issue, and cannot be offset or mitigated in any significant way whilst the facility remains in place. • The negative effects of an inappropriate fire regime could in theory be mitigated but this is deemed unlikely. • Alien plant invasion can be mitigated by appropriate management. • Any security lights and floodlights should take into account the fact that lighting can have a significant negative impact on insects, especially if the light has a high UV component. Floodlights should either be high pressure sodium lamps or red, amber or yellow LEDs, and the security lights should ideally be red, amber or yellow LEDs, which have

THEME	VEGETATION IMPACTS	
Impact focal point	**Indirect botanical impacts of the proposed Asteria Eskom MTS**	
Phase	**Construction Phase**	**Operational Phase**
		the significant added advantage of being much more energy efficient than more conventional lighting.
Level of significance after mitigation	**Medium**	**Medium**

The botanical impacts of the construction phase of the 400kV LILO Transmission power line alternatives are rated as medium before mitigation. The most sensitive ecological habitats (seepage area, wetlands and rocky outcrops) could be adequately avoided at the walk-down stage (pylon positioning, post-environmental authorisation). The level of significance after mitigation would then reduce to low.

THEME	VEGETATION IMPACTS	
Impact focal point	**Direct botanical impacts of the proposed LILO 1 and LILO 3 corridors**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	• Loss of existing vegetation habitat within pylon footprints and access roads • Possible loss of portions of local populations of certain plant SCC	Erosion and habitat damage in access tracks
Status of impact	Negative	Negative
Extent of impact	Site (2)	Site (2)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	Medium (6)	Medium (6)
Probability	Highly likely (4)	Likely (3)
Calculation	(2+4+6) × 4 = 48	(2+4+6) × 3 = 36
Level of significance before mitigation	**Medium**	**Medium**
Confidence	High	High
Reversibility	No	Yes
Replaceability	Yes	Yes
Mitigation measures	• Specialist botanical input at walk-down stage to avoid high sensitivity habitats, including seepage areas, rocky outcrops and shallow soils, especially for pylons 3, 4, 9 and 10. • Use of helicopters rather than building new access roads in most sensitive areas, especially around Pylon 3.	Maintain access roads to minimise erosion.
Level of significance after mitigation	**Medium**	**Medium**

THEME	VEGETATION IMPACTS	
Impact focal point	**Direct botanical impacts of the proposed LILO 2 corridor**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	• Loss of existing vegetation habitat within pylon footprints and access roads • Possible loss of portions of local populations of certain plant SCC	Erosion and habitat damage in access tracks
Status of impact	Negative	Negative

THEME	VEGETATION IMPACTS	
Impact focal point	**Direct botanical impacts of the proposed LILO 2 corridor**	
Phase	**Construction Phase**	**Operational Phase**
Extent of impact	Site (2)	Site (2)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	Low-Medium (4)	Low-Medium (4)
Probability	Likely (3)	Likely (3)
Calculation	(2+4+4) × 3 = 30	(2+4+4) × 3 = 30
Level of significance before mitigation	**Low**	**Low**
Confidence	High	High
Reversibility	No	Yes
Replaceability	Yes	Yes
Mitigation measures	Specialist botanical and faunal input at walk-down stage to avoid high sensitivity habitats, including seepage areas, rocky outcrops and shallow soils.	Maintain access roads to minimise erosion.
Level of significance after mitigation	**Low**	**Low**

9.7.2 Faunal Impacts

The primary direct faunal impact will occur at the construction phase and relates to loss of natural and partly natural habitat (vegetation) within the 14 ha of the proposed MTS, and could also include direct mortality, and construction noise and vibration frightening animals in the area. These impacts are likely to be most serious for invertebrates and smaller animals, including reptiles and amphibians, which generally have smaller home ranges, and these may in some cases lose all or large parts of their home ranges.

Additional construction-related impacts may impact on frogs and reptiles in particular, notably the building of the tower footprints and the access tracks, especially where these impact on wetlands and rocky outcrops.

Most operational phase impacts are likely to be negligible from a faunal perspective, although the large Asteria Eskom MTS will clearly have a negative impact in terms of ecological connectivity and habitat fragmentation. Bats (unlike some birds) are not known to suffer significant mortality due to collisions with static objects such as powerlines.

THEME	TERRESTRIAL FAUNA IMPACTS	
Impact focal point	**Direct faunal impacts of the proposed Asteria Eskom MTS**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	• Total loss of existing vegetation and faunal habitat within site. • Displacement of faunal species in area. • Possible loss of site populations of certain faunal species with low mobility.	
Status of impact	Negative	Negative
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	High (10)	High (10)
Probability	Definite (5)	Definite (5)
Calculation	(3+4+10) × 5 = 85	(3+4+10) × 5 = 85
Level of significance before mitigation	**High**	**High**

THEME	TERRESTRIAL FAUNA IMPACTS	
Impact focal point	**Direct faunal impacts of the proposed Asteria Eskom MTS**	
Phase	**Construction Phase**	**Operational Phase**
Confidence	High	High
Reversibility	No	No
Replaceability	Yes	Yes
Mitigation measures	• Alien vegetation management in vicinity of the Asteria Eskom MTS. • Search and rescue for translocatable plant and low mobility faunal species.	• Ongoing alien vegetation management in vicinity of the Asteria Eskom MTS. • Any security lights and floodlights should take into account the fact that lighting can have a significant negative impact on insects, especially if the light has a high UV component. Floodlights should either be high pressure sodium lamps or red, amber or yellow LEDs, and the security lights should ideally be red, amber or yellow LEDs, which have the significant added advantage of being much more energy efficient than more conventional lighting.
Level of significance after mitigation	**Medium**	**Medium**

The faunal impacts of the construction phase of the 400kV LILO Transmission power line alternatives are rated as medium before mitigation. The most sensitive faunal habitats (seepage area, wetlands and rocky outcrops) could be adequately avoided at the walk-down stage (pylon positioning, post-environmental authorisation). The level of significance after mitigation would then reduce to low.

THEME	TERRESTRIAL FAUNA IMPACTS	
Impact focal point	**Direct faunal impacts of the proposed LILO 1 and LILO 3 corridors**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	• Loss of existing vegetation and faunal habitat within pylon footprints and access roads • Possible loss of portions of local populations of certain faunal species with low mobility (notably frogs), and of certain plant SCC	Erosion and habitat damage in access tracks
Status of impact	Negative	Negative
Extent of impact	Site (2)	Site (2)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	Medium (6)	Medium (6)
Probability	Highly likely (4)	Likely (3)
Calculation	(2+4+6) × 4 = 48	(2+4+6) × 3 = 36
Level of significance before mitigation	**Medium**	**Medium**
Confidence	High	High
Reversibility	No	Yes
Replaceability	Yes	Yes
Mitigation measures	• Specialist botanical input at walk-down stage to avoid high sensitivity habitats, including seepage areas, rocky outcrops and shallow soils, especially for pylons 3, 4, 9 and 10. • Use of helicopters rather than building	Maintain access roads to minimise erosion.

THEME	TERRESTRIAL FAUNA IMPACTS	
Impact focal point	**Direct faunal impacts of the proposed LILO 1 and LILO 3 corridors**	
Phase	**Construction Phase**	**Operational Phase**
	new access roads in most sensitive areas, especially around Pylon 3.	
Level of significance after mitigation	**Medium**	**Medium**

THEME	FAUNAL IMPACTS	
Impact focal point	**Direct faunal impacts of the proposed LILO 2 corridor**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	• Loss of existing vegetation habitat within pylon footprints and access roads • Possible loss of portions of local populations of certain plant SCC	Erosion and habitat damage in access tracks
Status of impact	Negative	Negative
Extent of impact	Site (2)	Site (2)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	Low-Medium (4)	Low-Medium (4)
Probability	Likely (3)	Likely (3)
Calculation	(2+4+4) × 3 = 30	(2+4+4) × 3 = 30
Level of significance before mitigation	**Low**	**Low**
Confidence	High	High
Reversibility	No	Yes
Replaceability	Yes	Yes
Mitigation measures	Specialist botanical and faunal input at walk-down stage to avoid high sensitivity habitats, including seepage areas, rocky outcrops and shallow soils.	Maintain access roads to minimise erosion.
Level of significance after mitigation	**Low**	**Low**

9.7.3 Construction Phase Impacts

Loss of all existing natural and partly natural vegetation (and faunal habitat) within the proposed Asteria Eskom MTS facility (up to 14ha) would be permanent. The underlying Kogelberg Sandstone Fynbos is classified as a Critically Endangered vegetation type (DEA, 2011), but neither of the development alternatives is likely to result in the loss of any regionally significant populations of plant or animal SCC.

The construction phase (direct) botanical and faunal impacts of development on either of the layout alternatives are likely to be of Low to Medium negative significance at a regional scale (before mitigation), primarily because these areas were previously cultivated and are now of only low to medium ecological conservation value. The proposed mitigation (alien clearing in vicinity of the site; search and rescue) is outlined in **Chapter 9.7.4**, and implementation could result in a Low negative impact after mitigation.

CRITERIA	LAYOUT ALTERNATIVE 1	LAYOUT ALTERNATIVE 3
Extent	Local (site), but of regional significance given that the vegetation type is restricted to the region.	Local (site), but of regional significance given that the vegetation type is restricted to the region.

Duration	Permanent (in MTS footprint)	Permanent (in MTS footprint)
Intensity	High (complete cessation of ecological functioning in footprint)	High (complete cessation of ecological functioning in footprint)
Probability	Definite	Definite
Confidence	High	High
Calculation	No calculation used by the specialist	No calculation used by the specialist
Significance before mitigation	Low to Medium negative (due to disturbed nature of area)	Low to Medium negative (due to disturbed nature of area)
Significance after mitigation	Low negative	Low negative
CUMULATIVE IMPACTS		
Nature of cumulative impact	Loss of up to 14ha of previously disturbed Kogelberg Sandstone Fynbos, which is a Critically Endangered (but well conserved) vegetation type; loss of a single plant of *Serruria inconspicua* (Vulnerable) in layout alternative 1; loss of 14ha of partly degraded faunal habitat and displacement of fauna; possible loss of site populations of certain low mobility faunal species	
Reversibility	Loss of vegetation and faunal habitat in the development footprints cannot be reversed.	
Irreplaceability	The proposed development is not likely to cause significant loss of an irreplaceable vegetation type (although Critically Endangered this vegetation type is well conserved, and more than 80% of its original extent still remains), nor irreplaceable loss of plant or animal species.	
Degree of mitigation of impact	Loss of habitat can only be effectively mitigated by a biodiversity offset, which is not recommended in this particular case, due to Low overall levels of impact, due to development being proposed in a previously degraded area. Ongoing alien vegetation management in vicinity of MTS could improve conservation status of the area. Search and rescue for translocatable plant species; Search and rescue for low mobility faunal species at construction phase.	

The construction phase botanical and faunal impacts of development of LILO 1 and LILO 3 could be medium to high if the most sensitive habitats (seepage area, wetlands and rocky outcrops) are not completely avoided. Loss or damage to very localised rare plant and animal species are a particular concern in parts of this corridor. Avoidance of these often small areas is relatively easily achieved by mapping them at the walk-down stage, in which case impacts could be reduced to low-medium. As can be seen in **Figure 3-11**, access roads and pylon footprints can be the source of significant habitat loss and degradation, especially where soils are wet, or very thin. Bat mortality (caused by collisions with power lines) is not likely to be high (especially as there are existing power lines along both corridors), and is unlikely to require specific mitigation.

CRITERIA	LILO 1 AND LILO 3	LILO 2
Extent	Local (site), but of regional significance given that the vegetation type is restricted to the region.	Local (site), but of regional significance given that the vegetation type is restricted to the region.
Duration	Permanent (in tower footprints) and temporary (1-5 years) in access roads and areas around towers	Permanent (in tower footprints) and temporary (1-5 years) in access roads and areas around towers
Intensity	**Low** (partial disruption in access roads and areas around access roads) **to Medium** (complete cessation of ecological functioning in tower footprint)	**Low** (partial disruption in access roads and areas around access roads) **to Medium** (complete cessation of ecological functioning in tower footprint)
Probability	Definite	Definite

Confidence	High	High
Calculation	No calculation used by the specialist	No calculation used by the specialist
Significance before mitigation	Medium to High	Medium
Significance after mitigation	Low to Medium	Low
Cumulative impact	Low to Medium negative	Low negative
CUMULATIVE IMPACTS		
Nature of cumulative impact	Loss of up to 0.2ha of largely pristine Kogelberg Sandstone Fynbos in tower and access road footprints, which is a Critically Endangered (but well conserved) vegetation type; possible local loss of up to about ten plant SCC (although small percentages of regional populations); possible local loss of up to three frog SCC (although small percentages of regional population).	
Reversibility	Loss of vegetation and faunal habitat in the tower development footprints cannot be reversed; impacts in temporary disturbance areas (such as access roads) can be partly reversed.	
Irreplaceability	The proposed 400kV LILO Transmission power lines are not likely to cause significant loss of irreplaceable vegetation types (although Critically Endangered this vegetation type is well conserved, and more than 80% of its original extent still remains); but minor irreplaceable loss of various plant and animal SCC may be caused if not adequately mitigated or avoided.	
Degree of mitigation of impact	• Loss of habitat can only be effectively mitigated by a biodiversity offset, which is not recommended in this particular case, due to Low overall levels of impact. • Key loss of SCC can be fairly easily and fully avoided by carefully placing towers and access road at walk-down stage. • Road damage to habitat can be minimised by restricting access in most sensitive areas to existing tracks or use of helicopters.	

9.7.4 Mitigation Measures Required

The following is regarded as appropriate, feasible and reasonable mitigation, and is accordingly regarded as essential, and is factored into this assessment:

- Prior to development the approved development footprint for the Asteria Eskom MTS must be surveyed and clearly fenced off so that the Contractor knows exactly what area is involved, and does not disturb the adjacent areas of natural vegetation.
- No temporary dumping or storage of building materials or soil/fill should be allowed outside the designated and fenced off development area.
- Immediately after the site area for the proposed Asteria Eskom MTS is fenced off a suitably experienced horticultural Contractor must be engaged to undertake a plant search and rescue program, in liaison with the botanist. All translocatable plant specimens (primarily bulbs and succulents, but also certain small shrubs) must be translocated from the development footprint to suitable adjacent areas that will not be developed. Depending on the time of year the specimens may have to be bagged up and kept in a nursery for transplanting the following winter, as if transplanted in late spring or summer the mortality rate will be very high.
- All movable and low mobility fauna (such as tortoises) must be translocated all at once.
- All woody alien invasive vegetation must be properly cleared from within 100m of the Asteria Eskom MTS (irrespective of landownership), within one year of project commencement. This must be undertaken by suitably qualified Contractors, using DAFF

approved methodology. This should be repeated annually for five years after project completion in order to allow for removal of regrowth and germination of seed banks.

- The ecologist must be engaged at the walk-down phase of the LILO power line construction, in order to demarcate to the Eskom engineers any botanically and faunally sensitive areas that must be avoided by access roads and infrastructure (tower) placement, especially for pylons 3, 4, 9 and 10.
- Any security lights and floodlights should take into account the fact that lighting can have a significant negative impact on insects, especially if the light has a high UV component. Floodlights should either be high pressure sodium lamps or red, amber or yellow LEDs, and the security lights should ideally be red, amber or yellow LEDs, which have the significant added advantage of being much more energy efficient than more conventional lighting.
- Access roads or tracks for the new LILO power line construction should be minimised, and where possible existing tracks should be used.
- Construction of the LILO power line should ideally be undertaken in the dry season (November to April) in order to minimise soil erosion and damage to seasonal plants.
- The construction of the line in certain areas (steep, rocky or some high sensitivity areas) may necessitate the use of helicopters instead of terrestrial access, and this should be determined by the botanist at the walk-down stage. This measure should receive particular attention for the area surrounding Pylon 3.
- Any new power line servitudes associated with this project may not be brushcut at a level lower than 0.5m[5] above mean ground level, in order to prevent degradation of the vegetation in this area. The only plant species that may be removed at ground level from within servitudes are alien invasive species (as per CARA legislation). Servitude brushcutting must thus be undertaken by hand (using hand held brushcutters), and may not be undertaken using tractors and bossieslaners (which disturb the soil surface). Brushcutting should not be undertaken in any one area more often than once every eight years.

9.8 AVIFAUNA IMPACTS

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms but two common problems in southern Africa are (a) **electrocution of birds** and other animals and (b) **birds colliding with power lines** (Ledger & Annegarn 1981; Ledger 1983; Ledger 1984; Hobbs & Ledger 1986a; Hobbs & Ledger 1986b; Ledger *et al.* 1992; Verdoorn 1996; Kruger & Van Rooyen 1998; Van Rooyen 1998; Kruger 1999; Van Rooyen 1999; Van Rooyen 2000, Anderson 2001). Other problems include electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure (Van Rooyen *et al.* 2002), and displacement due to disturbance and habitat destruction during construction and maintenance activities.

5 The Ecological Assessment refers to 1.5m for brushcutting during the maintenance of the power line servitudes. Following communication with the Ecologist, it was agreed that this could be reduced to 0.5m for the construction phase (*pers comm.*).

The **cumulative impact** of the proposed new Asteria Eskom MTS and associated power lines should be limited due to the low probability of power line sensitive Red Data species being affected by the proposed Asteria Eskom MTS project.

9.8.1 Electrocutions

Large birds of prey are the most commonly electrocuted on power lines. The large transmission lines from 220kV to the massive 765kV structures usually do not pose an electrocution threat to large birds, because the pylons are designed in such a manner that the birds do not perch in close proximity to the potentially lethal conductors. In fact, these power lines have proved to be beneficial to birds such as Martial Eagles, Tawny Eagles *Aquila rapax*, White-backed Vultures *Gyps africanus*, and even occasionally Verreauxs' Eagles by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce (Van Rooyen, *pers. obs.*). Cape Vultures *Gyps coprotheres* have also taken to roosting on power lines in large numbers, while Lappet-faced Vultures *Torgos tracheliotis* also uses power lines as roosts, especially in the Northern Cape (Van Rooyen, *pers. obs.*).

Unfortunately the same cannot be said of the smaller sub-transmission and reticulation lines of 11kV to 132kV (Van Rooyen 1998; 2000). Raptors and vultures often seek out the highest vantage point as suitable perches from where they scan the surrounding area. In flat, treeless habitat power pylons often provide ideal vantage points for this purpose. The vast majority of electrical structures were designed and constructed at a time when the awareness of the danger that they pose for raptors was very limited or totally absent. Depending on the design of the pole, a large raptor can potentially touch two live components or a live and earthed component simultaneously, almost inevitably resulting in instant electrocution and a concomitant disruption in the electrical supply (Van Rooyen 1998).

Electrocution is not foreseen as an impact associated with the proposed new substation and associated power lines. The 400kV LILO lines pose no electrocution risk. The planned 132kV line will use the single steel pole design, which will hold no electrocution risk to any of the Red Data power line sensitive species that could occur on the site. Electrocution on single steel pole designs has only been recorded in very specific circumstances, namely where several vultures drawn to a carcass presumably attempted to perch on the insulators and caused a phase-earth short circuit (Van Rooyen 2007). This scenario should never happen at Houhoek.

9.8.2 Collisions

Anderson (2001) summarises collisions as a source of avian mortality as follows:

"The collision of large terrestrial birds with the wires of utility structures, and especially power lines, has been determined to be one of the most important mortality factors for this group of birds in South Africa (Herholdt 1988; Johnsgard 1991; Allan 1997). It is possible that the populations of two southern African endemic bird species, i.e., the Ludwig's Bustard *Neotis ludwigii* and Blue Crane *Anthropoides paradiseus*, may be in decline because of this single mortality factor (Anderson 2000; McCann 2000).

The Ludwig's Bustard (Anderson 2000) and Blue Crane (McCann 2000) are both listed as "vulnerable" in the Eskom Red Data Book of Birds of South Africa, Lesotho & Swaziland (Barnes 2000) and it has been suggested that power line collisions is are one of the factors responsible for these birds' present precarious conservation status.

Collisions with power lines and especially overhead earth-wires have been documented as a source of mortality for a large number of avian species (for example, Beaulaurier *et al.* 1982; Bevanger 1994, 1998). In southern Africa, this problem has until recently received only limited attention. Several studies however have identified bird collisions with power lines as a potentially important mortality factor (for example, Brown & Lawson 1989; Longridge 1989). Ledger *et al.* (1993), Ledger (1994) and Van Rooyen & Ledger (1999) have also provided overviews of bird interactions with power lines in South Africa. Bird collisions in this country have been mainly limited to; Greater and Lesser Flamingos, various species of waterbirds (ducks, geese, and waders), Stanley's *Neotis denhami*, Ludwig's Bustards, White Storks *Ciconia ciconia*, Wattled Crane *Grus carunculatus*, Grey Crowned Crane *Balearica regulorum* and Blue Cranes (for example, Jarvis 1974; Johnson 1984; Hobbs 1987; Longridge 1989; Van Rooyen & Ledger (1999).

Certain groups of birds are more susceptible to collisions, namely the species which are slow fliers and which have limited manoeuvrability (as a result of high wing loading) (Bevanger 1994), and birds which regularly fly between roosting and feeding grounds undertake regular migratory or nomadic movements. Birds flying in flocks or that fly during low-light conditions are also vulnerable.

Other factors which can influence collision frequency include; the age of the bird (younger birds are less experienced fliers), weather factors (decreased visibility, strong winds, etc.), terrain characteristics and power line placement (lines that cross the flight paths of birds), power line configuration (the larger structures are more hazardous [for collisions; with electrocutions the opposite is the case]), human activity (which may cause birds to panic and fly into the overhead lines), and familiarity of the birds with the area (therefore nomadic Ludwig's Bustards would be more susceptible) (Anderson 1978; APLIC 1994).

Although collision mortality rarely affects healthy populations with good reproductive success, collisions can be biologically significant to local populations (Beer & Ogilvie 1972) and endangered species (Thompson 1978; Faanes 1987). The loss of hundreds of Northern Black Korhaans *Eupodotis afraoides* due to power line collisions would probably not affect the success of the total population of this species and would probably not be biologically significant, but if one Wattled Crane was killed due to a collision, that event could have an effect on the population that would be considered biologically significant. Biological significance is an important factor that should be considered when prioritizing mitigation measures. Biological significance is the effect of collision mortality upon a bird population's ability to sustain or increase its numbers locally and throughout the range of the species.

There are many methods that can be used to **mitigate avian power line interactions** (for example, Avian Power Line Interaction Committee (APLIC), 1994) and several investigations dealing with the collision problem have recently focused on finding suitable mitigation measures (see APLIC 1994 for an overview). The most proactive measures are; power line route planning (and the subsequent avoidance of areas with a high potential for bird strikes)

and the modification of power line designs (this option includes line relocations, underground burial of lines, removal of overhead ground wires, and the marking of ground wires to make them more visible to birds in flight). In many instances, decisions on power line placement and possible mitigation measures are however eventually based on economic factors. The relocation of an existing line is the last option that is usually considered when trying to mitigate avian collisions. The huge expense of creating a new line and servitude usually cannot be justified unless there are biologically significant mortalities. Underground burial of power lines is another option available to managers in areas of high collision risk. This will obviously eliminate collisions, but the method has many drawbacks. The costs of burying lines can be from 20 – 30 times (or more) higher than constructing overhead lines (Hobbs 1987), and such costs are related to the line voltage, type and length of cable, cable insulation, soil conditions, local regulations, reliability requirements, and requirement of termination areas. Limitations of cable burial include: no economically feasible methods of burying extra HV power lines have been developed, there is a potential to contaminate underground water supplies if leakage of oil used in insulating the lines occurs, and extended outage risks due to the difficulty in locating cable failures (APLIC 1994).

Since most strikes involve earth wires (more than 80% of observed bird collisions) (for example, Beaulaurier 1981; Faanes 1987; Longridge 1989), the removal of these wires would decrease the number of collisions (Beaulaurier 1981; Brown *et al.* 1987). Faanes (1987) has argued that the large number of earth wire collisions is because birds react to the more visible conductors by flaring and climbing and then collide with the thinner earth-wires. Earth-wire removal is however, not a simple matter. Due to the need for lightning protection and other types of electricity overload, it is only possible on lower-voltage power lines (where polymer lightning arresters can be used).

The marking of overhead earth wires to increase their visibility is usually considered to be the most economical mitigation option for reducing collision mortality (Morkill & Anderson 1991; Brown & Drewien 1995). This is particularly so for the thousands of kilometres of established power lines through areas of high potential for avian interaction which cannot be rerouted."

The potential for Red Data power lines sensitive species to collide with the proposed LILO power lines is always there. However, this is likely to be a rare occurrence, because the majority of the site is either transformed or semi-transformed in such a way that these species are unlikely to be regularly attracted to the site. The biggest risk of collisions will be in the structurally untransformed area on the slopes of the mountains (see **Figure 7-15**), where power line sensitive Red Data species (as well as other non-Red Data raptors e.g. Jackal Buzzard, Booted Eagle and Verreaux's Eagle) are most likely to be occasionally encountered, especially when using the updrafts on the slopes for low altitude soaring. Overall, due to the short length of the proposed power lines, the risk is likely to be **low**. The collision risk will again be assessed once the alternative alignments have been finalised.

THEME	AVIFAUNA
Impact focal point	**Collisions: LILO 400kV Transmission power lines**
Phase	**Operational Phase**
Nature of impact	Mortality of Red Data species through collisions with the earth wire of the LILO 400kV Transmission power lines

THEME	AVIFAUNA
Impact focal point	**Collisions: LILO 400kV Transmission power lines**
Phase	**Operational Phase**
Status of impact	Negative
Extent of impact	Regional (3)
Duration of impact	Long-term (4)
Intensity of impact	High (10)
Probability	Likely (3)
Calculation	(3+4+10) x 3 = 51
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	Yes
Mitigation measures	The spans that cross structurally untransformed areas of fynbos against the slopes of the should be marked with Bird Flight Diverters on the earth wire of the line, 5m apart, alternating black and white. See **Figure 9-3** for the sections of line to be marked with Bird Flight Diverters. Appendix C of the Avifauna Assessment (**Appendix E-5**) indicates the preferred Bird Flight Diverters to be used.
Level of significance after mitigation	**Medium**

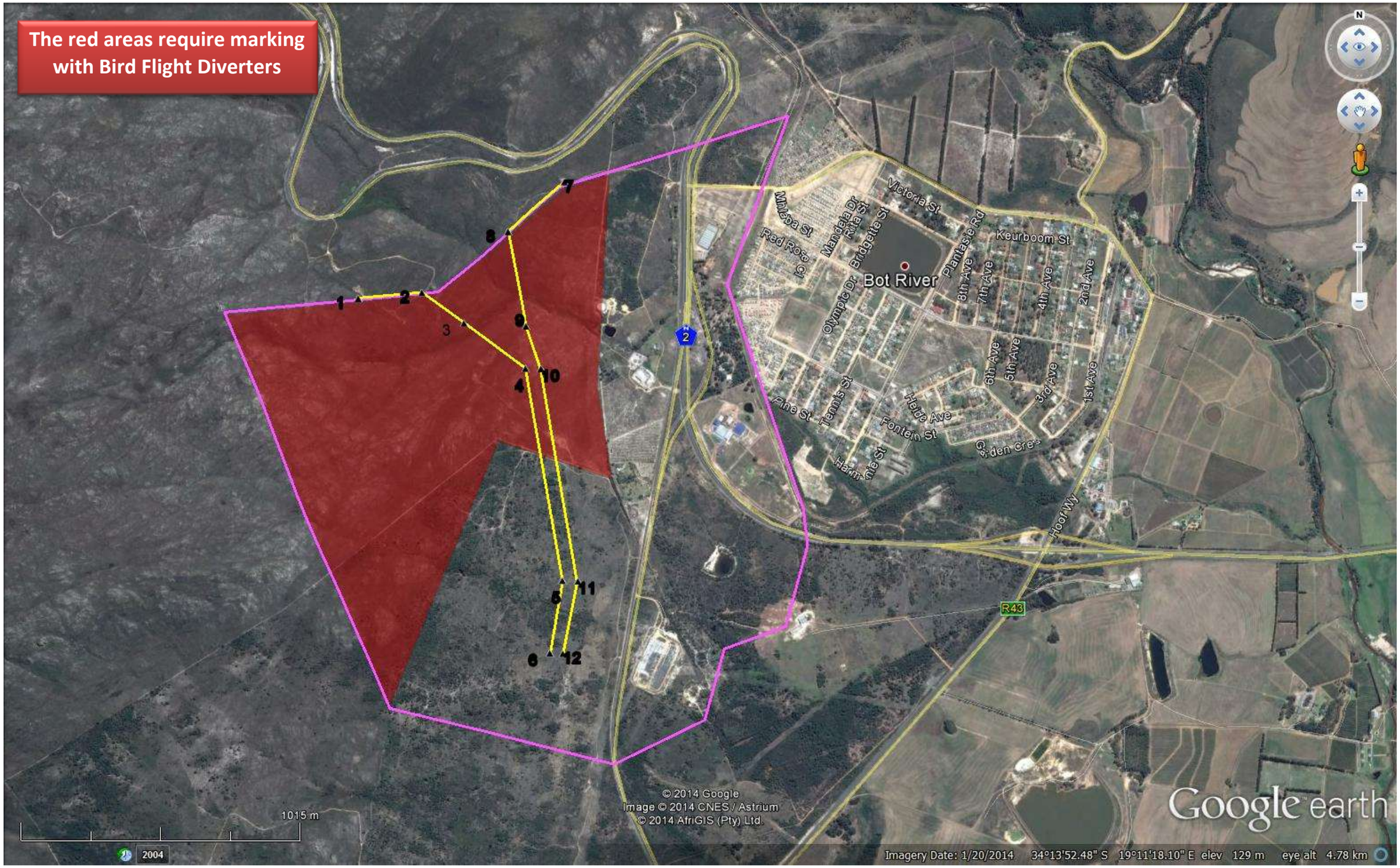


Figure 9-3: Sensitivity Map referring to marking with Bird Flight Diverters

9.8.3 Displacement Due to Habitat Destruction

During the construction phase and maintenance of power lines and substations, some habitat destruction and transformation inevitably takes place. This happens with the construction of access roads and the clearing of servitudes. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors, and to minimise the risk of fire under the line which can result in electrical flashovers. These activities could have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude, through transformation of habitat, and resultant displacement.

Historically the area where the proposed substation sites are located probably comprised entirely of pristine Fynbos. However these areas have since been transformed by urbanisation, industrial development and the uncontrolled increase of alien trees (both uncontrolled invasive aliens and cultivated plantations), which would have reduced the number and variety of Red Data species originally inhabiting the area, on account of the loss of habitat and decline in food availability. Few Red Data species would specifically be attracted to the transformed habitat, although raptors may on occasion perch or roost in the alien trees. The habitat at all the proposed alternative **Asteria Eskom MTS sites** does not contain unique features that will make it critically important for Red Data species (see **Chapter 7 Description of Affected Environment** above). The species that are most likely to be affected by the loss of habitat are the smaller, non-threatened passerines that are currently potentially resident in the 12 hectares of habitat that will be taken up by the substation. As mentioned earlier, the presence of alien trees may be an attractant for several non-Red Data raptor species, although the trees are generally not tall enough to serve as suitable nesting substrate (except possibly for Black-shouldered Kite). None of the known or suspected raptor nests in the vicinity should be affected by the habitat destruction at the proposed substation site (see **Figure 9-4** below).

It is not envisaged that any Red Data species will be permanently displaced by the habitat transformation that will take place, irrespective of which substation alternative is approved.

The potential impact of access roads associated with the 400kV LILO lines will be assessed in the next stage of the investigation once the potential alignment of these lines has been determined.

Figure 9-4: Known and Suspected Raptor Nests in the Bot Rivier Area (Source: Rob Martin)

THEME	AVIFAUNA	
IMPACT FOCAL POINT	**Displacement due to Habitat Transformation: Asteria Eskom MTS**	
PHASE	**CONSTRUCTION PHASE**	**OPERATIONAL PHASE**
Nature of impact	This impact is the potential displacement of Red Data species due to the habitat transformation associated with the construction activities	This impact is the potential displacement of Red Data species due to the habitat transformation associated with the operational activities
Status of impact	Negative	Negative
Extent of impact	Footprint (1)	Footprint (1)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	Low-Medium (4)	Low-Medium (4)
Probability	Possible (2)	Possible (2)
Calculation	(1+4+4) x 2 = 18	(1+4+4) x 2 = 18
Level of significance before mitigation	**Low**	**Low**
Confidence	High	High
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	No mitigation measures are possible for this impact as the complete transformation of the habitat in the footprint is inevitable	No mitigation measures are possible for this impact as the complete transformation of the habitat in the footprint is inevitable
Level of significance after mitigation	**Low**	**Low**

THEME	AVIFAUNA	
IMPACT FOCAL POINT	**Displacement due to Habitat Transformation: LILO 400kV Transmission power lines**	
PHASE	**CONSTRUCTION PHASE**	**OPERATIONAL PHASE**
Nature of impact	This impact is the potential displacement of Red Data species due to the habitat transformation associated with the construction activities	This impact is the potential displacement of Red Data species due to the habitat transformation associated with the operational activities
Status of impact	Negative	Negative
Extent of impact	Footprint (1)	Footprint (1)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Low (2)	Low (2)
Probability	Possible (2)	Possible (2)
Calculation	(1+2+2) x 2 = 10	(1+2+2) x 2 = 10
Level of significance before mitigation	**No impact**	**No impact**
Confidence	High	High
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	Limit the habitat transformation to the construction footprint area. Do not allow access to neighbouring areas.	
Level of significance after mitigation	**No impact**	**No impact**

9.8.4 Displacement Due to Disturbance

The construction of a power line and/or substation can be highly disturbing to birds breeding in the vicinity of the construction activities. Many birds are highly susceptible to disturbance and should this disturbance take place during a critical time in the breeding cycle, for example, when the eggs have not hatched or just prior to the chick fledging, it could lead to temporary or permanent abandonment of the nest or premature fledging. In both instances, the consequences are almost invariably fatal for the eggs or the fledgling. Such a sequence of events can have far reaching implications for certain large, rare species that only breed once a year or once every two years.

THEME	AVIFAUNA	
Impact Focal Point	**Displacement due to Habitat Transformation**	
Phase	**Construction Phase**	
Infrastructure	**Asteria Eskom MTS**	**LILO 400kV Transmission power lines**
Nature of impact	This impact is the potential displacement of Red Data species due to disturbance during a critical time in the breeding cycle caused by construction activities	This impact is the potential displacement of Red Data species due to disturbance during a critical time in the breeding cycle caused by construction activities
Status of impact	Negative	Negative
Extent of impact	Footprint (1)	Footprint (1)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Low (2)	Low (2)
Probability	Improbable (1)	Improbable (1)
Calculation	(1+2+2) x 1 = 5	(1+2+2) x 1 = 5
Level of significance before mitigation	**No impact**	**No impact**
Confidence	High	High

THEME	AVIFAUNA	
Impact Focal Point	**Displacement due to Habitat Transformation**	
Phase	**Construction Phase**	
Infrastructure	**Asteria Eskom MTS**	**LILO 400kV Transmission power lines**
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	Limit the disturbance to the construction footprint area. Do not allow access to neighbouring areas.	
Level of significance after mitigation	**No impact**	**No impact**

The location of the proposed construction camp site comprises an additional 1 hectare of habitat transformation, which could potentially result in displacement of red data species due to habitat transformation and disturbance.

THEME	AVIFAUNA	
Impact Focal Point	**Displacement due to Habitat Transformation and Disturbance**	
Phase	**Construction Phase**	
Infrastructure	**Construction Camp Site**	**Asteria Eskom MTS**
Nature of impact	The potential displacement of Red Data species due to habitat transformation associated with the construction camp site.	The potential displacement of Red Data species due to disturbance caused by construction activities.
Status of impact	Negative	Negative
Extent of impact	Footprint (1)	Footprint (1)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Low-Medium (4)	Low (2)
Probability	Possible (2)	Improbable (1)
Calculation	(1+2+4) x 2 = 14	(1+2+2) x 1 = 5
Level of significance before mitigation	**Low**	**No Impact**
Confidence	High	High
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	Limit the habitat transformation to the construction camp footprint. Rehabilitation of the construction camp area should be undertaken after the construction activities have ceased in accordance with the recommendations of the Botanical Specialist Study to ensure the complete rehabilitation of the area to its natural state.	Limit the disturbance to the construction camp site footprint area. Do not allow access to neighbouring areas.
Level of significance after mitigation	**Low**	**No impact**

9.9 IMPACT OF MECHANICAL CRANES ON SITE

As shown in **Figure 3-15**, in order to erect the pylon structures for the 400kV LILO Transmission power lines, a mechanical crane will be used to lift them in place. Due to the limited space available for construction and the risk of the construction staff working among existing live power lines, the use of a helicopter to place the pylons may be disregarded by

Eskom for maintenance purposes. The conductor between Pylon 2 and Pylon 4 will be pulled via helicopter to avoid the creation of additional access roads.

There would be temporary single-lane tracks that would be used for the maintenance of the 400kV LILO Transmission power lines. An access road may also be required from the R43 to the proposed Asteria Eskom MTS. The transport of these mechanical cranes to the tower positions via the temporary tracks or the possible access road will cause an impact on the watercourse (Impact location 'a' – see **Figure 7-7**).

THEME	HEAVY DUTY CONSTRUCTION EQUIPMENT
Impact focal point	**Watercourse inbetween Layout Alternative 1 and Layout Alternative 3 (impact location 'a')**
Phase	**Construction Phase and Decommissioning Phase**
Nature of impact	The construction of an access road to link the R43 and the proposed Asteria Eskom MTS could go through the watercourse within Layout Alternative 1 and Layout Alternative 3
Status of impact	Negative
Extent of impact	Site (2)
Duration of impact	Short-Medium-term (2)
Intensity of impact	Medium (6)
Probability	Highly Likely (4)
Calculation	(2+2+6) × 4 = 40
Level of significance before mitigation	**Medium**
Confidence	Medium
Reversibility	Yes
Replaceability	Yes
Mitigation measures	No new acess tracks to be constructed for the maintenance of the LILO Transmission power lines as existing access tracks must be used. Where existing tracks cannot be used, temporary tracks (single lane for a 4×4 vehicle) may be created. The temporary tracks must be scarified regularly through the construction phase else full rehabilitation would be required as stated in the EMPr. A Water Use License Application must be submitted to the DWA before the construction of any access roads through a watercourse.
Level of significance after mitigation	**Low**

9.10 SOCIO-ECONOMIC IMPACTS

9.10.1 Inflow of Workers

According to current planning, it is anticipated that the construction of the Asteria Eskom MTS and power lines would last for approximately two years in total.

The construction teams would on average vary from 5 to 15 individuals, increasing to 20 individuals per team during the peak construction periods such as the foundation laying process and tower erection. Approximately one hundred (100) workers would on average be on-site for the construction of the power lines and on average three hundred (300) workers would be involved with the construction of the substation which would peak to 400 during the main construction period. The increase in the footprint size is not expected to result in additional workers to be involved.

As the majority of the construction work requires skilled workers or specialists, and few opportunities for locals to be employed exist, an inflow of outside workers to the area is

expected. The presence of these workers and the construction activities (vehicle movement, noise, dust) could result in temporary intrusion impacts. As the construction areas are in close proximity to the town of Botrivier, it is anticipated that residents within the town of Botrivier (with a population count of approximately 5 266 individuals) would experience some negative impacts due to the presence of these workers (average of 400 workers and peak of 500 workers). These impacts would relate to possible additional pressure on services and infrastructure for a certain period of time, increase people movement, social conflict and various social ills due to an increased population profile.

Previous incidences of social unrest within Botrivier could highlight the increased risk in the area for social conflict and the need for a transparent and all-inclusive communication and recruitment process.

During the operational phase a small permanent staff component (approximately ten individuals) would be employed to undertake work at the substation site. The operation at the proposed Asteria Eskom MTS could thus be viewed as a "static" operation as it would not be a manned station. The employees would most likely only be present at the substation during inspections or emergency work. Their presence and movement within the area would thus not result in negative impacts on the social environment.

For the proposed 400 kV and 132 kV lines, *ad hoc* maintenance activities would be done live line by helicopter. These maintenance activities would occur intermittently (e.g. twice a year) or in the case of emergency repair work to be undertaken. The inflow of these workers (small teams), if properly managed is anticipated to have limited negative impacts on the affected property owners.

THEME	**INFLOW OF WORKERS**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Medium (6)		Medium (6)	Medium (6)		
Probability	Highly Likely (4)		Highly Likely (4)	Highly Likely (4)		
Calculation	(3+2+6) × 4 = 44		(3+2+6) × 4 = 44	(3+2+6) × 4 = 44		
Significance without mitigation	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium** • Added pressure on service delivery and the existing infrastructure with resultant additional socio-economic burdens for the local municipalities and surrounding property owners during the construction phase. • Increased impact on the larger area should other construction projects such as the construction of the wind farms be undertaken concurrently with this project.					

THEME	INFLOW OF WORKERS					
Mitigation measures	• A transparent and all-inclusive communication and recruitment process should be implemented by the Contractor. • The use of local labour should be maximised especially for the construction of the power lines as this could limit the intrusion impacts to some extent if less outsiders would be present in the area. • Eskom should introduce contractual obligations for Contractors to use local labour as far as possible. • Accommodation facilities should be adequate and should be able to deal with the requirements set by the Contractor. • Construction workers should be supervised at all times. • Construction activities should be kept to normal working hours e.g. from 7 am until 5 pm during weekdays. • Property owners affected by the power lines and those surrounding the proposed Asteria Eskom MTS area should be informed of the construction schedules and activities. • Security (infrastructure and personnel) on-site at the proposed Asteria Eskom MTS should be implemented during the construction period.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	INFLOW OF WORKERS					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+4) × 2 = 20		(2+4+4) × 2 = 20	(2+4+4) × 2 = 20		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium** Possible inflow of additional workers to the area once the proposed Donderboskop Industrial Development has been completed.					
Mitigation measures	• Eskom personnel should preferably not access private properties without prior notification of the property owners • Property owners should be notified if alien vegetation clearing would be undertaken • Maintenance and emergency activities on private properties should be strictly supervised • When accessing private properties, general good conduct of workers should prevail					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

Movement of equipment and personnel between the construction camp to the pylon position areas, as well as the substation site would result in temporary disruptions in the daily living and movement patterns of affected and neighbouring property owners. The figures mentioned above for those that seek work would thus have a concentrated impact on the affected section of the R43 and on Bakenhoogte Olives (intrusion impacts) due to the concentrated worker presence and movement between the construction sites and the

construction camp site. In this regard, a negative impact is thus foreseen on the affected residents and local road network.

During the tower pegging, installation of gates (where required), excavation of foundations, foundation pouring (concrete), tower assembly and erection, stringing of the conductors, and site rehabilitations, workers on site (at the pylon positions), however, are anticipated to have some, but limited negative impact on the social environment as no homesteads are in close proximity to the tower positions.

Once the construction period has been completed, the construction camp site would not be further required. Decommissioning of the infrastructure would still result in intrusion impacts, but in the long term the impact would thus be negated with workers moving out of the area.

Maintenance on the line would be undertaken on an *ad hoc* basis. The inflow of these workers (small teams), if properly managed, is anticipated to have limited negative impacts on property owners due to the relative remote location of the pylons.

THEME	**INFLOW OF WORKERS**		
Phase	**Construction Phase**	**Construction Phase**	**Operational Phase**
Description	Construction Camp Site	Proposed Pylon Positions	Proposed Pylon Positions
Status	Negative	Negative	Negative
Extent	Regional (3)	Regional (3)	Site (2)
Duration	Short-Medium-term (2)	Short-Medium-term (2)	Long-term (4)
Intensity	Medium (6)	Medium (6)	Low-Medium (4)
Probability	Highly Likely (4)	Likely (3)	Possible (2)
Calculation	(3+2+6) × 4 = 44	(3+2+6) × 3 = 33	(2+4+4) × 2 = 20
Significance without mitigation	**Medium**	**Medium**	**Low**
Confidence	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes
Cumulative Impacts	**Medium** Increased impact on the area concentrated around the construction camp and substation site should other construction projects such as the upgrading of the R43 and proposed toll gates be undertaken concurrently with this project.	**Medium** Added pressure on service delivery and the existing infrastructure with resultant additional socio-economic burdens for the local municipalities and surrounding property owners during the construction phase.	**Medium** Possible continuous inflow of additional workers to the area should other developments be undertaken after the completion of this project.
Mitigation measures	• The use of local labour should be maximised especially for the construction of the power lines as this could limit the intrusion impacts to some extent if less outsiders would be present in the area. • Eskom should introduce contractual obligations for contractors to use local labour as far as possible. • Construction activities should be kept to normal working hours e.g. from 7 am until 5 pm during weekdays, Saturdays from 7 am to 1 pm and no work on Sundays or public holidays. • Noise and dust pollution should be kept to a minimum.		• Eskom personnel should preferably not access private properties without prior notification of the property owners of at least 24 hours. • Maintenance and emergency activities should be strictly supervised. • When accessing private

THEME	INFLOW OF WORKERS		
Phase	Construction Phase	Construction Phase	Operational Phase
			properties, general good conduct of workers should prevail.
Significance with mitigation	Low	Low	Low

9.10.2 Influx of Job Seekers

The Asteria Eskom MTS project is situated near the town of Botrivier, which can be viewed as a relatively low density rural area. However, in this case it should be noted that the area is already under pressure from the large pool of unskilled migrants from the Eastern Cape who flock into the area in search of work and a better life (especially to Grabouw and Villiersdorp). Consequently, the number of unemployed people in the area has grown.

Job seekers are usually seen as "outsiders" coming from areas surrounding the local communities and would refer to all individuals gathering at the actual construction-sites. Due to the existing number of job seekers in the area and the location of the proposed Asteria Eskom MTS next to the R43, jobseekers at the construction-site of the proposed Asteria Eskom MTS are thus quite likely and possible at the construction areas associated with the 400 kV and 132 kV lines. These jobseekers could thus be from Botrivier and/or other nearby settlements such as the Houwhoek area, Velaphi, Fishershaven, Hawston, Kleinmond, Onrus, Hermanus or even further afield such as from Grabouw and Villiersdorp. Furthermore, workers, whether employed or unemployed, from the farms within the study area could be among the jobseekers as they could seek additional work outside their seasonal employment activities.

Should the construction of the proposed toll gate and road upgrading (planned in the vicinity of Site Alternative 1), and/or the construction of the Donderboskop Industrial Development, take place at the same time as the construction of the substation, the area could experience an increase in the influx of jobseekers with the subsequent social problems usually associated with outsiders. Safety and security risks would then also be intensified.

The negative impacts in this regard, especially with regards to the added pressure on employment creation, as well as infrastructure and services would thus have to be considered.

As almost no additional jobs would be created during the operational phase of the project, it is also anticipated that there would not be any marked inflow of jobseekers to the area due to this specific project. The impact is thus rated very low. No mitigation measures are proposed.

THEME	INFLUX OF JOBSEEKERS					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		

THEME	INFLUX OF JOBSEEKERS					
Intensity	Medium (6)		Medium (6)	Medium (6)		
Probability	Likely (3)		Possible (2)	Possible (2)		
Calculation	(3+2+6) × 3 = 33		(3+2+6) × 2 = 22	(3+2+6) × 2 = 22		
Significance without mitigation	**Medium**	**Medium**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium** Possible inflow of additional job seekers to the area once the proposed Donderboskop Industrial Development has been initiated and once the construction associated with the proposed toll gate and road upgrading would be undertaken. This could result in added pressure on service delivery and the existing infrastructure with resultant additional socio-economic burdens for the TWK municipality and surrounding property owners					
Mitigation measures	• Maximise the use of local labour by Contractors where possible, by developing a strategy to involve local labour in the construction process. • The recruitment process and the use of Contractors should be clearly communicated to the local communities. • The communication strategy should ensure that unrealistic employment expectations are not created. • A representative of Eskom could liaise with the local councillors to either attend key community meetings arranged within the various wards to discuss the employment and recruitment process; or liaise with the local councillors to ensure that the correct information regarding this issue is portrayed to the communities via the councillors, especially in the light of previous social unrest in the area					
Significance with mitigation	**Medium**	**Medium**	**Low**	**Low**	**Low**	**Low**

THEME	INFLUX OF JOBSEEKERS					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low (2)		Low (2)	Low (2)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+2) × 2 = 16		(2+4+2) × 2 = 16	(2+4+2) × 2 = 16		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low** None anticipated.					
Mitigation measures	None proposed					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

Various construction-related activities will be coordinated from the construction camp site area. The location of the construction camp site could thus serve as a possible focus area where jobseekers could gather in search of employment. Due to the site being located next to the R43, close to the proposed substation site and in proximity to the town of Botrivier, jobseekers gathering at the site would thus be highly likely. Existing pressure from the large pool of unskilled migrants from the Eastern Cape (especially during the harvesting season) could worsen the situation (Theewaterskloof Local Municipality, 2011). The presence of jobseekers is thus highly possible for the duration of the construction period, which would last for approximately two years.

It is not anticipated that the pylon positions, as proposed, would lure jobseekers to where these towers would be situated. The actual construction activities at the pylon positions would also be of a short duration and it is not expected that jobseekers would be present at these sites during that time.

The construction camp site would cease to exist during the operational phase of the project. Even with the presence of the substation site, the inflow of jobseekers to the area would be limited. The impact for the operational phase is thus rated very low, with no mitigation measures proposed.

THEME	**INFLUX OF JOBSEEKERS**	
PHASE	Construction Phase	
Description	Construction Camp Site	Proposed Pylon Positions
Status of impact	Negative	Negative
Extent of impact	Regional (3)	Site (2)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Medium (6)	Low-Medium (4)
Probability	Highly Likely (4)	Possible (2)
Calculation	(3+2+6) x 4 = 44	(2+2+4) x 2 = 16
Level of significance before mitigation	**Medium**	**Low**
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Cumulative Impacts	**Medium** Added pressure on service delivery and the existing infrastructure with resultant additional socio-economic burdens for the TWK LM and surrounding property owners during the construction phase.	**Medium**
Mitigation measures	• Maximise the use of local labour by Contractors where possible, by developing a strategy to involve local labour in the construction process. • The recruitment process and the use of Contractors should be clearly communicated to the local communities by the ECO or the Social Officer. • The communication strategy should ensure that unrealistic employment expectations and/or political protests are not created. • A representative of Eskom could liaise with the local councillors to either attend key community meetings arranged within the various wards to discuss the employment and recruitment process; or liaise with the local councillors to ensure that the correct information regarding this issue is portrayed to the communities via the councillors, especially in the light of previous social unrest in the area.	
Level of significance after mitigation	**Low**	**Low**

9.10.3 Accommodation of Workforce and Impact of Construction Camp Site

It is unlikely that a construction camp where the temporary workforce would be housed would have to be developed. This is mainly attributed to the specialised workforce that would be required. Should some of the members of the specialist teams however require accommodation, it would, as part of the EMPr, be decided whether these individuals could be housed in the existing accommodation facilities (e.g. Bed and Breakfast establishments, hotels and so forth) in and around Botrivier or whether an actual accommodation facility (camp) would be required. At this stage it is still anticipated that the existing establishments within the region would be able to accommodate these workers.

It should further be noted due to the proximity of Botrivier to the study area and the proposed Asteria Eskom MTS, lesser skilled workers (although only a few) from within the community could be sourced during the construction phase. These workers would thus have existing accommodation.

Possible negative impacts associated with an accommodation facility could have serious influences on surrounding residents and should thus be noted. Unless properly managed, these could include noisy behaviour, littering, and alcohol abuse at the facility, possible conflict with local residents, as well as environmental pollution.

A construction camp site where equipment will be stored, however, would be required. The impact of this facility cannot be determined at this stage as it would depend on the preferred and approved location of the Asteria Eskom MTS (Layout Alternative 1 or 3) and the alignment of the 400 kV and 132 kV lines. However, the main social impacts associated with a construction camp site on the surrounding communities would mainly be in the form of traffic and noise generated by construction vehicles. Care should thus be taken to place this facility in an environment where existing traffic problems do not occur and where the movement of pedestrians, especially school children would be minimal.

No impacts with regards to this variable are anticipated during the operational phase of the project. No rating is thus provided for that phase.

THEME	**ACCOMMODATION OF WORKFORCE AND IMPACT OF CONSTRUCTION CAMP**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Likely (3)		Likely (3)	Likely (3)		
Calculation	(2+2+4) × 3 = 24		(2+2+4) × 3 = 24	(2+2+4) × 3 = 24		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low** None anticipated.					

THEME	ACCOMMODATION OF WORKFORCE AND IMPACT OF CONSTRUCTION CAMP					
Mitigation measures	• The location of the construction camp (if required) where workers could be housed and equipment yard should be carefully considered to limit any possible negative social impacts. • The construction camp should be located near support services, and ideally not in the vicinity of residential dwellings or the local school. • Construction camp management should adhere to the EMPr guidelines.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

9.10.4 Employment Opportunities and Skills Training

The procurement and contracting phase of Eskom would be approximately six months from the date of approval from the environmental authorities until the start of the construction process, although it should be noted that various factors could have an influence on this timeframe. Tenders would be advertised on the Eskom website. Local entrepreneurs or Contractors could thus tender for work through the formal tender process. Locals, however, should be aware of the process to be followed and understand the tender procedure. Due to the timeframes involved it is thus unlikely that Eskom and/or the Contractors could embark on a detailed skills training and capacity building exercise prior to the construction process to enhance the local skills available.

Once the Contractor has been appointed the construction period could start. Even though the construction of the MTS and the power lines is specialised work, some limited opportunities for unskilled labour from the local municipal area would be available. Such individuals would be appointed by the main Contractor. The peak construction period associated with the proposed transmission line would be the establishment of the foundations, the erection of the towers and the stringing of the line where the largest number of workers would be involved.

The following table provides a breakdown of the number of unskilled, semi-skilled, skilled and professionals that could be involved in the construction period:

Construction Period	Unskilled Individuals	Semi-Skilled Individuals	Skilled Individuals	Professionals
Entire construction period	±260	±260	±40	±40
Peak construction periods only	±160	±160	±40	±40

From the above it is apparent that various unskilled and semi-skilled individuals would be involved in the construction process. It should however be noted that although the skills levels of these workers fall in the lower skilled categories, these workers would have some experience in the construction of power lines and a MTS, as most of the activities require specialised work.

Employment is a scarce resource and relative high unemployment figures among the youth in the municipal area are prevailing. Social unrest in the Botrivier area in the past year is a source of concern. The main reasons for the unrest were political issues, and dissatisfaction among residents with regards to service delivery. Care should thus be taken with the appointment of local labours as part of the construction process to ensure an all-inclusive and transparent process.

During the operational phase of the project, the proposed Asteria Eskom MTS would have a permanent staff component of approximately ten employees or even less. Only routine maintenance, inspections or emergency work would be undertaken and these workers would not be permanently situated at the MTS. The Asteria Eskom MTS would thus have a neutral impact on the local community with regards to any possible employment opportunities.

Routine maintenance and emergency work on the 400 kV and 132 kV lines would be dealt with by Eskom personnel. Again no additional employment opportunities would be created.

THEME	**EMPLOYMENT OPPORTUNITIES AND SKILLS TRAINING**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Positive		Positive	Positive		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Likely (3)		Likely (3)	Likely (3)		
Calculation	(3+2+4) × 3 = 27		(3+2+4) × 3 = 27	(3+2+4) × 3 = 27		
Significance without enhancement	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium** Possible conflict and social unrest due to dissatisfaction with employment creation and recruitment process due to previous tension experienced in the area.					
Enhancement measures	• The number of job opportunities available as part of the proposed project and the recruitment process should be clearly communicated. • The aforementioned incidences of social unrest within Botrivier could emphasise the need for a transparent and all-inclusive communication and recruitment process. • The communication strategy should ensure that unrealistic employment expectations are not created. • The use of local labour should be maximised through contractual conditions set for the sub-Contractors. • Even though a detailed skills training and capacity building programme might not be feasible due to the timeframes involved, Eskom and/or the Contractor should still aim to provide some form of capacity building and skills training during the construction phase					
Significance with mitigation	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**

THEME	**EMPLOYMENT OPPORTUNITIES AND SKILLS TRAINING**					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Neutral		Neutral	Neutral		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low (2)		Low (2)	Low (2)		
Probability	Improbable (1)		Improbable (1)	Improbable (1)		

THEME	EMPLOYMENT OPPORTUNITIES AND SKILLS TRAINING					
Calculation	(3+4+2) × 1 = 9		(3+4+2) × 1 = 9	(3+4+2) × 1 = 9		
Significance without mitigation	**No Impact**	**No Impact**	**No Impact**	**No Impact**	**No Impact**	**No Impact**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Mitigation measures	None proposed					
Significance with mitigation	**No Impact**	**No Impact**	**No Impact**	**No Impact**	**No Impact**	**No Impact**

9.10.5 Local Economic Contribution

The total cost of the project could amount to approximately R570 million of which R20 million would be channelled to the power lines. Of the total cost, approximately R120 million would go to imports as primary equipment would possibly be manufactured overseas, with a local office responsible for the supply and installation. The percentage of the total costs that would go to suppliers and Contractors in the Western Cape Province would be determined once the tenders have been awarded. The detailed figures and costing for local materials and the quantity of materials required, as well as for consumables (e.g. fuel for construction vehicles) for the construction of the proposed Asteria Eskom MTS, 400 kV lines and 132 kV line would thus also be finalised as part of the tender procedure and Contractors' appointment. It can thus be assumed that some local procurement of goods, materials and services could occur which would result in positive economic spin-offs, although limited in comparison with the overall project costs.

Local economic benefits during the construction phase would thus be focused on the temporary employment of local labourers and short term socio-economic spin-offs such as increased buying power around the construction-site of the proposed Asteria Eskom MTS, and Botrivier town, as well as some small scale economic advancement of entrepreneurs (e.g. those selling food and goods to the construction workers). The benefits of the temporary employment positions is short lived and of a restricted extent, but should still be regarded as positive.

The actual accommodation of the construction workers within local establishments could have further positive economic implications for the owners of such establishments. It is however, doubtful that the town of Botrivier would be able to handle all the outsiders and added positive implications could results for nearby towns such as Caledon, Hermanus, Kleinmond and so forth.

Botrivier has been earmarked as part of the planning processes of the TWK Municipality as a wine region, renewable energy generation centre (wind farming) as well as a light industrial hub for the region. Release of land for the major industrial development potential, as outlined in the Botriver Growth study, would unlock economic activity in the area and create opportunities for sustainability-type businesses.

Within Botrivier, the local economic development of the area would thus be dependent on the tourism industry and industrial development (proposed Donderboskop Industrial development) which requires the upgrading of bulk infrastructure to support the development. The upgrading of the electricity supply in the area would thus assist in meeting these objectives, but would also assist in importing the proposed wind energy into the existing Eskom electricity grid.

The proposed project would thus result in an overall positive economic contribution in the area, although no direct full time employment during the operational phase of the project would be created.

THEME	**LOCAL ECONOMIC CONTRIBUTION**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Positive		Positive	Positive		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low- Medium (4)		Low-Medium (4)	Low- Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(3+2+4) × 2 = 18		(3+2+4) × 2 = 18	(3+2+4) × 2 = 18		
Significance without enhancement	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low**					
Enhancement measures	• Local procurement should be aimed at local businesses and entrepreneurs as far as possible. • Local sourcing of materials would assist in providing more economic and employment opportunities for the local people. • Local procurement could result in indirect economic spin-offs and benefits such as increased income, and expansion of other local economic sectors. • Maximise the use of local labour even if the number of locals that would be employed would be limited. • Accommodate, but regulate the activities of vendors in the vicinity of the construction areas.					
Significance with mitigation	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**

THEME	**LOCAL ECONOMIC CONTRIBUTION**					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Positive		Positive	Positive		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Medium (6)		Medium (6)	Medium (6)		
Probability	Likely (3)		Likely (3)	Likely (3)		
Calculation	(3+4+6) × 3 = 39		(3+4+6) × 3 = 39	(3+4+6) × 3 = 39		

THEME	LOCAL ECONOMIC CONTRIBUTION					
Phase	Operational Phase					
Significance without enhancement	**Medium (+)**	**Medium (+)**	**Medium (+)**	**Medium (+)**	**Medium (+)**	**Medium (+)**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low**					
Enhancement measures	New business development should be encouraged by means of the Asteria Eskom MTS projectto enhance the local economy.					
Significance with mitigation	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**	**Low (+)**

9.10.6 Disruption in Farming Activities

During the construction phase, the accumulation of dust on crops can influence the production capacity of those crops. No vineyards are currently is close proximity to the areas where construction activities would be undertaken, although olive production is taking place to the north of the substation sites. No negative impacts on vineyards are foreseen, but the possible negative impact of dust pollution on the olive production remains a concern.

The construction of additional access routes to reach the construction-sites remains a concern as this would sterilise additional land which cannot be used for crop production activities. Moreover, the construction and maintenance of these roads are very costly, impact on the residents' daily living and movement patterns, and create a potential for erosion. In this regard, all three LILO alternative corridors could have a similar impact as some existing access routes for the current lines in those areas could be re-used.

Movement of construction workers on properties are deemed to have a minimal impact on the farming activities as no intensive agricultural activities are undertaken within close proximity to the construction areas.

The servitude width is required for the safe operation of the transmission and distribution lines and reliability of electricity supply to consumers and therefore no structures are allowed within the servitude. Most farming activities can be carried out under the conductors, provided that there is adherence to safe working clearances, building restrictions and general restrictions. Minimal negative impacts on the farming community are thus anticipated in this regard as it is not anticipated that the type of farming activities within the study area or equipment would interfere with the functioning of the 400 kV or 132 kV lines. At this stage no agricultural activities are undertaken within the LILO 1, 2 and 3 corridors and no future plans in this regard are known to the consultant. The future plans to start breeding cattle in the northern section of the study area where the LILO 2 and 3 corridors could be situated, would also not be impacted upon. No impacts on agricultural activities are further foreseen where the distribution lines might be constructed.

The substation site (Site 1: Alternative Layout 1) would not impact on existing agricultural activities. It would, however, sterilise the footprint area for any future agricultural production or farming activities, and possible future development of vineyards. As sections

of the Wildekrans property to the west of the R43 can be seen as disturbed areas due to previous ploughing activities, the winemaker is investigating the possibility of developing the area for Sauvignon Blanc vineyards, although as long-term planning. Another concern relate to the usage of a borehole to the south of the substation site. Any disruptions in this water source would impact on the existing agricultural production and upkeep of the tourist related activities of the Wildekrans Wine Estate.

The substation site (Site 1: Alternative Layout 3), would also, as is the case with Alternative Layout 1, sterilise land for future agricultural activities, although no impact on existing agricultural activities are known.

Both substation sites assessed are thus not anticipated to directly impact on existing agricultural activities or the olive production undertaken to the north of these sites. The impact for both sites, however are rated negative as it would sterilise land for future agricultural activities in the long-term.

THEME	**DISRUPTION OF FARMING ACTIVITIES**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low-Medium (4)		Low (2)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+2+4) × 2 = 16		(2+2+2) × 2 = 12	(2+2+4) × 2 = 16		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low**					
Mitigation measures	• Eskom should keep the construction of access roads to a minimum and rather use the existing infrastructure. • It is imperative that the construction of additional access roads (if required) be undertaken in full consultation with the property owners. Land to be used for future agricultural activities should not be negatively impacted on. • Rehabilitation of new access roads for construction vehicles should be undertaken as soon as the construction process allows. • Dust pollution should be minimised.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	**DISRUPTION OF FARMING ACTIVITIES**					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		

THEME	DISRUPTION OF FARMING ACTIVITIES					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Intensity	Medium-High (8)		Low-Medium (4)	Medium (6)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+8) × 2 = 28		(2+4+4) × 2 = 20	(2+4+6) × 2 = 24		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low**					
Mitigation measures	• No activities associated with the operation of the substation site should negatively impact on the borehole used by the Wildekrans Wine Estate • No activities should negatively impact on the production of olives (at the Bakenhoogte Olive Farm) to the north of the proposed Asteria Eskom MTS. • It is imperative that the construction of additional access roads be undertaken in full consultation with the property owners. Land to be used for future agricultural activities should not be negatively impacted on					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

9.10.7 Disruption in Daily Living and Movement Patterns and Proximity of Homesteads

Temporary disruptions in the daily living and movement patterns of affected and neighbouring private property owners could be foreseen, due to the movement of the construction workers through the area, as well as the construction vehicles. Approximately one hundred (100) workers would on average be on-site for the construction of the power lines and on average three hundred (300) workers would be involved with the construction of the substation which would peak to 400 during the main construction period. In addition, an average of twenty construction vehicles would travel on the local roads on a daily basis for the entire construction period. This would include material delivery vehicles and vehicles that will travel daily to and from the construction areas.

As indicated under **Section 9.10.1**, the number of workers involved in the process could impact on the social environment and local roads within Botrivier town and surrounding areas. Anticipated temporary intrusion impacts on the residents of the town of Botrivier, are however anticipated to successfully respond to mitigation. It should also be noted that the R43 and N2, as well as the railway line could act as infrastructural buffers between the new proposed MTS (both locations) and the town of Botrivier.

From observations made, the current dust sources in the area refer to agricultural activities, fires, and wood burning activities. The main noise sources relate to the traffic generated on the N2 and R43. General intrusion impacts on the daily living and movement patterns of residents foreseen during the construction phase also include additional noise and possible dust creation. The construction phase, however, is temporary and these short term impacts could thus be mitigated as mechanisms stipulated in the EMPr. Both locations proposed for

the MTS are in close proximity to each other and are thus expected to have similar impacts on the social environment in terms of dust and noise.

Residences that are in close proximity to the construction areas refer to the dwellings of Bakenhoogte Olywe (Property Owner: Mr. and Mrs. Punt) which include a residential dwelling also used for business purposes and one dwelling for the farm workers; and Kompanjiesdrift (Property owner: Mr. Bothma) which include a dwelling currently on lease, and one dwelling for the farm workers. The residential dwelling of Bakenhoogte Olywe and farm worker dwelling are both approximately 150 metres from the nearest point from Site 1: Alternative Layout 3. Construction-related intrusion impacts would thus have severe negative impacts on these residents of these dwellings which would mainly relate to noise and dust and possibly an increased security risk. The impact of the construction activities of the transmission lines on the dwellings of Bakenhoogte Olywe and Kompanjiesdrift would be less as smaller teams of workers would intermittently be present at the construction areas. LILO 1 and 3 which are located further to the west would thus have less of an impact compared to LILO 2 which is nearest to the dwellings.

As the general construction activities associated with the substation locations and LILO lines would have similar negative impacts, the construction-related rating of the impacts was based on the construction impacts on the residential proximity to these affected areas.

Maintenance of the power lines are said to be undertaken by helicopter which could result in some noise impacts but limited intrusion impacts on private properties. Limited access routes to the proposed power lines are therefore also anticipated to be required.

When operational the proposed Asteria Eskom MTS would be unmanned. Daily access by vehicles would thus not be required. At this stage it is anticipated that the site would be accessed by one or two vehicles a week for the routine maintenance at the site. Emergency work or repairing of faults would further require access to the site. The traffic impact and subsequent intrusion on the social environment is thus expected to be minimal and no mitigation is required, except for the possible upgrading of access to the site.

THEME	**DISRUPTION IN DAILY LIVING PATTERNS AND MOVEMENT PATTERNS AND PROXIMITY OF HOMESTEADS**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Medium (6)		Low (2)	Low-Medium (4)	Medium (6)	
Probability	Possible (2)	Highly Likely (4)	Possible (2)	Possible (2)	Highly Likely (4)	Possible (2)
Calculation	(2+2+6) × 2 = 20	(2+2+6) × 4 = 40	(2+2+2) × 2 = 12	(2+2+4) × 2 = 16	(2+2+6) × 4 = 40	(2+2+6) × 2 = 20
Significance without mitigation	**Low**	**Medium**	**Low**	**Low**	**Medium**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium

THEME	DISRUPTION IN DAILY LIVING PATTERNS AND MOVEMENT PATTERNS AND PROXIMITY OF HOMESTEADS					
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• Working hours should be kept to normal working hours (e.g. 7 am until 5 pm) during the construction phase. • The movement of construction vehicles near dwellings should be limited. • Construction vehicles should keep to the speed limits. Speeding on gravel access roads should also be avoided to limit any excess dust pollution. • Clear warning signs should be erected at strategic places along the R43 during the construction phase. • The Contractor should contact affected property owners before construction commences to inform them of the Contractor's plans, procedures, and schedules. • Access to properties should be maintained as far as possible. Expected difficulties with regards to access to properties should be clarified with the affected property owners. • Construction-sites should be fenced off to limit unauthorised entry. • Sufficient water and sanitation facilities should be provided for the workers on-site during the construction period. • Construction-sites should be rehabilitated as soon as the construction activities and planning allows					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	DISRUPTION IN DAILY LIVING PATTERNS AND MOVEMENT PATTERNS AND PROXIMITY OF HOMESTEADS					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Medium (6)		Low (2)	Low-Medium (4)	Medium (6)	Low-Medium (4)
Probability	Possible (2)	Likely (3)	Possible (2)	Possible (2)	Likely (3)	Possible (2)
Calculation	(2+4+6) × 2 = 24	(2+2+6) × 3 = 36	(2+4+2) × 2 = 16	(2+4+4) × 2 = 20	(2+4+6) × 3 = 36	(2+4+4) × 2 = 20
Significance without mitigation	**Low**	**Medium**	**Low**	**Low**	**Medium**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low**					
Mitigation measures	• Maintenance schedules of the power lines should be communicated and clarified with the property owners. • The proposed Asteria Eskom MTS should be maintained and operated according to relevant regulations and guidelines.					

THEME	DISRUPTION IN DAILY LIVING PATTERNS AND MOVEMENT PATTERNS AND PROXIMITY OF HOMESTEADS					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

The nearest residential dwelling to the proposed pylon positions (e.g. Pylon 10) is a dwelling situated near the pump station approximately 270 m from the east of the pylon positioning. This dwelling is situated on the farm Kompanjiesdrift (Property owner: Mr. Bothma) and is currently on lease. Although the tower is in relative close proximity to this dwelling, no long term negative impact on the residents are foreseen.

Various intrusions (noise, dust, worker movement, vehicular movement, possible littering and so forth) could be experienced during the construction phase. One should however note that the relative small construction teams would only be stationary at the pylon positions for a short duration. The impacts would thus occur on an intermittent basis and would not involve large numbers of construction workers at any one time.

Pylon 10 is also situated in close proximity to the Bakenhoogte Olives homestead which is also used for business purposes. This tower is approximately 480 m north-west of the homestead. Pylon 11 situated at the construction camp site is located to the south-west of the dwelling and is approximately 450 m from this homestead. It should further be noted that an existing Distribution power line traverses in very close proximity to the homestead. In this regard, the negative long term social impacts and intrusion on the daily living and movement patterns are noted to be of a limited significance. Only some negative intrusion impacts (similar to those listed above) are foreseen during the construction phase.

The other pylon positions are not anticipated to have any impact on dwellings or on living and movement patterns of any residents.

The increase in the substation footprint size is furthermore not expected to result in additional impacts, apart from the impacts assessed earlier in this section. No ratings and mitigation measures would thus be included as part of this type of social impact.

The location of the construction camp site could have a more marked impact on the Bakenhoogte Olives homestead due to the increased noise (vehicle and worker movement) and dust and possibly an increased security risk. Once the construction phase has been completed no impact in this regard would further occur.

A concentrated inflow of workers at the construction camp site area and the substation site would further possibly result in individuals selling food and goods to the construction workers in that area. Care should be taken to not negatively impact on the flow of traffic due to unauthorised stopping and parking next to the R43 where traffic is anticipated to increase during the construction phase.

Due to the topography and sensitive area where the proposed pylons would be situated *ad hoc* maintenance activities could be undertaken by helicopter. These maintenance activities would occur intermittently (e.g. twice a year) or in the case of emergency repair work to be undertaken. The inflow of these workers (small teams), if properly managed, is anticipated to have limited negative impacts (noise) on the affected property owners.

Limited use of existing and potential short new access routes to the proposed Transmission power lines is therefore also anticipated to be required.

THEME	**RESIDENTIAL PROXIMITY AND IMPACT ON DAILY LIVING AND MOVEMENT PATTERNS**	
PHASE	Construction Phase	
Description	Construction Camp Site	Proposed Pylon Positions
Status of impact	Negative	Negative
Extent of impact	Regional (3)	Site (2)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Medium (6)	Medium (6)
Probability	Likely (3)	Likely (3)
Calculation	(3+2+6) x 3 = 33	(2+2+6) x 3 = 30
Level of significance before mitigation	**Medium**	**Low**
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Cumulative Impacts	**Medium** None anticipated.	**Medium** None anticipated.
Mitigation measures	• Working hours should be kept to normal working hours e.g. from 7 am until 5 pm during weekdays, Saturdays from 7 am to 1 pm and no work on Sundays or public holidays. • The movement of construction vehicles near dwellings should be limited by reduced use. • Construction vehicles should keep to the speed limits. Speeding on gravel access roads should also be avoided to limit any excess dust pollution. • Clear warning signs should be erected at strategic places along the R43 and on all existing or new access routes during the construction phase. • The Contractor should contact affected property owners before construction commences to inform them of the Contractor's plans, size of the workforce, procedures, and schedules. • Access to properties should be maintained as far as possible. Expected difficulties with regards to access to properties should be clarified with the affected property owners. • Construction-sites should be fenced off to limit unauthorised entry. • Sufficient transportable water and sanitation facilities should be provided for the workers on-site during the construction period. • Construction-sites should be rehabilitated as soon as the construction activities and planning allow.	
Level of significance after mitigation	**Low**	**Low**

THEME	**RESIDENTIAL PROXIMITY AND IMPACT ON DAILY LIVING AND MOVEMENT PATTERNS**	
PHASE	Operational Phase	
Description	Construction Camp Site	Proposed Pylon Positions
Status of impact	Negative	Negative
Extent of impact	Regional (3)	Site (2)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Medium (6)	Medium (6)
Probability	Likely (3)	Likely (3)
Calculation	(3+2+6) x 3 = 33	(2+2+6) x 3 = 30

THEME	RESIDENTIAL PROXIMITY AND IMPACT ON DAILY LIVING AND MOVEMENT PATTERNS	
PHASE	Operational Phase	
Level of significance before mitigation	Medium	Low
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Cumulative Impacts	Medium None anticipated.	Medium None anticipated.
Mitigation measures	Maintenance schedules of the Transmission power lines should be communicated and clarified with the property owners prior to construction starting.	
Level of significance after mitigation	Low	Low

9.10.8 Impact on Land Use

Botrivier is enclosed by physical en ecological constraints. Future expansion is thus limited by the servitudes to the north and west of the town. Drainage lines to the south and east of the town, as well as natural slopes to the north and west also act as natural buffers or corridors. The N2 passes the town to the south and the proposed Donderboskop Industrial Development is proposed further south. The railway line borders the town to the west.

Care should thus be taken not to further impede the development potential of the town by the proposed substation and additional servitudes required for the 132 kV and 400 kV lines. Municipal documentation indicated that leapfrog development to the west of Botrivier as well as to the west of the N2 should be restricted and development should preferably be contained within the barriers of the N2 and R43. One of the reasons that the two substation location alternatives to the west of the R43 were assessed as part of the EIA phase, was to actually allow the Donderboskop Industrial Development to continue unhampered within these barriers. Even though the site positions are in conflict with the recommendations of the SDF, the presence of other infrastructure in the area such as existing power lines, roads and the proposed industrial development, the proposed toll road development, the proposed project is not viewed as “leapfrog” development. The impacts on the land use in this area are, from a social perspective, thus anticipated to be low.

In this regard, the cumulative impacts of the existing and future infrastructure concentrated within a larger section of the study area, could from a social perspective be seen as some form of mitigation with regards to the impact on the land use in the study area.

As the impact on the land use would be a long-term impact, only the operational phase was rated as part of the rating tables.

THEME	LAND USE					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		

THEME	LAND USE					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(3+4+4) × 2 = 22		(3+4+4) × 2 = 22	(3+4+4) × 2 = 22		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	No	No	No	No	No	No
Cumulative Impacts	**Medium**					
Mitigation measures	To limit the impact on the land use in the area, the development should remain as close to the existing infrastructure as possible.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

Due to the location of Bakenhoogte Olive Farm to the proposed substation site and construction camp site, possible negative impacts in terms of dust pollution on the olive production remains a concern. The intrusion impacts and noise created during the construction phase, however, are not anticipated to directly impact on the land-use and farming activities on this property. The increase in the footprint size of the substation is also not expected to result in additional impacts on this business.

Movement of construction workers on the affected properties are also deemed to have a minimal impact on the farming activities as no intensive agricultural activities are undertaken within close proximity to any of the pylon positions.

The footprint of the pylon positions would sterilise the land-use, but this impact would be of a low significance as no olive or wine farming activities are currently taking place at these footprints. As indicated in **Section 9.10.6** above, the servitude width is required for the safe operation of the transmission and distribution lines and reliability of electricity supply to consumers and therefore no structures are allowed within the servitude. Most farming activities can be carried out under the conductors, provided that there is adherence to safe working clearances, building restrictions and general restrictions. Minimal negative impacts on the farming community are thus anticipated in this regard as it is not anticipated that the type of farming activities within the study area or equipment would interfere with the functioning of the lines.

The proposed construction camp would not sterilise land during the construction phase for agricultural activities, as no existing agricultural activities occur on site. Rehabilitation of the site is thus critical to ensure no future land sterilisation.

THEME	IMPACT ON LAND USE AND FARMING ACTIVITIES		
Phase	**Construction Phase**	**Construction Phase**	**Operational Phase**
Description	Construction Camp Site	Proposed Pylon Positions	Proposed Pylon Positions
Status	Negative	Negative	Negative
Extent	Site (2)	Site (2)	Regional (3)

THEME	IMPACT ON LAND USE AND FARMING ACTIVITIES		
Phase	**Construction Phase**	**Construction Phase**	**Operational Phase**
Duration	Short-Medium-term (2)	Short-Medium-term (2)	Long-term (4)
Intensity	Low-Medium (4)	Low-Medium (4)	Low-Medium (4)
Probability	Possible (2)	Possible (2)	Possible (2)
Calculation	(2+2+4) × 2 = 16	(2+2+4) × 2 = 16	(3+4+4) × 2 = 22
Significance without mitigation	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes
Replaceability	Yes	Yes	No
Cumulative Impacts	**Medium** None anticipated		**Medium**
Mitigation measures	• Noise and dust pollution should be kept to a minimum		• Rehabilitation of the construction camp remains important to ensure that land would not be sterilised for any planned future use and specifically for agricultural activities • The footprint size of the pylons should be kept to a minimum
Significance with mitigation	**Low**	**Low**	**Low**

9.10.9 Proposed Donderboskop Industrial Development

The TWK SDF indicated that the town of Botrivier has a lack of industrial erven to stimulate economic growth and create the potential for economic development, as well as to strengthen the town's strategic locational advantage. Given the wider role of Botrivier in the district's economy there is thus the need to make sufficient provision in terms of land for such an industrial development (including agri-industrial) and taking the natural (slopes) and physical constraints (roads and railway line) into account. An area of 70 ha between the N2 (south) and the split of the R43 has been earmarked for the proposed Donderboskop Industrial Development.

To link the residential areas to the south of the N2 with the proposed Donderboskop Industrial Development, a north-south link road along Plantation Street is planned.

The proposed MTS site locations and power lines will thus not influence the planning of the Donderboskop Industrial Development or the roads associated with this development. This was also one of the reasons, from a social perspective, for recommending these two substation locations as the preferred sites on completion of the Scoping Study. The proposed Asteria Eskom MTS project which would ensure increased electricity capacity could also assist in ensuring electricity supply to the industrial area.

In this regard it should, however be noted, that possible negative intrusion impacts and challenges to the existing social fabric, infrastructure and services in the area could be experienced should the construction phase of the proposed Donderboskop Industrial Development overlap with this proposed project's construction timeframe. As such a

situation could be seen as a "worst case scenario", the impacts were rated accordingly in the table below.

THEME	PROPOSED DONDERBOSKOP INDUSTRIAL DEVELOPMENT					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Medium (6)		Medium (6)	Medium (6)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(3+2+6) × 2 = 22		(3+2+6) × 2 = 22	(3+2+6) × 2 = 22		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	If the construction phase of the Donderboskop Industrial Development overlaps with the construction phase of the proposed Asteria Eskom MTS project, mitigation measures to deal with the larger influx of workers to the area should be developed.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	PROPOSED DONDERBOSKOP INDUSTRIAL DEVELOPMENT					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low (2)		Low (2)	Low (2)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+2) × 2 = 16		(2+4+2) × 2 = 16	(2+4+2) × 2 = 16		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	No mitigation measures are deemed necessary.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

9.10.10 Proposed Residential Development

Within the town of Botrivier, the TWK Municipality plans to implement densification of the CBD and infill development within the existing Botrivier town. The proposed substation development would thus not sterilise land identified for such housing needs. According to a presentation made by Urban Dynamics Town and Regional Planners in 2008, low density residential developments are planned to the east of the N2 and west of the existing township of Botrivier and the railway line. This pending application is proposed in the vicinity of Substation Alternative 2 that was investigated in the Scoping Phase of the project. A further pending application for a low to medium density residential development is located to the south of Botrivier, just south of the railway line and just north of the N2 and R43 interchange. The proposed Asteria Eskom MTS Layout Alternative 1 and Layout Alternative 3 would thus not directly impact on these planned developments as it is some distance from both proposed developments. The R43 and N2 also act as buffers between the proposed Asteria Eskom MTS project and these developments. From a social perspective very limited negative impacts on the quality of life of residents to be accommodated at these residential developments are thus anticipated.

Again, the only impact on the social environment that should be noted is the possible negative intrusion impacts and challenges to the existing social fabric, infrastructure and services in the area should the construction phase of the proposed residential developments overlap with this proposed project's construction timeframe. As such a situation could be seen as a "worst case scenario", the impacts were rated accordingly in the table below.

The presentation by Urban Dynamics Town and Regional Planners further indicated that, as part of possible development opportunities, an area to the west of the N2/R43 are viewed as a potential future urban extension area. The proposed substation locations are located within this area. This area, however, falls outside the existing urban edge and have some infrastructure and development constraints. For the purposes of the SIA study, this development opportunity would thus be noted and viewed as a possible long-term expansion opportunity, as it is not yet listed as a priority in the TWK IDP or considered as a pending application.

THEME	**PROPOSED RESIDENTIAL DEVELOPMENT**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Medium (6)		Medium (6)	Medium (6)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(3+2+6) × 2 = 22		(3+2+6) × 2 = 22	(3+2+6) × 2 = 22		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes

THEME	PROPOSED RESIDENTIAL DEVELOPMENT					
Cumulative Impacts	**Medium**					
Mitigation measures	If the construction phase of the proposed residential developments overlap with the construction phase of the proposed Asteria Eskom MTS project, mitigation measures to deal with the larger influx of workers to the area should be developed.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	PROPOSED RESIDENTIAL DEVELOPMENT					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low (2)		Low (2)	Low (2)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+2) × 2 = 16		(2+4+2) × 2 = 16	(2+4+2) × 2 = 16		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	No mitigation measures are deemed necessary.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

9.10.11 Impact on Tourism

Botrivier lies just off the Whale Route to Hermanus and is also in close proximity to various popular coastal towns such as Kleinmond, Onrus, and Sandbaai, as well as the internationally known Arabella Golf Estate. The fact that the town forms part of the Cape Country Meander Route, and is also situated in the first Biodiversity and Wine Route in the world, adds to the viability of efforts to encourage tourism in the area. Botrivier furthermore borders the Kogelberg Biosphere (a 700 hectare nature reserve), which is famous for its fynbos and a UNESCO declared World Heritage Site. The Overberg area is also well known for various tourist establishments and activities due to the landscape character. Coastal towns in the region are especially popular.

Botrivier is home to the oldest rail station outside of Cape Town. The focus of tourism in the area is on the rail links with Elgin, combined with a wagon and cycle route into Greyton. The town and surrounding area offers various bed and breakfast establishments where tourists can stay and enjoy the natural environment. Within the town, the focus is on agri-tourism products such as wine-tasting and fruit picking. As part of the municipal documentation it

was indicated that Botrivier would concentrate its tourism on green energy, the countryside offering farm accommodation and nature based adventure sports, as well as on the area's history and growing number of wine farms on a niche wine route. Within the town itself the focus would, as part of the spatial development concept, be on the aim to further tourism around the station and hotel to establish a key tourism node within town.

The areas possibly affected by the 400 kV power lines and the 132 kV lines, as well as the proposed substation sites are currently not used or earmarked for any specific tourist related activities. However, the larger Botrivier area should be the focus of the SIA, as the main impact on tourism not only refers to the impact on the resource use but the visual impact of the proposed project and subsequent impact on the sense of place of the larger area which could also influence the scale of the impact on the tourism sector.

During the construction phase, the local tourism sector could be influenced by noise and dust pollution associated with construction activities. This would be temporary and as most of these activities would be concentrated away from the main tourism node in Botrivier, the intrusion impacts in this regard is very low. Botrivier itself and surrounding towns, could however be positively affected as various tourism establishments would be used for accommodation of the workforce. The construction-related activities are thus rated positive.

LILO 1 traverses some parts of the Houwhoek Nature Reserve (a section of the Kogelberg Biosphere Reserve), and LILO 2 and 3 would also be visible from the reserve. This reserve serves as recreation area for people from surrounding areas and tourists, but no hiking trails are located within this section of the Kogelberg Nature Reserve. The main activities take place in the areas of the Biosphere which is situated to the north of the towns of Rooi Els, Pringle Bay, Betty's Bay and Kleinmond. Also, even though a wider corridor width is investigated as part of LILO 1, to ensure the placement of pylons in such a way as to avoid sensitive vegetation communities, a possible impact on the tourism industry and the Reserve cannot be disregarded. In this regard LILO 2 and 3 are preferred.

The length and possible location of the distribution lines within an area where infrastructure disturbances already occur limit the negative visual impacts and possible spill over impacts on the tourism industry. Furthermore, with regards to the impact of the overall project (MTS, transmission and distribution lines), it should be noted that the tourism developments within the larger Botrivier area would be focused on the countryside surrounding Botrivier and not on the study area itself. The visual impact of the proposed project on the specific tourism node within the town of Botrivier, is also considered to have limited impacts on the tourism activities concentrated in that area.

The Bakenhoogte Olive Farm receives visitors and/or tourists on a regular basis. Olives and olive products are on sale at the residential dwelling/office of the Bakenhoogte Olive Farm, which is in close proximity to the proposed substation sites, construction camp site and associated power lines. ~~At this stage it is difficult to predict whether the visual impact of the infrastructure associated with the substation and power lines would result in fewer visitors to this establishment. The possible impact would thus remain of concern.~~ The construction camp site and proposed substation site would be visible to tourists to the area and specifically the Bakenhoogte Olive Farm. Even though there could be a negative visual impact and impact on the tourists' experience (as a result of noise and dust pollution) of the

area, it should be noted that the construction camp site would be demolished once the construction period is completed. Rehabilitation of the site is thus critical.

The pylons would probably be visible to tourists travelling on the N2 and the R43. This area is not currently earmarked for any specific tourist related activities. Due to the infrastructure already present in the area, the add-on visual impact of these lines would be rated of a medium significance. However, as stated above, the main impact on tourism not only refers to the impact on the resource use but the visual impact of the proposed project and subsequent impact on the sense of place of the larger area which could also influence the scale of the impact on the tourism sector. As the Houwhoek Nature Reserve (a section of the Kogelberg Biosphere Reserve) is in close proximity to the pylon positions, a possible impact on the tourism industry and the Nature Reserve cannot be disregarded.

Overall, it can be concluded that the impact of the proposed Asteria Eskom MTS project on the regional tourism industry is of low significance, as the area is already disturbed by existing infrastructure such as the Houhoek Eskom Distribution Substation and associated power lines, the railway line, the N2 and R43. Even though the scenic character and landscape quality would be changed it is concluded that the presence of the new infrastructure would not necessarily discourage tourists to travel through the area or to visit the town of Botrivier and surrounding areas. Further cumulative intrusions in the area should also be noted e.g. the proposed industrial development planned to the south of Botrivier and the proposed toll plaza. Locally the main impact on the tourism industry refers to visual impacts on the Bakenhoogte Olive Farm and the subsequent possible impacts on the tourist numbers to the establishment. This impact is considered to remain of a medium significance.

THEME	**PROPOSED TOURISM**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Positive		Positive	Positive		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Medium (6)		Medium (6)	Medium (6)		
Probability	Likely (3)		Likely (3)	Likely (3)		
Calculation	(3+2+6) × 3 = 33		(3+2+6) × 3 = 33	(3+2+6) × 3 = 33		
Significance without enhancement	**Medium (+)**	**Medium (+)**	**Medium (+)**	**Medium (+)**	**Medium (+)**	**Medium (+)**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Low**					
Mitigation measures	Eskom and the Contractors to determine the accommodation needs and to communicate these to the local establishments and the TWK LM. Management of construction activities and the inflow of workers as indicated as part of Chapters 9.10.1, 0, 9.10.7 and 0 would be applicable: • A transparent and all-inclusive communication and recruitment process should be implemented by the Contractor. • The use of local labour should be maximised especially for the construction of the power					

THEME	PROPOSED TOURISM					
	lines as this could limit the intrusion impacts to some extent if less outsiders would be present in the area. • Eskom should introduce contractual obligations for Contractors to use local labour as far as possible. • Accommodation facilities should be adequate and should be able to deal with the requirements set by the Contractor. • Construction workers should be supervised at all times. • Construction activities should be kept to normal working hours e.g. from 7 am until 5 pm during weekdays. • Property owners affected by the power lines and those surrounding the proposed Asteria Eskom MTS area should be informed of the construction schedules and activities. • Security (infrastructure and personnel) on-site at the proposed Asteria Eskom MTS should be implemented during the construction period. • The location of the construction camp (if required) where workers could be housed and equipment yard should be carefully considered to limit any possible negative social impacts. • The construction camp should be located near support services, and ideally not in the vicinity of residential dwellings or the local school. • The movement of construction vehicles near dwellings should be limited. • Construction vehicles should keep to the speed limits. Speeding on gravel access roads should also be avoided to limit any excess dust pollution. • Clear warning signs should be erected at strategic places along the R43 during the construction phase. • The Contractor should contact affected property owners before construction commences to inform them of the Contractor's plans, procedures, and schedules. • Access to properties should be maintained as far as possible. Expected difficulties with regards to access to properties should be clarified with the affected property owners. • Construction-sites should be fenced off to limit unauthorised entry. • Sufficient water and sanitation facilities should be provided for the workers on-site during the construction period. • Construction-sites should be rehabilitated as soon as the construction activities and planning allows. - A release form should be signed by the affected property owners ensuring that the construction areas have been left in a good condition. - The recommendations made by the VIA (**Appendix E-8**) should be adhered to.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	PROPOSED RESIDENTIAL DEVELOPMENT					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(3+4+4) × 2 = 22		(3+4+4) × 2 = 22	(3+4+4) × 2 = 22		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					

THEME	PROPOSED RESIDENTIAL DEVELOPMENT					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Mitigation measures	• The recommendations made by the VIA (**Appendix E-8**) should be adhered to. • Screening of the substation site (if possible) should be considered to limit the visual impacts on the Bakenhoogte Olive Farm.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	IMPACT ON TOURISM		
Phase	**Construction Phase**	**Construction Phase**	**Operational Phase**
Description	Construction Camp Site	Proposed Pylon Positions	Proposed Pylon Positions
Status	Negative	Negative	Negative
Extent	Regional (3)	Site (2)	Regional (3)
Duration	Short-Medium-term (2)	Short-Medium-term (2)	Long-term (4)
Intensity	Low-Medium (4)	Low-Medium (4)	Medium (6)
Probability	Likely (3)	Possible (2)	Likely (3)
Calculation	(3+2+4) × 3 = 27	(2+2+4) × 2 = 16	(3+4+6) × 3 = 39
Significance without mitigation	**Low**	**Low**	**Medium**
Confidence	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes
Replaceability	Yes	Yes	No
Cumulative Impacts	**Medium** None anticipated		
Mitigation measures	• Noise and dust pollution should be kept to a minimum. • Screening of the construction camp site and substation site (if possible) should be considered to limit the visual impacts on the Bakenhoogte Olive Farm. • The construction camp site should be successfully rehabilitated to its pre-construction state or better. • The recommendations made by the VIA (**Appendix E-8**) should be adhered to.		
Significance with mitigation	**Low**	**Low**	**Low**

9.10.12 Visual Disturbances and Impact on Sense of Place

The Botrivier town and surrounding area is characterised by a pleasing rural landscape characterised by mountains and valleys with natural vegetation, the nearby Kogelberg Nature Reserve, farms with vineyards, olive trees, wheat production and stock farming. The vegetation in the study area is mainly fynbos with some exotic tree species. Even though the scenic quality of the area is to some extent disturbed by the exotic trees, the railway line, local roads as well as the N2 and R43, various transmission power lines and distribution power lines, as well as the existing Houhoek Eskom Distribution Substation, it is still regarded as visually pleasing.

The main visual impact associated with the construction phase would be the actual construction camp site, and possible storage of material and equipment, as well as the disruption of the soil and vegetation due to the tower footprints and possible new access routes.

The actual construction sites however would have a limited temporary negative visual impact. No negative long lasting impacts are thus foreseen on passing motorists and the tourists' experience of the area due to the construction activities. The same can be said for the limited visual impacts related to the pylon positions due to the intermittent activities and rural location of the construction.

The sense of place of the study area, which refers to the visual character of the area, could thus be classified as of a good scenic quality with some disturbances. It is anticipated that the proposed substation, whether located at Alternative Layout 1 or 3, would be visible from the town of Botrivier and to various areas surrounding the town with resultant long-term negative impacts on these receptors. For travellers passing the area on the N2 or R43, the impact could be higher although of a short duration. Of more concern, however, is the possible visual impact on the Bakenhoogte Olive Farm due to its proximity to the proposed substation site. This farm receives various tourists throughout the year. During the operational phase, security lights associated with the substation could further influence the visual quality of the area with possible negative impacts on the nearby dwellings. As Site 1: Alternative Layout 3 is in closer proximity to the residential dwelling of the Bakenhoogte Olive Farm, Site 1: Alternative Layout 1 would receive a lower rating.

The visibility of the two alternative substation sites (Layout 1 and Layout 3) from the R43, and the cumulative visual impact and impact on sense of place with two substations (new proposed and existing Houhoek Eskom Distribution Substation) located opposite of the R43 on passing motorists, would remain of concern especially with regards to tourists regularly making use of the road as gateway to the Overberg area and other popular coastal towns. It is however not anticipated that tourists would avoid this route or limit their travels to the Overberg area as a result of the substation. From a social perspective, however, screening of the substation site could mitigate the negative impacts on the residents of Botrivier and surrounding area, travellers and tourists to some extent.

The visual impact of the transmission and distribution Lines is not expected to be successfully mitigated as Self-supporting pylon towers would be used for the Transmission power line and no design alternative for these towers can be considered due to technical considerations. Cumulative impacts on the sense of place due to the proposed road upgrading, the proposed Asteria Eskom MTS, as well as the Donderboskop Industrial Development should also be considered. Once all these developments have been implemented it would have a long-term negative impact on the visual character and sense of place of the area.

For LILO 1, a servitude corridor width of 250 metres was assessed to allow for placement of the LILO power line either adjacent to the existing power lines or away from the existing power lines (to reduce the visual impact caused by cluttering of power lines). In addition, as this corridor width goes through parts of the Houwhoek Nature Reserve, the wider corridor width is suggested to ensure placement of pylons to avoid sensitive vegetation communities. LILO 2 and 3 would also impact on the visual quality of the area and with LILO 2 possibly more so on the residential dwellings of the Bakenhoogte Olive Farm. LILO 1 and LILO 3 would thus receive a lower rating from a social perspective.

Due to the length of the distribution lines and the disturbances of existing infrastructure and the proposed toll gates, the visual impact of these lines, are considered to be of a low significance.

In the long term, the scenic character and landscape quality would be changed as a result of the overall project and the proposed pylon positions. As stated above, the presence of the new infrastructure would not necessarily discourage tourists to travel through the area or to visit the town of Botrivier and surrounding areas. Further cumulative intrusions in the area should also be noted e.g. the proposed industrial development planned to the south of Botrivier and the proposed R43 toll plaza. Locally the main impact on the tourism industry refers to visual impacts on the Bakenhoogte Olive Farm and the subsequent possible impacts on the tourist numbers to the establishment. This impact is considered to remain of a medium significance.

THEME	**VISUAL DISTURBANCE AND IMPACT ON SENSE OF PLACE**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Likely (3)		Possible (2)	Possible (2)		
Calculation	(2+2+4) × 3 = 24		(2+2+4) × 2 = 16	(2+2+4) × 2 = 16		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• Soils should be replaced and rehabilitated as soon as possible after construction to its pre-construction state or better. • The construction-sites should be kept litter free. • Overall site rehabilitation should occur as soon as the construction process allows. • A release form should be signed by the affected property owners ensuring that the construction areas have been left in a good condition. • The recommendations made by the VIA (**Appendix E-8**) should be adhered to.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	**VISUAL DISTURBANCE AND IMPACT ON SENSE OF PLACE**					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Medium (6)		Low-Medium (4)	Medium (6)		

THEME	VISUAL DISTURBANCE AND IMPACT ON SENSE OF PLACE					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Probability	Likely (3)	Highly Likely (4)	Possible (2)	Likely (3)	Highly Likely (4)	Likely (3)
Calculation	(3+4+6) × 3 = 39	(3+4+6) × 4 = 52	(3+4+4) × 2 = 22	(3+4+6) × 3 = 39	(3+4+6) × 4 = 52	(3+4+6) × 3 = 39
Significance without mitigation	**Medium**	**Medium**	**Low**	**Medium**	**Medium**	**Medium**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	No	No	No	No	No	No
Cumulative Impacts	**Medium**					
Mitigation measures	• The recommendations made by the VIA (**Appendix E-8**) should be adhered to. • Screening of the substation site (if possible) should be considered to limit the visual impacts on the Bakenhoogte Olive Farm and/or other properties as well as from the R43.					
Significance with mitigation	**Medium**	**Medium**	**Low**	**Medium**	**Medium**	**Medium**

THEME	VISUAL DISTURBANCES AND IMPACT ON SENSE OF PLACE		
Phase	**Construction Phase**	**Construction Phase**	**Operational Phase**
Description	Construction Camp Site	Proposed Pylon Positions	Proposed Pylon Positions
Status	Negative	Negative	Negative
Extent	Regional (3)	Site (2)	Regional (3)
Duration	Short-Medium-term (2)	Short-Medium-term (2)	Long-term (4)
Intensity	Low-Medium (4)	Low-Medium (4)	Medium (6)
Probability	Likely (3)	Possible (2)	Likely (3)
Calculation	(3+2+4) × 3 = 27	(2+2+4) × 2 = 16	(3+4+6) × 3 = 39
Significance without mitigation	**Low**	**Low**	**Medium**
Confidence	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes
Replaceability	Yes	Yes	No
Cumulative Impacts	**Medium** The proposed industrial development planned to the south of Botrivier and the proposed R43 toll plaza present additional visual intrusions into the area.		
Mitigation measures	• Screening of the construction camp site and substation site (if possible) should be considered to limit the visual impacts on the Bakenhoogte Olive Farm. • The construction camp site should be successfully rehabilitated to its pre-construction state or better. • The recommendations made by the VIA (**Appendix E-8**) should be adhered to.		
Significance with mitigation	**Low**	**Low**	**Medium**

9.10.13 Impact on Property Value

The intensity and significance of the impact would thus depend on the size of the property, the activities undertaken on the property (land use), the location of the substation site and the final line alignment.

With regards to the construction phase no impact on the land value is foreseen, except in worst cases where the construction-sites have not been rehabilitated to its original state and/or where environmental degradation occurred, e.g. erosion. This could then have subsequent negative impacts on the land value. If the mitigation measures proposed by the various specialists have been incorporated into the EMPr and have been implemented this possible negative impact could be attended to.

The main adverse impact of the proposed project on the land value relates to the visual and aesthetic impacts on such land. Once the change in landscape character can be proven to have impacted on the existing land use and resource use, negative impacts on the land value could occur. Invasion of a new servitude on possible future developments on such properties could further worsen the impact. In this regard all the properties affected by the proposed LILO corridors could be negatively affected especially due to the presence of existing power lines and other infrastructure on these properties. Additional issues that should be considered when aiming to establish the impact on the land value would include the size of the property, the activities undertaken on the property (land use), the presence of existing infrastructure and power lines, the resource use, the proximity of the new proposed line(s) to dwellings, tourism related structures and so forth. The impact on the land value is thus very difficult to quantify from a social perspective.

Eskom compensates property owners based on market value and it is thus not expected that the property owners would suffer financial losses due to the construction of the transmission lines itself.

Concerns with regards to the impact on property values specifically relates to the Bakenhoogte Olive Farm, which is a relative small property visited by tourists. This property is anticipated to be negatively affected by the actual tower positions of LILO 2, and the location of the servitude just west of the residential dwelling. It could be further worsened by the placement of the MTS at Site 1: Alternative Layout 3. Such a situation could then have an impact on the land and resource use of the property and its future developmental potential. The intensity would further depend on the outcome of the negotiation process and the actual placement of the substation and transmission line.

The actual intensity of the impact on the property's value can therefore only be determined by a registered evaluator once a final route alignment and substation site has been selected and once the negotiation process has been completed. A possible negative impact should thus not be discarded and the rating was done accordingly.

THEME	IMPACT ON PROPERTY VALUE					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		

THEME	IMPACT ON PROPERTY VALUE					
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+2+4) × 2 = 16		(2+2+4) × 2 = 16	(2+2+4) × 2 = 16		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• Soils should be replaced and rehabilitated as soon as possible after construction. • The construction-sites should be kept litter free. • Overall site rehabilitation should occur to its pre-construction state or better as soon as the construction process allows. • A release form should be signed by the affected property owners ensuring that the construction areas have been left in a good condition.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	IMPACT ON PROPERTY VALUE					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Medium (6)		Low-Medium (4)	Medium (6)		
Probability	Likely (3)	Highly Likely (4)	Possible (2)	Likely (3)	Highly Likely (4)	Likely (3)
Calculation	(3+4+6) × 3 = 39	(3+4+6) × 4 = 52	(3+4+4) × 2 = 22	(3+4+6) × 3 = 39	(3+4+6) × 4 = 52	(3+4+6) × 3 = 39
Significance without mitigation	**Medium**	**Medium**	**Low**	**Medium**	**Medium**	**Medium**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• The recommendations made by the VIA (**Appendix E-8**) should be adhered to. • Screening of the substation site (if possible) should be considered to limit the visual impacts on the Bakenhoogte Olive Farm and/or other properties. • Property owners should be compensated based on market values.					
Significance with mitigation	**Medium**	**Medium**	**Low**	**Medium**	**Medium**	**Medium**

9.10.14 Safety and Security Risks

Safety and security impacts always remain a concern during the construction phase and would include:

- The increased risks of veld fires in the open space areas due to possible cooking practices. Regular fires in the area are already problematic;
- The increased risk of vehicular and pedestrian accidents because of construction vehicle movements near the N2 and R43. Considerations should also be given to the future road upgrading projects planned in the area and possible closure of access to the town from the N2;
- General risks related to construction activities (for example, electrocution, risks of falling from working heights and so forth);
- Perceived increase in crime because of outsiders being in the area.

Safety and security impacts during the operational phase relate to the maintenance of the transmission lines and emergency work to be undertaken. With this project maintenance on the lines is anticipated to be done via helicopter which would result in limited impacts on the property owners' daily living and movement patterns and their sense of security.

Additional safety risks during the operation phase relate to possible mechanical failures (e.g. collapse of pylons) and the increased fire risk due to the presence of an additional substation in the area. As the substation site would be electrically fenced and would most likely have permanent security personnel on-site, the safety risk of unauthorised entries to the substation site would be minimised.

THEME	**SAFETY AND SECURITY RISKS**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(3+2+4) × 2 = 18		(3+2+4) × 2 = 18	(3+2+4) × 2 = 18		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• The influx of jobseekers should be discouraged. • Construction-sites should be properly managed. Open fires should not be allowed. • Signs must be erected at strategic locations throughout the area, warning residents and visitors about the hazards around the construction-site and the presence of heavy vehicles. • The employment of locals for lesser skilled jobs should be encouraged, where possible.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	SAFETY AND SECURITY RISKS					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+4) × 2 = 20		(2+4+4) × 2 = 20	(2+4+4) × 2 = 20		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• Eskom should take a strong stance with regards to the illegal entering of the servitude areas and substation site. • Eskom should, in conjunction with the TWK LM, develop an emergency management plan to specifically deal with the increased risk of fires.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

9.10.15 Health Risks

An increased health risk, such as the spread of HIV/AIDS with long-term possible regional consequences, could be created due to the influx of workers to the area and the social interaction between these outsiders and the local population.

Other cumulative health impacts are associated with the construction activities. If the construction-sites are not properly managed it could result in negative impacts on the environment with related health impacts on the surrounding communities such as pollution of water sources due to improper sanitation facilities, solid waste management or wastewater management.

Accidents during the construction phase also remain a source of concern especially due to the high volumes of traffic on the R43 and N2 and the topography of the area (e.g. vehicles speeding down hill on the N2/R43 and the split of the N2/R43 as well as possible areas with limited viewing distances of oncoming traffic). The noise to be created due to the construction vehicles is not anticipated to result in health impacts on the surrounding communities. In this regard it should also be noted that the area already experiences relative high noise levels from the traffic volumes on the N2 and R43 and that possible health impacts can thus not just be attributed to the proposed Asteria Eskom MTS project.

The possible negative impact of all the power lines in the area, and an additional substation on community health due to EMFs should be noted. Drawing on the existing body of research, the World Health Organisation has stated that it is becoming increasingly unlikely that exposure to EMFs constitutes a serious health hazard, although it concedes that some

uncertainty remains. However, electric and magnetic fields can be reduced (through shielding, engineering techniques or line designs) and be decreased with an increase in distance from the line. The different size servitude areas limit the constant exposure to these EMFs and according to the Eskom regulations no one is allowed to live within the servitude. Site 1: Alternative Layout 1 and 3, are some distance from the local community and residential development of Botrivier which could thus limit the possible negative impacts on community health (due to EMFs) during the operational phase of the Asteria Eskom MTS.

The above concerns with regards to community health remain sensitive and should not be dismissed as irrelevant. Even though all precautionary safety measures will be implemented, this possible impact should be adequately addressed.

THEME	**HEALTH RISKS**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Regional (3)	Regional (3)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(3+2+4) × 2 = 18		(3+2+4) × 2 = 18	(3+2+4) × 2 = 18		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• A Health and Safety Officer should be appointed for the duration of the construction period. The contact details of this person should be made available to the affected property owners to enable them to lodge complaints when problems with regards to community health arise. • Although the conduct of individuals cannot be easily controlled, the Contractor and/or Eskom could assist to limit the risk of the spread of HIV/Aids by providing additional awareness campaigns prior to the construction phase. • The appointment of local labour could assist to limit the spread of diseases as it would limit the number of outsiders coming to the area. • Adequate water supply and sanitation related facilities should be provided to the workers at the construction-sites. • Local labour should be employed as far as possible to avoid additional pressure of outsiders on the existing services. • Personal protective equipment and clothing should be given to workers and be enforced to avoid construction-related accidents • The influx of jobseekers should be discouraged.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

THEME	**HEALTH RISKS**					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3

THEME	HEALTH RISKS					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low-Medium (4)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+4) × 2 = 20		(2+4+4) × 2 = 20	(2+4+4) × 2 = 20		
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• Eskom should ensure that no one is allowed to live within the servitude. • In no cases should the regulated servitude widths, which function as buffers, be relaxed.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

9.10.16 Impact on Infrastructure

The proposed water pipeline which would run in an easterly direction from the reservoir situated to the west of the R43, to the town of Botrivier should be noted. At this stage no impacts as a result of the proposed Asteria Eskom MTS project on this development is foreseen.

According to the Transport Impact Assessment (TIA) and the Western Cape Department of Transport and Public Works (DoT) some future road upgrading planned in the area include the following:

- Widening of the R43: No detailed planning regarding the widening of the R43 was available at the time of the study. The intent to undertake this, should however be considered when planning the access point and layout of the proposed substation site.
- A proposed toll/gantry plaza to be constructed as part of the tolling of the N2 situated in close proximity to the proposed substation sites. The preliminary design for the proposed toll plaza on the R43 which incorporated the access to the existing 132kV Houhoek Eskom Distribution Substation.

As part of the upgrading of the R43 and the N2, access to adjacent properties from these roads will be limited and various existing access points off these two roads will be closed. Alternative access points, however, will be provided. The access road to the proposed substation site should therefore be carefully considered due to the possible toll gate and road upgrading, limited access points that would be approved, as well as to ensure safety of road users and pedestrians. In this regard it should be noted that the proposed toll plaza could assist with safety at the proposed access to the substation site as vehicles travelling on the R43 would already be slowing down to travel through the toll plaza.

With regards to the possible impact of the distribution lines and transmission lines, it was decided to include LILO 3 as part of the study. LILO 1 and 2 resulted in the LILO power lines crossing over existing 66kV and 132kV power lines. This would then require some pylons to be higher than usual with a possible subsequent negative visual impact at specific locations. Even though this challenge could be accommodated it would still be preferable that cross-overs should be limited as far as possible. With LILO 2 the most instances where cross-overs could be required would occur. In this regard LILO 1 and 3 are seen to have less of an impact.

During the operational phase of the MTS and power lines, the impacts on other infrastructure are anticipated to be limited as no airfields were identified in close proximity to the sites and no agricultural activities are taking place on-site which make use of central pivot irrigation equipment.

THEME	**IMPACT ON INFRASTRUCTURE**					
Phase	Construction Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Negative		Negative	Negative		
Extent	Regional (3)		Site (2)	Site (2)		
Duration	Short-Medium-term (2)		Short-Medium-term (2)	Short-Medium-term (2)		
Intensity	Medium (6)		Low-Medium (4)	Low-Medium (4)		
Probability	Possible (2)		Possible (2)	Possible (2)	Likely (3)	Possible (2)
Calculation	(3+2+6) × 2 = 22		(2+2+4) × 2 = 16	(2+2+4) × 2 = 16	(2+2+4) × 3 = 24	(2+2+4) × 2 = 16
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	• Detail design of the proposed Asteria Eskom MTS and construction activities should take note of the road upgrading and proposed toll plaza as detailed in the TIA (**Appendix E-10**). • Cross-overs of existing power lines should be limited as far as possible.					
Significance with mitigation	**Medium**	**Medium**	**Low**	**Medium**	**Medium**	**Medium**

THEME	**IMPACT ON INFRASTRUCTURE**					
Phase	Operational Phase					
Description	Alternative Layout 1	Alternative Layout 3	132 kV Distribution power lines	LILO 1	LILO 2	LILO 3
Status	Neutral		Neutral	Neutral		
Extent	Site (2)		Site (2)	Site (2)		
Duration	Long-term (4)		Long-term (4)	Long-term (4)		
Intensity	Low (2)		Low (2)	Low (2)		
Probability	Possible (2)		Possible (2)	Possible (2)		
Calculation	(2+4+2) × 2 = 16		(2+4+2) × 2 = 16	(2+4+2) × 2 = 16		

THEME	IMPACT ON INFRASTRUCTURE					
Significance without mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Confidence	Medium	Medium	Medium	Medium	Medium	Medium
Reversibility	Yes	Yes	Yes	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes	Yes	Yes	Yes
Cumulative Impacts	**Medium**					
Mitigation measures	No mitigation measures are proposed.					
Significance with mitigation	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**

Temporary access roads might be required for the construction phase to access Pylons 1, 3, 4, 8 and 9. The length of these access roads would differ as some existing gravel roads could be used to come in closer range of these locations. The access road would need to be suitable for the usage of large flatbed trucks and possibly abnormal heavy vehicles, which would deliver the components and the transformers of the substation. However, the access roads should consider the affected property owners, and the sensitive floral environment.

As maintenance is said to be undertaken by means of helicopter, these access roads could be rehabilitated once the construction phase has been completed.

Access to the construction camp site would be from the R43. The proposed upgrading of this road and the toll gates should be considered when planning the exact location of such an access road (preferably using existing access tracks/roads), as well as the timing of the construction thereof. The a

The increase in the footprint size of the substation would not result in different or additional impacts to those already assessed as part of the original SIA.

THEME	**ADDITIONAL ACCESS ROADS**	
PHASE	Construction Phase	Operational Phase
Description	Construction Camp Site and Proposed Pylon Positions	Construction Camp Site and Proposed Pylon Positions
Status of impact	Negative	Negative
Extent of impact	Site (2)	Site (2)
Duration of impact	Short-Medium-term (2)	Short-Medium-term (2)
Intensity of impact	Medium (6)	Medium (6)
Probability	Likely (3)	Likely (3)
Calculation	(2+2+6) x 3 = 30	(2+2+6) x 3 = 30
Level of significance before mitigation	**Medium**	**Low**
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Cumulative Impacts	**Medium** None anticipated.	**Medium** None anticipated.
Mitigation measures	• Eskom should keep the construction of access roads to a minimum and rather use the existing infrastructure	• Access roads should not have any negative impacts on farming activities or lead to additional

THEME	ADDITIONAL ACCESS ROADS	
PHASE	Construction Phase	Operational Phase
	• It is imperative that the construction of additional access roads (if required) be undertaken in full consultation with the property owners. Land to be used for future agricultural activities should not be negatively impacted on • Rehabilitation of new access roads for construction vehicles should be undertaken as soon as the construction process allows	environmental impacts • Access roads should not sterilise land for future agricultural activities (crop production) • Access roads should be designed to limit any soil erosion
Level of significance after mitigation	Low	Low

9.11 VISUAL IMPACTS

9.11.1 Site Alternative 1: Layout Alternative 1

The construction and operation of the proposed Asteria Eskom MTS would entail:

- Clearing of lay down site and construction of camp.
- Clearing of vegetation on-site.
- Extensive cutting into the earth to create the two lowered platforms of different height.
- Creation of the gabion retaining walls.
- Creation of the screening berm using the fill from the cut sites.
- Stabilisation and rehabilitation of the berm.
- Construction of the security fence and structures.
- Construction of the substation structures.
- Positioning of transformers and larger structures would require a crane on-site.
- Security lights would burn during the night.
- The movement of vehicles.

Horizontal and vertical lines created by the power lines and substation infrastructure will protrude above the limited screening provided by the vegetation. This will generate strong levels of form, line, colour and texture contrast with the grey-green colour, diffuse lines and matt textures of the existing landscape. The overall degree of contrast will be perceived as strong. The Class III visual objective, which requires moderate change in contrast, will not be met. The potential for mitigation is limited as surrounding vegetation is fynbos in species. Any introduction of large screening trees would look out of place and would increase risk of trees adjacent to the substation falling. However, the slight shift of the proposed site to the south places the substation in a position were partial views to the toll site receptors, and out of the direct and highly exposed views of the N2 Westbound Botrivier gateway and N2 Houwhoek Pass eastbound traffic.

The change in landscape character without mitigation would be perceived as high. The project is prominently placed in clear view of the N2 and R43 scenic routes, strongly associated with tourism. The surrounding areas of Botrivier are also associated with tourism, include viticulture and viniculture activities and are associated with a distinct cultural landscape. Without mitigation, the proposed landscape modification is not recommended. Potential cumulative visual impacts associated with landscape degradation are rated high as

surrounding properties to the north and south would lose their potential for tourism. The potential landscape sterilisation (reference 6 in **Figure 7-22**) of these lands due to the proximity of the substation and future power line corridors is an important factor to consider as these areas are conspicuous to N2 and R43 receptors.

Over time the large screening berm would be rehabilitated and restored to fynbos type vegetation which would effectively reduce the magnitude of the impact to R43 receptors who would effectively see only the upper extents of the substation against a textured fynbos background. The cutting into the earth and the utilisation of gabion retaining walls filled with grey-brown, brown and dark grey coloured rock would reduce colour contrast generated by the white traditional cement coloured retaining walls and blocks. The screening berm planted with small shrubs and trees (refer to mitigations for details) would also offer some screening to the base views of the site which would also reduce the magnitude of the visual impact as seen from the N2 highway.

Without mitigation, the significance of the construction and operation phases is rated high and is not recommended. With mitigation described above, the visual significance for construction phase will be high. Over time, with the establishment of the screening berm, the operation phase visual impacts could be reduced to Medium to High. The site is constrained to the south by the drop-off in elevation which would increase the exposure of the site as seen from the R43 northbound receptors, the R43 to the east, the drainage channel to the north and the increased elevation and visibility going uphill to the west. It is recommended that no further expansion of the site in the future is undertaken.

The strong levels of industrial type contrast generated by the proposed substation could attract similar higher contrast inducing industrial type land uses without mitigation. In order to control the negative cumulative effects of landscape degradation to the Houwhoek scenic resource and the N2 and R43 view corridors, the possibility of incorporating the portion of land to the west and north of the proposed site into the adjacent Houwhoek Nature Reserve should be investigated. The scenic value of these land portions will be compromised if inappropriate development occurs, but could be rehabilitated to its pre-construction state or better as an offset to add biodiversity value.

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for Site Alternative 1: Layout Alternative 1**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Change in landscape character	
Status of impact	Negative, Direct	
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Permanent (5)	Permanent (5)
Intensity of impact	High (10)	High (10)
Probability	Highly Likely (4)	Highly Likely (4)
Calculation	(3+5+10) × 4 = 72	(3+5+10) × 4 = 72
Level of significance before mitigation	**High (Not Recommended)**	**High (Not Recommended)**
Confidence	High	Medium
Reversibility	No	No
Replaceability	Yes	Yes
Mitigation measures	Refer to **Figure 9-5** for a concept map of the proposed mitigation measures, which are	

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for Site Alternative 1: Layout Alternative 1**	
Phase	**Construction Phase**	**Operational Phase**
	described below. **Design:** • Consider the following in the detailed design of the substation: - Rotate the proposed site in a clockwise direction, so as to align more with the terrain and hence to reduce the scale of the earthworks and visible scarring. - Cut the platform into the terrain with gabion type retaining walls to support the back cut as well as a small retaining wall to support the front fill areas. - The gabion retaining wall supporting the back wall should curve and follow the contour of the resultant cut and not be angular. - ~~Locate structures on the east side of the site where they will be partially screened by the screening berm.~~ Avoid the location of structures to the east of the site where they will become more prominently placed and increase visual intrusion (Locate close to the back wall). • Cut in two benches and support with gabion type structure filled with grey-brown and dark grey coloured rocks to give a mottled, dark shadow effect. • Excess material derived from the cut areas shall be placed on fill embankments to reduce the slopes and 'soften' the visual impact from the N2 and R43. • The services of a certified landscape architect are required to assist in the design, construction and rehabilitation of the approximately five metre and organically shaped berm which needs to tie into the surrounding terrain and appear natural. • Assess the possibility of using any excess fill from the platform cut to create a low screening berm between the existing substation and the R43 to reduce the higher levels of intrusion generated from this substation as seen from R43 receptors. The berm would need to be effectively rehabilitated and restored to medium sized fynbos vegetation. • The berm is to be planted with fynbos type vegetation and medium sized shrubs (e.g. *Buddleja saligna, Pittosporum* sp., *Tarcomanthos, Protea* sp., *Leucospermum* sp., *Kiggelaria africana, Helichrysum* sp, *Elitropapus rinocerotes, Watsonia* sp, *Protea repens, Metalasia muricata, Stoebe plumosum, Leucodenronm salignum*) and other indigenous and endemic species from the area. • The access road should be routed closer to the existing substation. The access road should appear curved as seen from the R43 receptors and be placed opposite the existing substation road. • The possibility of using wooden poles for the 132kV Distribution power line crossing the R43 should be investigated to reduce visual intrusion. • The **25 m overhead mast lights are not recommended**. Design the substation security lighting so that the planned 25 m overhead mast lights are replaced with more frequently placed, directional lighting 5 m in height. These are to be directed as much as possible towards the mountain so as to reduce light spillage towards the open valley to the east and to the N2 receptors travelling west. Assess the possibility of using Mesopic Lighting to reduce the light spillage. Refer to Annexure 3 of the VIA **Appendix E-8**). • It is recommended that if further expansion of the substation in the future is required, that a more suitable site is utilised that is less highly exposed to the N2 and R43 tourist view corridors. **Construction:** • ~~Assess the possibility of locating the construction camp within the boundaries of the proposed Asteria Eskom MTS site.~~ Locate the construction camp within the assessed Site Alternative 1: Layout 3. • Retain the existing alien trees (to visually block the construction activities) surrounding the site and along the R43 until the indigenous screening vegetation has reached a suitable screening height. However, shrubs and other alien vegetation should be removed. • Security fencing should not be palisade type fencing. Clearview fencing should be utilised and be black in colour and set back from the R43 so as not to dominate the views of the casual observer. • Dust control during removal of vegetation. • Stockpile of topsoil off-site to the north for use in rehabilitation of the screening	

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for Site Alternative 1: Layout Alternative 1**	
Phase	**Construction Phase**	**Operational Phase**
	berm. • Colour of structures grey-green or grey-brown (stone) with shallow roof of mid-grey or charcoal colour. • The back gabion structures should be filled with grey-brown and dark grey coloured rocks to give a mottled, dark shadow effect. • Effective rehabilitation and restoration of the more elevated and exposed back cut slopes to fynbos is vital to reduce visual intrusion. • Stockpile of topsoil offsite to the north of the drainage line on the same elevation as the proposed footprint for use in rehabilitation of the screening berm. • Security lights at night should to ensure that the visual influence is limited to the substation, without jeopardising operational safety and security. • No external up-lighting of any parts of the structures which would be visible from the N2 south receptors where a glow effect would attract the views of the casual observer. • Immediate rehabilitation and restoration post construction to ensure that the berm is stabilised and soil erosion does not take place. **Operation:** • Ongoing management of security lights at night. • Continued maintenance of screening vegetation. **Cumulative:** In order to control the negative cumulative effects of landscape degradation from the proposed Asteria Eskom MTS projectto the surrounding properties, the possibility of incorporating the greater property on which the site is located into the Houwhoek Nature Reserve should be investigated. Control over the property would also result in having more space to route the power lines away from the N2 and R43 receptors.	
Level of significance after mitigation	**High**	**Medium**

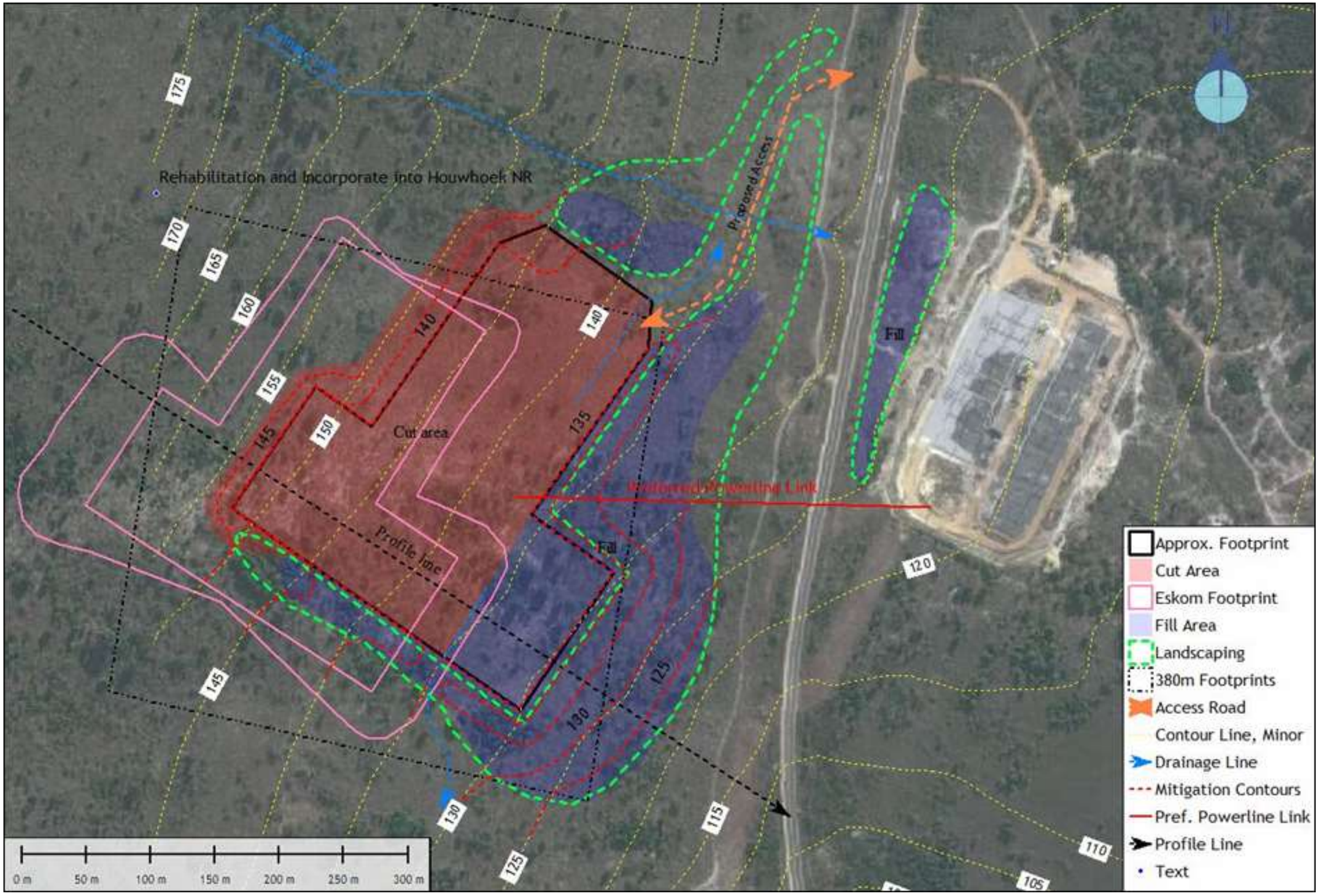


Figure 9-5: Concept of Mitigation Proposed for Site Alternative 1: Layout Alternative 1

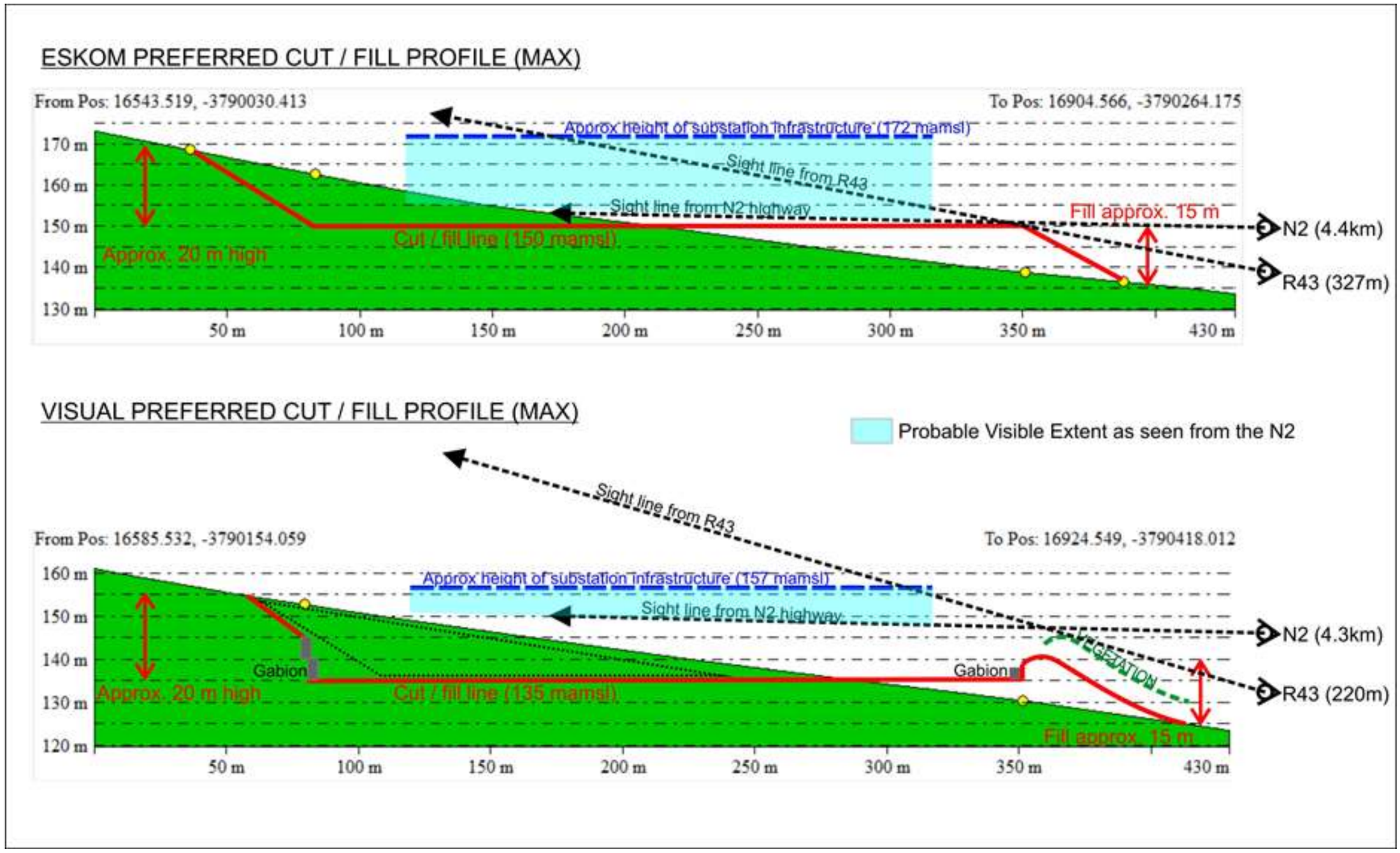


Figure 9-6: Eskom Preferred Layout versus Visual Preferred Layout Profiles and Sight Lines Generated from 5 m DEM

9.11.2 Site Alternative 1: Layout Alternative 3

The construction and operation of the Substation would entail the following:

- Clearing of lay down site and construction of camp.
- Clearing of vegetation on-site.
- Extensive cutting into the earth to create the two lowered platforms of different height.
- Creation of the gabion retaining walls.
- Creation of the screening berm using the fill from the cut sites.
- Stabilisation and rehabilitation of the berm.
- Construction of the security fence and structures.
- Construction of the substation structures.
- Positioning of transformers and larger structures would require a crane on-site.
- Security lights would burn during the night.
- The movement of vehicles.

Horizontal and vertical lines created by the power lines and substation infrastructure will protrude above the limited screening provided by the vegetation. This will generate strong levels of form, line, colour and texture contrast with the grey-green colour, diffuse lines and matt textures of the existing landscape. The overall degree of contrast will be perceived as strong. The Class III visual objective, which requires moderate change in contrast, will not be met. The potential for mitigation is limited as surrounding vegetation is fynbos in species. Any introduction of large screening trees would look out of place.

The proposed site is located adjacent to the proposed R43 toll station. The consequent slowing down of the traffic would offer extended views to receptors. They would be exposed to high levels of visual intrusion (reference 5 in **Figure 7-22**). The change in landscape character without mitigation would be perceived as very high. The proposed project is prominently placed in clear and direct central view of the N2 westbound receptors and R43 scenic routes. Both routes are strongly associated with tourism. The surrounding areas of Botrivier are also associated with tourism, include viticulture and viniculture activities and are associated with a distinct cultural landscape. Potential cumulative visual impacts associated with landscape degradation are rated high. Surrounding properties to the north and south would lose their potential for tourism. The potential landscape sterilisation of these lands due to the proximity of the substation and future power line corridors is an important factor to consider as these areas are conspicuous to N2 and R43 receptors.

In the long-term, the proposed toll station, Transmission power line links between substations and a new Transmission power line accessing the site from south, will potentially generate combined visual impacts, which due to the prominent location of the site on the site of a hill, will degrade the surrounding landscapes. The subsequent landscape degradation could attract other high contrast generating development, such as industries which could be attracted to the area by lowered property values. The prominent visual location of this potential industrial spread would increase visual intrusion (reference 4 in **Figure 7-22**). The close proximity to existing 132kV Houhoek Eskom Distribution Substation reduces alternative options for Transmission power line routings. Receptors slowing down or

stopping at the proposed toll booth on the R43 would be exposed to high levels of visual intrusion (reference 5 in **Figure 7-22**).

Without mitigation, the significance of the construction and operation phases is rated as fatally flawed and is not recommended. As mitigation of the magnitude of the visual impact is limited due to the prominence of the site and located within direct frontal views of the N2 Highway which is recognised as a significant tourist view corridor, the visual significance for mitigation remains high and is also not recommended.

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for Site Alternative 1: Layout Alternative 3**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Change in landscape character	
Status of impact	Negative, Direct	
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Permanent (5)	Permanent (5)
Intensity of impact	High (10)	High (10)
Probability	Definite (5)	Definite (5)
Calculation	(3+5+10) × 5 = 90	(3+5+10) × 5 = 90
Level of significance before mitigation	**Fatal Flaw**	**Fatal Flaw**
Confidence	High	High
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	The N2 Highway is recognised as a significant tourist view corridor. No mitigation measures are recommended for this layout alternative as the visual significance remains high and the alternative is not recommended. The construction camp site is proposed in the southeastern corner and should be rehabilitated to its pre-construction state or better after construction has ceased.	
Level of significance after mitigation	**Fatal Flaw (Not Recommended)**	**Fatal Flaw (Not Recommended)**

9.11.3 LILO 1

The construction of the LILO 1 would entail the following:

- Expansion of the existing access roads to the site.
- Clearing of vegetation for the placement of tower foundations.
- The movement of vehicles, cranes for tower construction.

Operation would require sporadic vehicle movement for maintenance via tracks.

The N2 from Houwhoek Pass Eastbound and N2 Westbound are the key receptors and would view the site from southerly and westerly directions respectively. The receptors from the Houwhoek Pass would see the power line towers protruding above the skyline in a prominent location. This would generate strong vertical line contrast. Colour and texture contrasts would be reduced by the use of smaller 132kV Distribution power line towers located in a similar location. Due to the significant skyline intrusion, the overall degree of contrast would be strong. As seen from the N2 westbound, strong line contrast could be created by the two proposed 400kV LILO Transmission power lines running up the ridgeline, directly adjacent to the existing two 66kV Distribution power lines, making a wide linear feature directly in the foreground view of the receptors. Glint on the line in the afternoons

would generate strong texture and tone contrast with colour contrast moderated by distance. The Class II visual objective of weak contrast change to protect the visual resources of the Houwhoek Nature Reserve and N2 pass would not be met.

The construction of the proposed LILO 1 would establish a dominant and visually defined multi line power line corridor which is in the clear and direct centre view of the N2 receptors travelling westbound. This would degrade the value of the N2 entrance to the Houwhoek pass. For this reason this routing is not recommended.

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for LILO 1**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Visual impact of LILO 1 on the affected visual receptors	
Status of impact	Negative, Direct	
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Permanent (5)	Permanent (5)
Intensity of impact	Medium-High (8)	Medium-High (8)
Probability	Highly Likely (4)	Highly Likely (4)
Calculation	(3+5+8) × 4 = 64	(3+5+8) × 4 = 64
Level of significance before mitigation	**High (Not Recommended)**	**High (Not Recommended)**
Confidence	Medium	Medium
Reversibility	Yes	Yes
Replaceability	No	No
Mitigation measures	**Design:** • Route off skyline as much as possible. • Stay off rocky outcrops (reference 1 in **Figure 7-22**). • The lattice type towers (self-supporting structures) for the 400kV LILO Transmission power lines (see **Figure 3-3**) should be used. **Construction:** • ~~Assess the possibility of locating the construction camp within the boundaries of the proposed Asteria Eskom MTS site.~~ Locate the construction camp within the assessed Site Alternative 1: Layout 3. • Dust control during removal of vegetation. • Utilisation of existing tracks and access routes as much as possible and implement an intensive soil erosion prevention program to limit visual linear scarring. • Immediate rehabilitation and restoration to pre-construction state or better. **Operation:** Continued rehabilitation and maintenance of erosion control programs **Cumulative:** Preference for LILO 3 which is located in a valley and has less exposure on prominent features as seen from the N2 Houwhoek Pass.	
Level of significance after mitigation	**Medium**	**Medium**

9.11.4 LILO 2

The construction of LILO 2 would include the following:

- Expansion of the existing access roads to the site.
- Clearing of vegetation for the placement of tower foundations.
- The movement of vehicles, cranes for tower construction.

Operation would require sporadic vehicle movement for maintenance via tracks.

The N2 eastbound is the key view point of the proposed LILO 2 as the receptor exits the Houwhoek Pass. The building of minimal foundations of the towers would generate weak contrast during construction. However, line, colour and texture contrasts would potentially be strong due to the multiple towers required for the crossing of the six existing power lines. The potential for colour contrast is moderated by the existing 66kV and 132kV Distribution power lines in the vista. The overall degree of contrast would be strong. The Class III visual objective defined for the site would not be met with, or without mitigation, as the tower structure is a requirement of design.

High visual impact will certainly lead to the degradation of the value of N2 as a scenic corridor. Multi towers will degrade the entrance view to Botrivier. The proposed 400kV LILO Transmission power lines cross six other 66kV and 132kV Distribution power lines, resulting in a fatal flaw for the routing from a visual perspective. Mitigation would not reduce the visual impact as visual intrusion is related to power line structures which are defined by design.

Without mitigation, the significance of the construction and operation phases is rated as fatally flawed and is not recommended. As mitigation of the magnitude of the visual impact is limited due to the tower type required for a power line crossing, the visual significance for mitigation remains high and is also not recommended.

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for LILO 2**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Visual impact of LILO 2 on the affected visual receptors	
Status of impact	Negative, Direct	
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Permanent (5)	Permanent (5)
Intensity of impact	High (10)	High (10)
Probability	Definite (5)	Definite (5)
Calculation	(3+5+10) × 5 = 90	(3+5+10) × 5 = 90
Level of significance before mitigation	**Fatal Flaw**	**Fatal Flaw**
Confidence	High	High
Reversibility	Yes	Yes
Replaceability	No	No
Mitigation measures	None	
Level of significance after mitigation	**Fatal Flaw**	**Fatal Flaw**

9.11.5 LILO 3

The construction of the LILO 3 would entail the following:

- Clearing of vegetation for placement of tower foundations.
- Movement of vehicles, cranes for tower construction.
- Operation would require sporadic vehicle movement for maintenance via tracks.

The N2 eastbound is the key view point of the proposed LILO 3 as the receptor exits the Houwhoek Pass. The building of minimal foundations of the towers would generate weak contrast during construction. However, line, colour and texture contrasts would potentially

be strong due to the multiple towers required for the crossing of the six existing 66kV and 132kV Distribution power lines. The potential for colour contrast is moderated by the existing 66kV and 132kV Distribution power lines in the vista. The overall degree of contrast would be moderate as the Transmission towers would be partially viewed through alien vegetation adjacent to the N2 and against existing power lines without skyline visual intrusion. Class III visual objective defined for the site would be met with mitigation, requiring the careful positioning of the towers off rocky outcrops or prominent topographic features.

Such high visual impact will certainly lead to the degradation of the value of N2 as a scenic corridor. Multi towers will degrade the entrance view to Botrivier. The proposed 400kV Transmission power line crosses six other existing 66kV and 132kV Distribution power lines, resulting in a fatal flaw for the routing from a visual perspective. Mitigation would not reduce the visual impact as visual intrusion is related to power line structures which are defined by design. Care should be undertaken to locate towers away from prominent features in area (reference 2 & 3 in **Figure 7-22**).

Without mitigation, the significance of the construction and operation phases is rated high and is not recommended. With mitigation described below, the visual significance could be reduced to medium as the route is located in a valley and mainly viewed from the east against the mountain background with some structures (water reservoir and existing Bacchus-Palmiet 400kV Transmission power line) located in the vicinity which increases the visual absorption capacity of the site. To reduce the visual intrusion on this route, careful positioning of the towers off rocky outcrops or prominent topographic features would be required. The location of the closest tower to the Houwhoek Pass would need to be located off prominent ground, ensuring that as much of the pylon is located below receptor views reducing visual intrusion (Point of concern map in **Figure 7-22** reference 2).

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for LILO 3**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Visual impact of LILO 3 on the affected visual receptors	
Status of impact	Negative, Direct	
Extent of impact	Regional (3)	Regional (3)
Duration of impact	Permanent (5)	Permanent (5)
Intensity of impact	Medium-High (8)	Medium-High (8)
Probability	Highly Likely (4)	Highly Likely (4)
Calculation	(3+5+8) × 4 = 64	(3+5+8) × 4 = 64
Level of significance before mitigation	**High**	**High**
Confidence	High	High
Reversibility	Yes	Yes
Replaceability	No	No
Mitigation measures	**Design:** • Stay off rocky outcrops (reference 1 in **Figure 7-22**). • The lattice type towers (self-supporting structures) for the 400kV LILO Transmission power lines (see **Figure 3-3**) should be used. Monopole pylons would generate high levels of visual intrusion and are clearly visible to the surrounding areas increasing the zone of visual influence (ZVI). **Construction:**	

THEME	VISUAL IMPACT	
Impact focal point	**Visual impact for LILO 3**	
Phase	**Construction Phase**	**Operational Phase**
	• ~~Assess the possibility of locating the construction camp within the boundaries of the proposed Asteria Eskom MTS site.~~ Locate the construction camp within the assessed Site Alternative 1: Layout 3. • Dust control during removal of vegetation. • Utilisation of existing tracks and access routes as much as possible. • Immediate rehabilitation and restoration. **Operation:** Continued rehabilitation and maintenance of erosion control programs.	
Level of significance after mitigation	**Medium**	**Medium**

9.11.6 Cumulative Impacts

There are two wind farm applications currently awaiting approval; the Langhoogte WEF and Caledon WEF. Refer to **Chapter 3.3.4** for further details about these wind farms and future developments in this region.

Due to the visual prominence of the proposed Asteria Eskom MTS project and existing multitude of power lines, the cumulative visual impacts of the further 400kV LILO Transmission power line and future power line routed to the proposed Asteria Eskom MTS are predicted to be high. The likely consequence for the area, due to the limited mitigation potential to reduce the visual intrusion of the 400kV LILO Transmission power line, is visual sterilisation of the surrounding landscape. Possible scenarios to mitigate the high cumulative visual impacts of the site are purchasing the greater property by Eskom and investigate the possibility of incorporating the property into the Houwhoek Nature Reserve, where their developmental potential would be restricted and the current alien vegetation infestation effectively managed.

9.12 HERITAGE IMPACTS

9.12.1 Potential Overall Impacts on Palaeontology

The Bokkeveld Group formations that underlie the Botrivier area are known to be richly fossiliferous elsewhere in the Western Cape (Almond, 2012). However, in the Botrivier-Caledon region their original fossil content appears to have been almost completely destroyed by a combination of intense tectonic deformation (folding, faulting, cleavage development) and deep chemical weathering. The Table Mountain Group formations represented in the extreme west of the study area (Houwhoekberge) are only sparsely fossiliferous, and have also suffered intense chemical weathering. The effective palaeontological sensitivity of all the rock units represented within the study area is consequently low to very low.

Nature of Impacts

Palaeontological material is destroyed by bulk earth moving, cutting and mining operations. Because palaeontological material is often very deeply buried, palaeontologists often rely on human intervention into the land surface to collect data. Natural exposures e.g. due to erosion, open cast mines, quarries and deep road cuttings often present the only opportunities for palaeontologists to examine deep sediments. In short, provided that

palaeontologists can use the opportunity arising from major construction works to adequately sample and record profiles and exposed material as part of the environmental management process, a potential negative impact can be transformed into a positive opportunity to increase the levels of knowledge about a locality and the presence of ancient species of fauna and flora.

Extent of Impacts

Given that the proposed activity will not require extensive cutting into bedrock it is anticipated that impacts will be minimal, restricted to the site footprint and unlikely to occur.

Duration of Impacts

No matter how minor, all impacts to palaeontology are of permanent duration.

Significance

It is expected that the significance of the impact will be very low.

With respect to palaeontology, impacts tend to take place at the construction phase only as it is during this time that the greatest disturbance of the land surface and or bedrock takes place. Once excavation is completed the impacts will no longer occur.

THEME	PALAEONTOLOGY	
Impact focal point	**The impact of the Asteria Eskom MTS projecton palaeontology**	
Phase	**Construction Phase**	
Nature of impact	Destruction of fossil material during blasting and earthmoving.	N/A
Status of impact	Negative	Neutral
Extent of impact	Footprint (1)	
Duration of impact	Permanent (5)	
Intensity of impact	Low (2)	
Probability	Improbable (1)	
Calculation	(1+5+2) × 1 = 8	
Level of significance before mitigation	No Impact	
Confidence	Medium	
Reversibility	Yes	
Replaceability	Yes	
Mitigation measures	No mitigation required	
Level of significance after mitigation	**No Impact**	

9.12.2 Potential Impacts on Pre-Colonial and Colonial Archaeology

The survey by (Webley & Halkett, 2011) of the Caledon WEF and proposed Langhoogte WEF identified at least nine scatters of Early Stone Age material on ploughed lands. The stone tools included quartzite flakes, flaked cobbles, cores including discoid cores and some crude bifaces (handaxes). In the survey on the farms Klipheuwel and Dassiesfontein to the south of the N2, some scatters of Early Stone Age material were also identified. Kaplan (2006) has also undertaken surveys around the Bot River area and found a number Early Stone Age artefact scatters. The study area is associated with the lower slopes of the Kogelberg which is far less archaeologically sensitive than the shale geology areas of the wheat lands.

A site inspection carried out on both layout alternatives of Site Alternative 1 revealed that neither layout contained any evidence of any archaeological material. There were no *foci* in the area that would have attracted pre-colonial settlement. The sandy sandstone derived surface deposits had evidently been ploughed and cultivated in the distant past. The mountain slopes where the 400kV LILO Transmission power lines corridors are proposed are notoriously sparse in terms of archaeological material. Furthermore, there are no rock shelters or significant rock outcrops that would have been *foci* of pre-colonial settlement. The proposed 400kV LILO Transmission power lines corridor alternatives are situated on windswept mountain slopes that are notoriously depleted of archaeological material. A site inspection of LILO 1, LILO 2 and LILO 3 showed no evidence of any archaeological material. There were a number of promising outcrops in the LILO 1 corridor; however none of these contained any rock paintings or archaeological sites.

Nature of Impacts

The main cause of impacts to archaeological sites is physical disturbance of the material and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example, a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they are found. Large-scale excavations may damage archaeological sites, and construction of roads and laydown areas, injudicious use of off-road vehicles can also contribute to high levels of impact.

Extent of Impacts

Given that much of the land under consideration has been subject to various forms of transformation in the past, it is not expected that archaeological material of good integrity will be located. A site inspection has revealed that all three alternatives are of very low archaeological potential.

Duration of Impacts

No matter how minor, all impacts to archaeology are of permanent duration.

Significance

It is expected that the significance of the impacts with respect all alternatives will be very low.

THEME	ARCHAEOLOGY	
Impact focal point	**The impact of the Asteria Eskom MTS projecton archaeology**	
Phase	**Construction Phase**	**Operational Phase**
Nature of impact	Destruction of fossil material during blasting and earthmoving.	N/A
Status of impact	Negative	Neutral
Extent of impact	Footprint (1)	
Duration of impact	Permanent (5)	
Intensity of impact	Low (2)	
Probability	Improbable (1)	
Calculation	(1+5+2) × 1 = 8	
Level of significance before mitigation	No Impact	

THEME	ARCHAEOLOGY	
Impact focal point	**The impact of the Asteria Eskom MTS projecton archaeology**	
Phase	**Construction Phase**	**Operational Phase**
Confidence	High	
Reversibility	Yes	
Replaceability	Yes	
Mitigation measures	No mitigation required	
Level of significance after mitigation	**No Impact**	

9.12.3 Potential Impacts on Cultural Landscape for Proposed Asteria Eskom MTS

There are no heritage sites, places or features within the study area or within the general locality that are threatened by any form of impact to their context or aesthetics. Notwithstanding this, the general area is visually sensitive due to the presence of wilderness areas and the N2 which is a scenic route. This aspect of the EIA process has been the subject of a separate VIA (**Appendix E-8**) that must be considered by the heritage authority (HWC).

There has been significant visual degradation of the slopes of the Houwhoek Mountains with power line clutter. There are some historic buildings on properties in the area such as Wildekrans Estate to the east, and Compagnies Drift (now Beaumont Wine Estate) to the west, next to the village of Botrivier. These however are too far from the study area to be affected by the proposal. The study area is very localised and situated well clear of any known historic properties. There is no evidence of any historical structures or ruins on any of the proposed alternatives.

In terms of the classification of development activities, a major industrial activity is a Category 5 development (Oberholzer, 2005). Category 5 developments in natural or agricultural landscapes tend to have a very high visual impact. This implies that there would be a significant change to the sense of place and character of the site if suitable mitigation is not applied.

While the proposed activity may, unless mitigation is implemented, tip the scale that would lower the landscape grading, cumulative impacts are a concern. SANRAL has identified a nearby site for the establishment of a toll plaza on the N2, while the rezoning of nearby land parcels for industrial purposes hints at a future industrial node at the bottom of the Houhoek Pass. The cumulative impact of these factors will reduce the quality of the landscape from IIIA to IIIB or even IIIC.

While the N2 is not strictly an historic route, it is a potentially sensitive visual receptor which will need to be considered in terms of the placement of facilities. The VIA (**Chapter 9.11** above and **Appendix E-8**) has expressed concern in terms of the visual impacts of the proposed activity (**Figure 7-22**). Both proposed alternative substations layouts will have a visual impact of high significance.

The VIA states that Site Alternative 1: Layout Alternative 1 will have a high impact on the visual qualities of the N1 scenic route which implies the possibility of the activity affecting the overall landscape grading. The VIA states that Site Alternative 1: Layout Alternative 1 can be mitigated by altering the orientation of the site to follow natural contouring along with landscaping, cutting the site into the slope and by using the fill material for the creation of

landscaped earth barriers and berms (**Figure 9-5**) to lower the profile and extensive planting. This is therefore the preferred alternative from a visual perspective.

Nature of Impacts

Historic farm structures (and these include old sheds, stone kraals and family cemeteries) have not been identified in the immediate areas of the proposed activities. Historic places, even if they are not directly impacted are context sensitive, in that changes to the surrounding landscape will affect their significance. No historic visual receptors have been identified in the vicinity of either layout alternative of Site Alternative 1.

Extent of the Impacts

Direct impacts are not expected on structures located in the study area. However, if the proposed activity results in changes to the way in which historic structures, towns or places are utilised, or affects their context, then negative impacts may result. Impacts of an indirect nature such as the visual intrusion of the proposed Asteria Eskom MTS project, the sense of place of historic buildings, places or landmarks may result. With respect to the study area, there are no historical receptors within range of impact.

Duration of Impacts

Impacts, if they occur would be of permanent duration.

Significance

The significance of the impact will be low in terms of impacts to historical features and cultural landscapes. According to the VIA (**Appendix E-8**), impacts to the general aesthetics of the landscape and the N2 scenic route will be high. The implementation of quite extensive mitigations measures will decrease the impact to medium significance over time. The VIA further considers Site Alternative 1: Layout Alternative 3 to be fatally flawed due to unmitigable visual impacts.

9.12.4 Potential Impacts on Cultural Landscape for 400kV LILO Transmission Power Lines

There are no heritage sites, places or features within the study area or within the general locality that will be traversed by the 400kV LILO Transmission power lines that are threatened by any form of impact to their context or aesthetics. The general area is visually sensitive due to the presence of wilderness areas and the N2, which is a scenic route. This aspect of the EIA process has been the subject of a separate VIA (**Appendix E-8**).

There has been significant visual degradation of the slopes of the Houwhoek Mountains with power line clutter.There are some historic buildings on properties in the area such as Wildekrans Estate to the east, and Compagnies Drift (now Beaumont Wine Estate) to the west, next to the village of Botrivier. These however are too far from the study area to be affected by the proposal. The study area is very localised and situated well clear of any known historic properties. There is no evidence of any historical structures or ruins on any of the proposed alternatives.

While the N2 is not strictly an historic route, it is a potentially sensitive visual receptor which will need to be considered in terms of the placement of facilities. The VIA (**Appendix E-8**) has

expressed concern in terms of the visual ~~impacts of proposed activity~~ clutter that would result from additional Transmission power lines. The study area situated at the decent of the Houwhoek pass forms a gateway zone to the Overberg. The presence of the existing 132kV Houhoek Eskom Distribution Substation and existing 66kV and 132kV Distribution power lines has already degraded the experience of transition into the Overberg Landscape, and conversely the traveller's experience of ascending the pass towards Cape Town.

In terms of general scenic impacts the VIA has indicated that construction of Transmission power lines on LILO 1 and LILO 2 will have high negative visual impacts, which are difficult to mitigate. LILO 1 will be visible from N2 receptors while LILO 2 will need to cross existing Transmission and Distribution power lines up to 6 times, each crossing requiring a self-supporting pylon to achieve this. LILO 3 can be mitigated to a Medium-High level of significance through careful siting of the towers within the corridor. The combined effect of new 400kV LILO Transmission power lines running parallel to, and crossing existing 66kV and 132kV Distribution power lines will exceed the "visual carrying capacity" of the landscape degrading the traveller's experience of the N2 and detracting from the aesthetic qualities of the area. The concern is that the proposed Asteria Eskom MTS as well as future connections will precipitate the development of an industrial node inappropriately situated at the foot of the Houwhoek Pass N2 decent/ascent.

The following evaluates the impact of the proposals on the context of cultural-historical elements on the landscape. The scenic impacts of the proposal are considered in detail in the VIA (see also **Chapter 9.11**).

Nature of Impacts

Historic farm structures (and these include old sheds, stone kraals and family cemeteries) have not been identified in the immediate areas of the proposed activities. Historic places, even if they are not directly impacted are context sensitive, in that changes to the surrounding landscape will affect their significance. No historic visual receptors have been identified in the vicinity of any of the three power line alternatives.

Extent of the Impacts

Direct impacts are not expected on structures located in the study area. However, if the proposed activity results in changes to the way in which historic structures, towns or places are utilised, or affects their context, then negative impacts may result. Impacts of an indirect nature such as the visual intrusion of transmission lines/electrical infrastructure the sense of place of historic buildings, places or landmarks may result. With respect to the study area, there are no historical receptors within range of impact.

Duration of Impacts

Impacts, if they occur would be of permanent duration.

Significance

The significance of the impact will be low in terms of impacts to historical features and cultural landscapes. According to the VIA (**Appendix E-8**), impacts to the general aesthetics of the landscape and the N2 scenic route will be high. The visual impact of LILO 1 will be very

high so this alternative is not supported in the VIA. LILO3 is the least problematic in that the line is reasonably screened by topography from N2 receptors.

THEME	IMPACT ON CULTURAL-HISTORICAL ELEMENTS OF THE LANDSCAPE	
Impact focal point	**The impact of the Asteria Eskom MTS projecton the context of elements of the landscape that have historical significance**	
Phase	Construction Phase	Operational Phase
Nature of impact	Destruction of fossil material during blasting and earthmoving.	
Status of impact	Negative	
Extent of impact	Regional (3)	
Duration of impact	Permanent (5)	
Intensity of impact	Low (2)	
Probability	Improbable (1)	
Calculation	(3+5+2) × 1 = 10	
Level of significance before mitigation	No Impact	
Confidence	High	
Reversibility	Yes	
Replaceability	Yes	
Mitigation measures	No mitigation required	
Level of significance after mitigation	**No Impact**	

9.13 TRAFFIC IMPACTS

9.13.1 Site 1 Alternative Layout 1

Site Alternative 1: Layout Alternative 1 (**Figure 7-23**) is located on the western side of the R43, and south of the existing 132kV Houhoek Eskom Distribution Substation. Along this section the R43 is narrow and has no shoulders. During the site investigation it was determined that access to this site cannot be achieved directly from the R43 due to the horizontal curve just south of the site. Any access would be unsafe.

Due to the horizontal alignment constraints on this section of the R43 adjacent to Layout Alternative 1 and the proximity of the site to the future toll plaza on the R43 it is recommended that access be obtained opposite the access to the existing substation. This will require an access road to be constructed parallel to the R43. This access would need to be incorporated into the toll plaza design similar to the way provision has been made for the access to the existing substation on the eastern side of the R43.

Under the upgrading of the R43 for the establishment of the toll and toll facilities on the N2 and R43, the access to the private property located some 300 metres north of the proposed R43 toll plaza from the R43 will be closed. Alternative access is proposed by the N2 Toll Consortium through the construction of a driveway from the toll plaza. The access to the site will need to be incorporated with the driveway.

The land requirements for the R43 upgrade potentially conflicts with the land requirements for this alternative.

9.13.2 Site 1 Alternative Layout 3

Site Alternative 1: Layout Alternative 3 (**Figure 7-24**) is located on the western side of the R43 to the north-west of the existing 132kV Houhoek Eskom Distribution Substation and just

south of the R43/N2 partial interchange. Along this section the R43 is narrow and has no shoulders. As previously mentioned, the access to the existing substation is situated in the middle of a sag vertical curve. The road crests on either side of this access 280m to the north and 250m to the south. It is therefore recommended that access to this site should be located opposite the access to the existing substation.

During the Technical Specialists Workshop (**Chapter 6.4**) it was agreed that the position of the proposed substation would be set back from the existing road reserve boundary of the R43 by 100 metres to ensure that substation would not be impacted by the future upgrading of the R43.

Due to the vertical and horizontal alignment constraints on the section of the R43 adjacent to Layout Alternative 3 it is recommended that access be obtained opposite the access to the existing substation. The proposed toll plaza will be located at this location and thus the access will need to be incorporated into the toll plaza design similar to the way provision has been made for the existing access. As discussed for Layout Alternative 1, provision has already been made for access to private property on the western side of the R43 from the proposed toll plaza and the access to Layout Alternative 3 will need to be incorporated into the design.

9.13.3 Evaluation of Sites

In completing the assessment it has been assumed that the construction phase will take place after the road network improvements have been completed. For the purpose of the assessment only the operational phase has been evaluated.

After evaluating each site individually, it was concluded that Site 1 Alternative Layout 3 and Site 1 Alternative Layout 3 will be best-suited from a traffic engineering perspective. With Site 1 Alternative Layout 3 being set back 100m from the R43, it will have no effect on the proposed location of the Toll Plaza. The access for either site will have to be incorporated into the toll plaza design similar to the way provision has been made for the existing access.

THEME	ROAD NETWORK IMPROVEMENTS	
Impact focal point	**The impact that the road network improvements will have on access to the location alternatives**	
Description	Layout Alternative 1	Layout Alternative 3
Nature of impact	Sight distance is inadequate due to the vertical & horizontal alignment of the R43 in the vicinity of the site. Proximity of toll plaza will also prohibit access. Upgrading of the R43, in the future, could result in the need by the Western Cape Government to expropriate land.	The vertical and horizontal alignment requires that the access to this site be provided opposite the access to the existing substation through the toll plaza site.
Status of impact	Access off the R43 will have a direct negative impact on road safety.	The new access will be incorporated in the toll plaza and will have a neutral impact.
Extent of impact	Regional (3)	Site (2)
Duration of impact	Long-term (4)	Long-term (4)
Intensity of impact	High (10)	Low (2)
Probability	Definite (5)	Possible (2)
Calculation	(3+4+10) × 5 = 85	(2+4+2) × 2 = 24
Level of significance before mitigation	**High**	**Low**

THEME	ROAD NETWORK IMPROVEMENTS	
Impact focal point	**The impact that the road network improvements will have on access to the location alternatives**	
Confidence	High	High
Reversibility	Yes	Yes
Replaceability	Yes	Yes
Mitigation measures	Place access at toll plaza on R43 and construct access road. Relocate location westwards by 100 metres.	None available.
Level of significance after mitigation	**Low**	**Low**

10 SUMMARY OF FINDINGS OF SPECIALIST STUDIES

This section will summarise the findings of the specialist studies (**Appendix E**) undertaken in the EIA Phase:

- Geotechnical Assessment by Dirk van Rooyen (Geotechnics Africa).
- Soil and Agricultural Potential Assessment by Garry Paterson (Institute of Soil, Climate and Water of the Agricultural Research Council).
- Freshwater Ecosystems Assessment (including wetlands, dams and rivers) by Dean Ollis (The Freshwater Consulting Group).
- Ecological Assessment by Nick Helme (Nick Helme Botanical Surveys).
- Avifauna Assessment by Chris van Rooyen (Chris van Rooyen Consulting).
- Social Impact Assessment by Ingrid Snyman (Ingrid Snyman Development Consultants).
- Town Planning Assessment by Nina Otto (AECOM SA).
- Visual Assessment by Stephen Stead (VRM Africa).
- Heritage Assessment by Tim Hart (Archaeological Contracts Office, University of Cape Town).
- Traffic Assessment by Colin Tichauer (AECOM SA).

10.1 GEOTECHNICAL ASSESSMENT

The following conclusions can be drawn about the sensitivity of geotechnical conditions in the study area:

- Site Alternative 1 is developable, provided that a detailed geotechnical investigation is undertaken and the recommendations and precautionary measures set out in the geotechnical report are adhered to.
- Uprooting of trees and grubbing out of their root systems will disturb the founding strata within the footprint areas of the substation components.
- Excavation difficulties should not be a major problem on Site Alternative 1.
- The establishment of the substation on sloping Site Alternative 1 would require the creation of cut-to-fill platforms.
- Watercourses, drainage lines and dams in the study area would need to be avoided for cut and fill operations.
- Founding conditions on Site Alternative 1 will depend on the extent and depth of cut, and thickness of the fill to create building platforms to accommodate the substation on the slope. Selection of the less sloping lower-lying parts of these sites should significantly reduce the extent of cut and fill. Establishing any part of the substation in the outcrop areas would result in excavation difficulties and produce fill dominated by oversize particles.
- All the anticipated soils covering the bedrock on Site Alternative 1 should provide suitable materials to construct the building platforms and any potential access road(s). Materials that derive from excavations formed in the outcrop areas will most likely be dominated by oversize particles, which should not be used to construct building platforms.

- The stiff residual Bokkeveld shale normally possesses adequate bearing capacity for foundations stressed to 400kPa. Site-specific investigations would need to be undertaken to determine the depths to such a founding stratum and to confirm satisfactory bearing capacities for the LILO 400kV Transmission power lines.

10.2 Soil & Agricultural Potential Assessment

10.2.1 Agricultural Potential

No high potential agricultural soils were identified and no arable agriculture is taking place on any of the alternative sites.

The following perennial crops, with a medium to high area suitability, were considered in terms of changes to the agricultural potential: grape vines, deciduous fruit (e.g. peaches), citrus and olives.

Annual dry-land winter growing crops that were taken into consideration were medics, clover, lucerne and small grain. It must be kept in mind that this is a very broad agricultural potential rating because of the limited soil information.

Table 10-1: Agricultural Potential Ratings (Soil Classification Working Group, 1991)

Map Units	Perennial Crops	Annual Crops
Cf 1	Low	Low
Cf 2	Low-Medium	Low-Medium
Ct 1	Medium-Low	Low-Medium
Es 1	Low-Medium	Medium-Low
Es 2	Low-Medium	Medium-Low
Pn 1	Medium	Low-Medium
Ss 1	Low	Medium-Low

10.2.2 Soil Erosion

The soils in the study area generally have relatively sandy topsoil overlying (often abruptly) a subsoil layer that has more clay and a higher degree of structure. The **Es1**, **Es2** and **Ss1** map units for Site Alternative 1 are where this situation is most critical. Cultivation of these areas is not recommended, and care should be taken if any surface vegetation is removed, as erosion can easily remove the sandy topsoil if correct protection measures are not taken.

The steeper parts of the study area landscape contain a coarse textured sandy material in the topsoil horizon, which may also be susceptible to soil erosion if the vegetation is disturbed. These soils are included in map units **Cf1** and **Cf2**.

10.2.3 Summary

The soils in the study areas are generally a mixture of coarse-grained sandy soils on rock, or duplex soils (sandy topsoil abruptly overlying a subsoil clay), and the agricultural potential varies from low to moderate at best.

Site Alternative 1: Layout 3 is preferred from a soil and agricultural potential perspective because this site has slightly shallower soil with poorer drainage and would be preferred for development. **LILO 2 or LILO 3** is preferred as LILO 1 traverses steeper terrain and is subject to erosion if the vegetation is disturbed.

10.3 FRESHWATER ECOSYSTEMS ASSESSMENT

10.3.1 Present Ecological State

The Present Ecological State (PES) of potentially affected freshwater ecosystems within the study area was assessed and observations made. A summary is provided below for each of the 'impact locations' (a) to (d) shown in **Figure 10-1**.

- Only one river will be potentially affected by the proposed substation layout and this is the non-perennial river flowing past Site Alternative 1, in between layout alternatives 1 and 3 (see **Figure 10-1**, impact location 'a'). This river is also potentially impacted by the LILO crossings 1-3. The PES of the potentially affected reach of this river was scored in Class C (moderately modified) for both instream and riparian components. Existing impacts on this river generally appear to be relatively minor, with the exception of exotic vegetation encroachment, which is severe both in the channel and in the riparian zone. At the lower end of this river where it crosses the R43 road, there has been moderate channel modification and the channel has been incised by erosion.
- The river potentially impacted by LILO 1 (impact location 'b' in **Figure 10-1**) was visited on 1 March 2013. The river occurs within a nature reserve and drains a predominantly pristine catchment in the Houhoekberg mountains. Although LILO 1 potentially crosses a point where two river channels merge, this joining point is treated as a single unit for ecological assessments in this study. The river at impact location 'b' in **Figure 10-1** is largely undisturbed and in very good condition, occurring upstream of human settlements and their associated impacts. The only potential existing impacts on this river that can be discerned are perhaps some limited physical disturbances to the river or its riparian zone associated with the existing Bacchus-Palmiet 400kV power line and its servitude and access road, which intermittently follows the course of the river along its path upstream to the source area (approximately 2 km upstream). There is also minor alien vegetation invasion in this area, but the density of alien plants in this area appears to be very sparse. The PES of the potentially affected reach of this river was scored in Class A (unmodified/natural) for both instream and riparian components.
- Where LILO 3 and the western portion of the LILO 2 corridor cross the river channel at impact location 'c' (see **Figure 10-1**), the condition of the instream river channel and its riparian zone are the same as for upstream at impact location 'b', described above (i.e. Class A). However, where the eastern portion of the LILO 2 corridor crosses the river near impact location 'c', the river channel and riparian zone are impacted by a road crossing of the river and the occurrence of a dam immediately downstream of this. The river channel is significantly altered at the road crossing, where there is a sudden disappearance of indigenous vegetation (and a consequent increase in exotic vegetation such as Acacia spp.) and the river is modified as a culvert underneath the road. The channel is then further modified downstream of the road as the culvert drains into a small farm dam. These impacts occur only within the eastern extremity of the proposed LILO 2 corridor and the PES of both the instream and riparian components of this section of river were assessed to be largely modified (Class D).
- Where LILO 3 meets impact location 'd', the river channel and riparian zone are in a largely natural/unmodified condition, although there is some possible impact on the hydrology of this river where the N2 road crosses it near its source. The PES of the river

in this area was assessed to be the same as that for impact location (b), namely Class A (unmodified/natural). Where LILO 2 meets impact location 'd', the river and its riparian zone have become heavily infested with alien vegetation, particularly Pinus spp., but Acacia spp. are also present in this area. Otherwise there are no other clearly discernible impacts to the river in this area except for where the river crosses a firebreak at the western edge of this area. Although there appear to be minimal impacts on the river here other than alien vegetation, the infestation of alien plants is so dense that it has caused a significant modification of the river from its natural state (particularly affecting the riparian zone) and the river was placed in Class C (moderately modified) in terms of its instream component and Class D (largely modified) in terms of its riparian component.

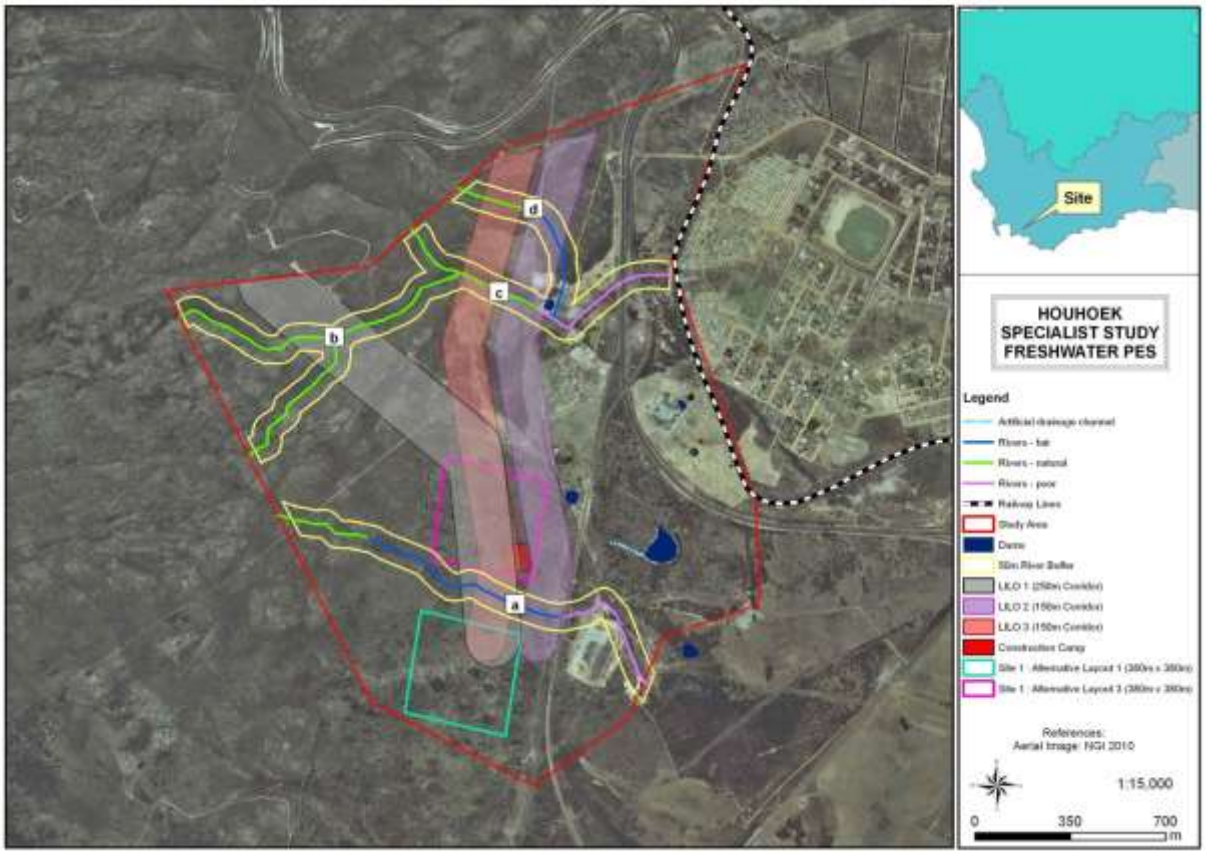


Figure 10-1: Present Ecological State of freshwater ecosystems in study area

10.3.2 Ecological Importance and Sensitivity

The Ecological Importance and Sensitivity (EIS) was assessed for three potentially affected rivers within the Asteria Eskom MTS project study area. The first river flows through impact location 'a' (hereafter 'River 1'). The second is the river flowing through impact locations 'b' and 'c' (hereafter 'River 2'). The third is the river flowing through impact location 'd', which is a tributary of River 2 (hereafter 'River 3').

Given the lack of information available on rare and endangered biota present in the rivers at the Asteria Eskom MTS project study area, only the habitat component of the EIS categories could be scored. It is however unlikely that Rivers 1 and 3 harbour a variety of resident aquatic biota because they are highly ephemeral (soil within the river channel was observed

to be completely dry as early as the initial field visit on 16 November). Fish are definitely absent from all river systems within the Asteria Eskom MTS project EIA study area and Rivers 1 and 3 are expected to be too ephemeral to harbour any significant amphibian populations. The aquatic invertebrate component of all three rivers is expected to consist almost entirely of aerial colonisers (taxa such as *Coleoptera* and *Hemiptera*) that can temporarily inhabit these rivers during brief inundation periods. On the other hand, any aquatic invertebrate taxa that do permanently inhabit these rivers (surviving dry periods as eggs or cysts in the soil) would be highly unique taxa.

Results of the EIS scoring procedure for Rivers 1 to 3 are presented below in **Table 10-2**. The potentially affected river reaches for Rivers 1 and 3 were rated to be of moderate importance and sensitivity. Both these rivers have a highly seasonal inundation regime, making them particularly susceptible to flow changes. The lack of any visible sources of water quality pollution in the vicinity of both these rivers indicates that the water quality is generally good (although this can only be verified by taking water samples during the wet season, an option that was not available for this project given the summer site visits) and thus sensitive to pollution. Both rivers appear to provide low refuge value, low diversity of habitat types and low importance as a migration route or corridor (mostly given their ephemeral nature). These rivers are, however, at least partly located within nature reserve land and thus have a high protected area value.

The potentially affected reach of River 2 was rated to be of high importance and sensitivity. This river channel is larger than those of Rivers 1 and 3, and it offers more diversity of habitat types. It also holds water for longer periods than the other rivers within the EIA study area and this, combined with the greater diversity of instream and riparian habitat types, accounts for the higher refuge value score for River 2 in comparison to Rivers 1 and 3. However, River 2 is still very much seasonal and will only possess flowing water during the wettest winter months. For long periods during the summer, this channel is expected to be completely dry. Thus the river is sensitive to water quality and flow related changes induced by human activities and received the same score in this regard as for Rivers 1 and 3. River 2 is longer than the others in the EIA study area and, as mentioned previously, has a considerably wider channel and riparian zone than for the other rivers, thus providing a more significant migration corridor for river-associated fauna. Within the EIA study area, this river occurs mostly within nature reserve land and thus has a high protected area value.

Table 10-2: Ecological Importance and Sensitivity Scores for Rivers 1 to 3

HABITAT COMPONENT	Score			Confidence		
	River 1	River 2	River 3	River 1	River 2	River 3
Diversity of Aquatic Habitat Types	1	2	1	3	3	3
Refuge Value of Habitat Types	1	2	1	2	3	2
Sensitivity of Habitat to Flow Changes	3	3	3	3	3	3
Sensitivity of Habitat to WQ Changes	3	3	3	2	2	2

HABITAT COMPONENT	Score			Confidence		
	River 1	River 2	River 3	River 1	River 2	River 3
Migration Route/Corridor	1	2	1	2	2	2
Protected/Natural Areas	3	3	3	4	4	3
Median Score	2	2.5	2			
Overall EIS Category	MODERATE	HIGH	MODERATE			

* 1 = Low; 2 = Medium (moderate); 3 = High; 4 = Very High

The recommendations of the Freshwater Ecosystems Assessment are:

- During the design phase, no power line towers should be positioned within the 50m buffer areas of the rivers along the LILO corridors. The LILO corridor that should be selected should avoid the need for any new access roads to be established across rivers or within the 50m buffer area of any rivers. As such, **no LILO corridor is selected for preference**.
- If a new access road is required for the proposed Asteria Eskom MTS that would cross the river that flows past the two layout alternatives, this road should be designed and constructed in such a way as to minimise the loss of any indigenous riparian vegetation and the alteration of flows within the river channel.

It is the recommendation of the EAP that the access road from the R43 to the Site Alternative 1: Layout Alternative 1 and to the proposed construction camp site be limited to the route shown in black in **Figure 10-2**, which follows an existing track, subject to confirmation by a Freshwater Ecological specialist at the walkdown stage. The impacts associated with crossing the watercourse and its associated buffer were assessed as part of **Chapter 9.6** and the mitigation measures should be considered (especially the box culvert with the wide span).

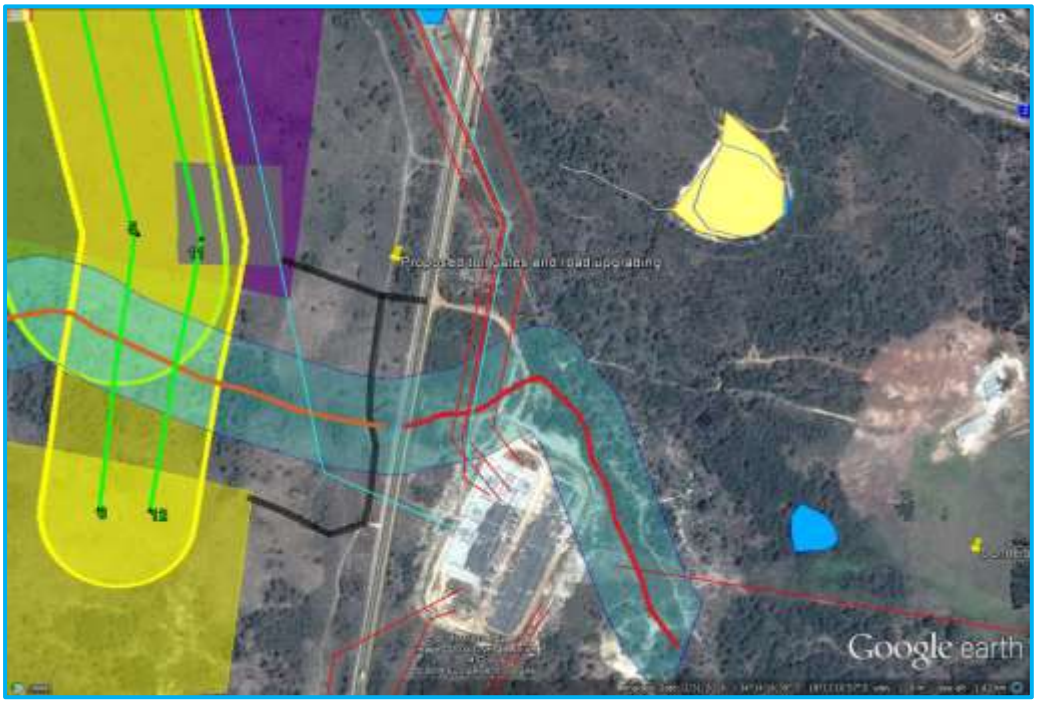


Figure 10-2: Proposed Access Roads, subject to Final Walk-Down Survey

10.4 ECOLOGICAL ASSESSMENT

The following conclusions can be drawn about the ecological sensitivity of each alternative:

- The ecological sensitivity within the overall project study area ranges from low to high (**Figure 7-13**), and within both layout alternatives is low to medium. **No plant or animal SCC are known to occur within the layout alternatives** and overall ecological impacts are likely to be low after mitigation.
- **LILO 2 is the marginally preferred alternative**, as it traverses a shorter section of High ecological sensitivity than LILO 1 and LILO 3. LILO 1 is the least preferred alternative from an ecological perspective, although most of its likely negative impact could, at least in theory, be mitigated.
- The construction of Pylon 3 is likely to have a Medium to High before mitigation as there at least five plant SCC likely to be present in the area surrounding this pylon. The implementation of two mitigation measures (tower placement with a helicopter and botanical input at the walkdown stage) could reduce the significance to low.
- Input from a Botanical specialist should be sought for the actual placement of Pylons 3, 4, 9 and 10 during the walkdown stage, prior to construction.
- Any security lights and floodlights should take into account the fact that lighting can have a significant negative impact on insects, especially if the light has a high UV component. Floodlights should either be high pressure sodium lamps or red, amber or yellow LEDs, and the security lights should ideally be red, amber or yellow LEDs, which have the significant added advantage of being much more energy efficient than more conventional lighting.

Both layout alternatives are acceptable from a botanical and faunal perspective, and are both likely to be rated as low significance (**Table 10-3**). Although, it is noted that **Site Alternative 1: Layout Alternative 3 is slightly more preferred** as the distance of the LILO 400kV Transmission power line that would connect to the Asteria Eskom MTS, would be approximately 15% shorter.

All three LILO alternatives cross areas of High sensitivity and **there is no strongly preferred alternative**. **LILO 2 and LILO 3 are likely to have slightly lower ecological impacts than LILO 1**, but this is not possible to reflect in the rather coarse impact assessment methodology typically used. All three could have significant negative impacts unless adequately mitigated at both the walk-down stage and during the operational phase.

Table 10-3: Comparison of overall likely botanical impacts

Alternative	Overall Significance of Botanical and Faunal Impacts (after mitigation)
Site Alternative 1: Layout 1	Low negative (slightly more negative than Site Alternative 1: Layout 3)
Site Alternative 1: Layout 3	Low negative
LILO 1	Low negative (slightly more negative than LILO 2 and LILO 3
LILO 2	Low negative
LILO 3	Low negative
No-Go	Neutral

10.5 AVIFAUNA ASSESSMENT

The construction of the new proposed Asteria Eskom MTS project poses a limited threat to the birds occurring in the vicinity of the new infrastructure. The power line poses a **low** collision risk to Red Data power line sensitive species. The collision risk will be re-assessed once the final route options become available. There is **no electrocution risk** to avifauna.

The proposed construction of the new substation at any of the two layout alternatives should have a **low displacement impact** on Red Data avifauna. Both layout alternatives are regarded as acceptable options with proper mitigation. Regarding the LILO alternatives, any of the potential alignments would be acceptable with proper mitigation from a bird impact perspective. However, LILO2 is **slightly** preferred as it crosses less of the structurally untransformed habitat on the mountain slopes which form part of the Eastern False Bay Mountains IBA than the other two alternatives. The other two LILO alternatives (1 and 3) might therefore have a slightly higher risk of collisions as far as Red Data species are concerned (low altitude foraging raptors).

Site Alternative 1: Layout 1 is preferred from an avifaunal perspective because this site contains very few trees, which means that raptors are less likely to be attracted to site to perch, roost or breed.

10.6 SOCIAL IMPACT ASSESSMENT

From a social perspective the following general conclusions and recommendations can be made:

- Positive and negative social impacts are associated with the proposed project, although the negative impacts are not of such a nature that the proposed project could not continue.
- The most severe impacts expected to occur during the construction phase of the proposed Asteria Eskom MTS projectare intrusions and disturbances related to the influx of workers and jobseekers to the area, as well as the possible negative impact the accommodation of workers in a construction camp within the area. In this regard it should again be noted that the foreseen accommodation of workers within existing accommodation establishments within the larger area would result in positive socio-economic impacts with a possible injection into the local tourism industry.
- The impacts associated with the construction phase are usually of a temporary nature and could, in most cases, satisfactorily respond to mitigation.
- The proposed project is not anticipated to have severe negative impacts on the social networks and lifestyle of the residents in the town of Botrivier and surrounding areas, although the spread of HIV/AIDS and other sexually transmitted diseases during the construction phase is likely. Any increased infection rate within the area is perturbing and should be avoided at all costs.
- The main impacts associated with the operational phase of the proposed Asteria Eskom MTS projectrevolve around the visual impact which impacts on the sense of place and

possibly on the daily living and movement patterns of residents. Subsequent negative impacts could further impact on tourism establishments that rely on the scenic quality of the area. Devaluation of property values also remains a concern.

- Due to the visual disturbances associated with the project it would have a negative impact on the local sense of place. The impact on the "sense of place" does not readily lend itself to mitigation. Since the sense of place is non-economic and non-transferable, it cannot be mitigated through reimbursement or relocation of individuals.
- Negative impacts on the tourism industry and future potential of this industry due to the visual impact of the proposed Asteria Eskom MTS project, although it was concluded that the local tourism activities and establishments are situated in the countryside (non-urban area) around Botrivier and not only the town itself. Furthermore it was outlined that the area is already disturbed by existing infrastructure and even though the scenic character and landscape quality would be changed it is not anticipated that the presence of the new infrastructure would discourage tourists to travel through the area or to visit the town of Botrivier and surrounding areas.
- In theory, the main farming activities in the area could continue within the servitude, although no existing farming activities are undertaken within the corridors assessed.
- Impacts on property values could only be successfully assessed once environmental authorisation is granted and the servitude negotiation process commences (**Chapter 6.14.1**).
- Limited positive impacts on a local scale are foreseen as the employment opportunities for construction workers are extremely limited. Regional economic contributions can occur as a result of indirect economic spin-offs created by the future stable electricity supply.
- The proposed project would not impact on the development of the Donderboskop Industrial Development planned in the area and would also not sterilise land for future planned residential development within Botrivier.
- Safety and security risks remain of concern. Minor negative impacts on farming activities are foreseen if safety and security of those farmers are not compromised through the presence of the construction and/or permanent workforce. It is thus imperative that proactive mitigation measures to limit the risks be strictly implemented.
- The impact of the project on the land use in the study area is considered to be of a low significance. Refer to **Chapter 10.7** for a summary of the findings of the Town Planning Assessment.
- Infrastructural developments such as the upgrading of the R43 and proposed toll plaza would be considered and taken into consideration when undertaking the detailed design of the proposed Asteria Eskom MTS. Refer to **Chapter 10.10** for a summary of the findings of the Traffic Impact Assessment.

The following concluding remarks should be noted regarding the LILO alternatives:

- LILO 2 received a higher rating than LILO 1 and 3 regarding the disruption in the daily living and movement patterns and residential proximity. This is mainly due to the proximity of this corridor to the residential dwelling of the Bakenhoogte Olive Farm and the main activities taking place on this property.
- Furthermore, LILO 1 and 3 are more preferred than LILO 2 due to the visual impact on the Bakenhoogte Olive Farm's residential dwelling and possible visual disturbances to tourists and visitors travelling through the area to the town and the larger Botrivier area. Should LILO 2 be pursued it could also be more likely that an impact on the property value could occur.
- With LILO 2 the most instances where cross-overs could be required would occur. In this regard LILO 1 and 3 are seen to have less of an impact as these corridors would thus limit an increase in some tower heights with a subsequent lower visual impact.
- The distribution lines are not anticipated to have a marked influence on the social environment as these lines would be of a relative short distance and would traverse a road. No agricultural activities would further be sterilised as a result of these lines.
- All three LILO corridors could be implemented as the social impacts are in most cases similar. LILO 1 and 3, however are more preferred due to the possible negative impacts on the Bakenhoogte Olive Farm as discussed.

With regards to the substation alternatives assessed, the following concluding remarks should be noted:

- Site Alternative 1: Alternative Layout 1 and Alternative Layout 3 received similar ratings except for the impact on the daily living and movement patterns, the visual disturbances and the possible negative impact on the property values in the area. Here Alternative Layout 3 received a higher negative rating seeing that the location of the substation is very close to the dwelling of the Bakenhoogte Olive Farm. This establishment also receive tourists and visitors to their business on the property. In this regard Site 1: Alternative Layout 1 would be preferred.
- For the remaining impacts the substation and their locations would result in similar social impacts.
- As the negative social impacts with regards to the substation could respond to mitigation, it is thus recommended that both sites could be pursued.
- However, Site 1: Alternative Layout 1 would be preferred to limit the possible negative impacts on the Bakenhoogte Olive Farm.

With regards to the increased footprint of the substation, the construction camp site and the proposed pylon positions, the following concluding remarks should be noted:

- The location of the construction camp site is anticipated to increase the likelihood of jobseekers gathering at the construction camp site and the substation site, thereby negatively impacting on the surrounding environment.
- The main intrusion impacts (noise, dust and visual pollution) of the construction camp site would be experienced during the construction phase. As this facility would be

demolished at the end of the construction phase, the long term impact on the social environment is deemed of a low significance.

- The increase in the footprint size of the substation would not result in additional workers to be employed during the construction phase.
- The proposed pylon positions would not have direct negative impacts on the daily living and movement patterns of residents, farming activities or land-use. Even though Pylons 10 and 11 are close to residential dwellings, the direct long term impacts are not perceived to be severe.
- The visual impact on the Bakenhoogte Olive Farm's residential dwelling/office and possible visual disturbances to tourists and visitors travelling through the area to the town and the larger Botrivier area remain of concern.
- As the negative social impacts could respond to mitigation, it is recommended that the construction camp site be established at the location proposed and that the pylon positions as proposed by Eskom remain.
- It is concluded that the footprint size of the substation site can increase without resulting in additional negative impacts on the social environment.

10.7 TOWN PLANNING ASSESSMENT

In terms of town planning, the following information should be considered:

- The Remainder of Farm 820 No: 820 – Caledon RD on which the selected Site Alternative 1 (Alternative Layout 1 and Alternative Layout 3) for the 400/132kV Asteria Eskom MTS is located, is currently zoned "Agricultural Zone 1" in terms of Clause 14.1 of the TWK Municipality Integrated Zoning Scheme Regulations (2011) read in conjunction with Table A of the Regulations.
- The current zoning does not allow for electrical substations and would therefore require an application for rezoning as confirmed with the TWK LM.

For the proposed Asteria Eskom MTS project to go ahead the following statutory procedures are envisaged to be followed:

- The selected Site 1 (Alternative Layout 1 and Alternative Layout 3) on Remainder of Farm 820 No: 820- Caledon RD, would have to be rezoned to "Authority Zone: Government (AU)" (from "Agricultural Zone 1") in terms of Section 17(1) of the Land Use Planning Ordinance (No. 15 of 1985) (LUPO).
- A footprint rezoning would have to be conducted (on the 11.2 hectares of land proposed to be used for the Asteria Eskom MTS).
- A land surveyor would have to survey the coordinates for the parcel of land which forms the "footprint" on Remainder of Farm 820 No: 820- Caledon RD, in accordance with the Land Survey Act (No. 8 of 1997).
- On ascertaining any restrictive title conditions, application would have to be made for the removal and/or amendment of Title Deed restrictions in terms of Section 3(1) of Removal of Restrictions Act (No. 84 of 1967).

- The rezoning application and the application for the removal and/or amendment of Title Deed restrictions can be submitted simultaneously to the TWK LM and must also be submitted to the Director-General of the Western Cape as the TWK LM does not have delegated authority to remove title conditions/restrictions.
- Apart from complying with the NEMA, no other approval is required in terms of any other legislation for acquiring the necessary zoning rights.

Figure 10-3 depicts the flow chart of the rezoning process in terms of Section 17(1) of the LUPO and **Figure 10-4** depicts the flow chart of the removal and/or amendment of Title Deed restrictions process as according to Section 3(1) of Removal of Restrictions Act (No. 84 of 1967). These application processes are envisaged to take place simultaneously and are estimated to take 6-12 months.

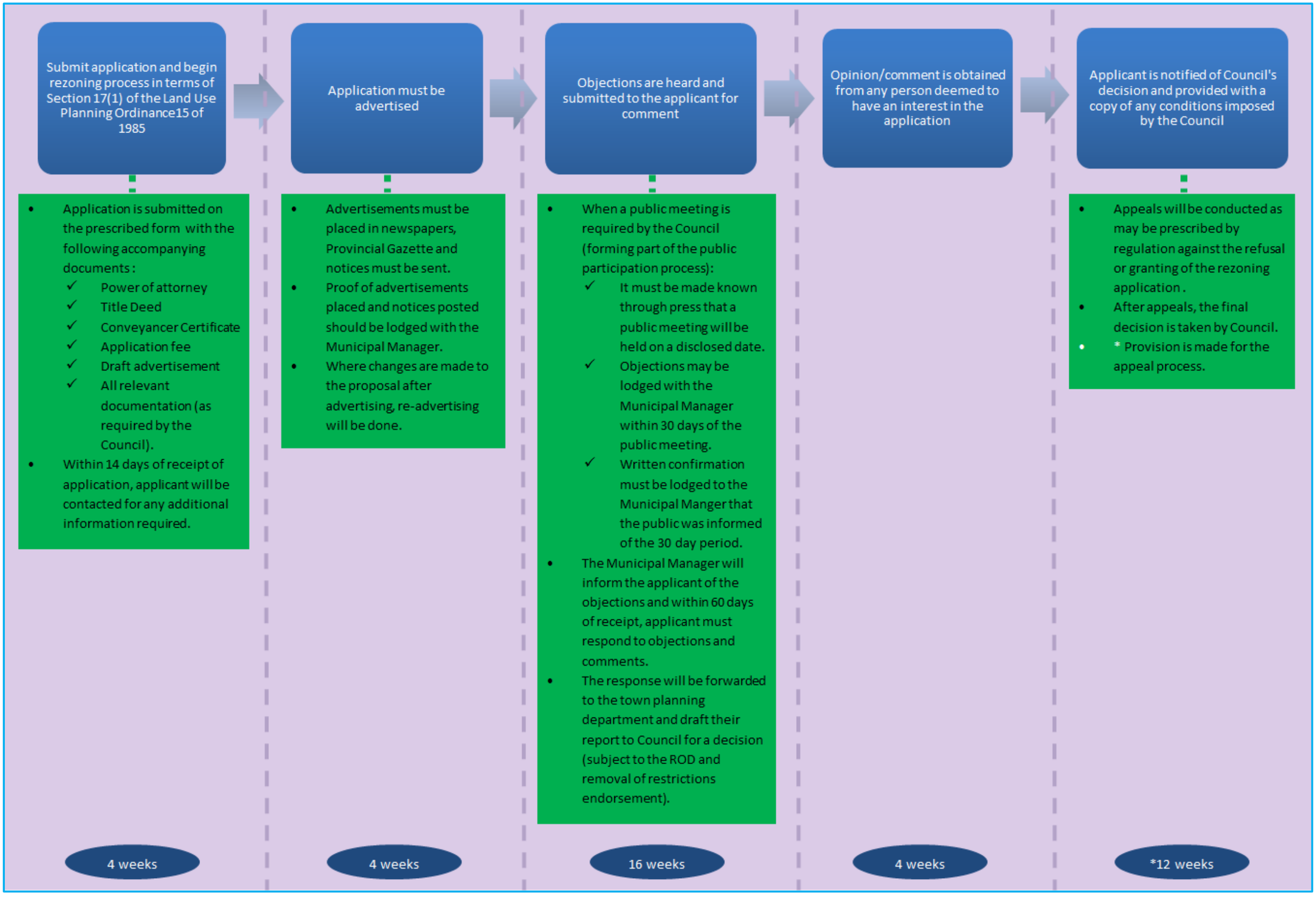


Figure 10-3: Rezoning Process Flow Chart

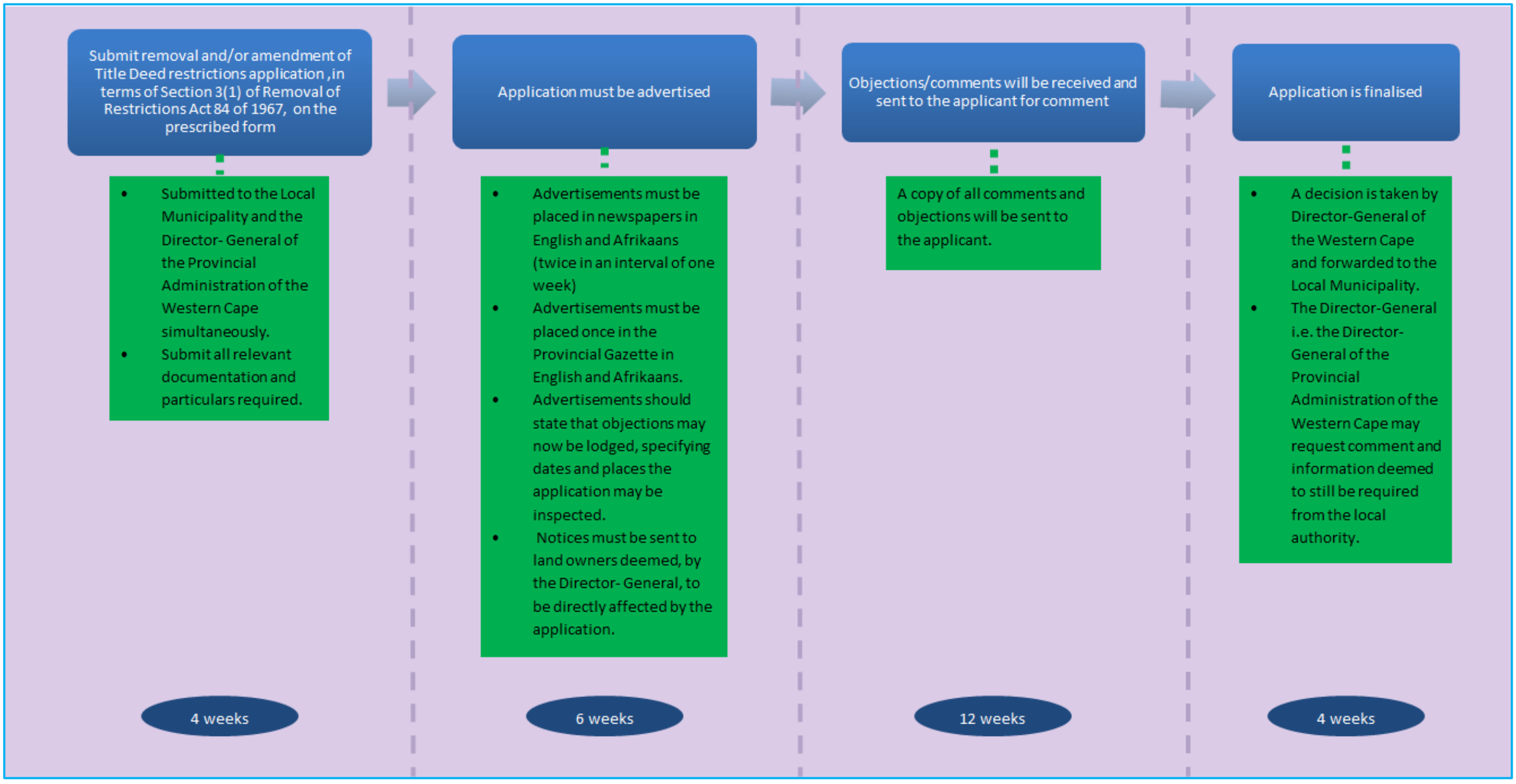


Figure 10-4: Removal of Restrictions Flow Chart

10.8 VISUAL ASSESSMENT

10.8.1 Zone of Visual Influence

The Zone of Visual Influence (ZVI) is defined as 'the area within which a proposed development may have an influence or effect on visual amenity' (Oberholzer, 2005). It is based on a combination of the visibility of the proposed landscape modification determined by a viewshed analysis, and the Visual Absorption Capacity (VAC) of the area, which is defined as the ability of the receiving landscape to absorb physical changes without the wholesale transformation in its visual character and quality (Oberholzer, 2005). The viewsheds were generated for each of the site alternatives making use of ASTER Global Mapper GIS software (ASTER GDEM. METI / NASA, 2011). **Table 10-4** refers to the receptors located within the ZVI for each component of the Asteria Eskom MTS project.

Table 10-4: Receptors of the Zone of Visual Influence

Project Component	N2 Highway from Houwhoek Pass	N2 Highway Westbound	R43 North and Southbound	Botrivier Residents
Layout Alternative 1		✓	✓	
Layout Alternative 3	✓	✓	✓	
LILO 1	✓			
LILO 2	✓	✓		✓
LILO 3	✓	✓		✓

The scenic quality for **Layout Alternative 1** was rated high. The visibility of the site is high due to its location on elevated ground facing east overlooking Botrivier and valley. The VAC levels of the area were rated low. The site is not located near or adjacent to any structures or infrastructure which would generate higher levels of visual contrast. Vegetation is of medium height and alien in nature and would be removed during construction.

The scenic quality for **Layout Alternative 3** was rated high for similar reasons as those discussed in Layout Alternative 1. However, the power line which runs through the site slightly increases the local VAC levels. Due to the elevation of the site in relation to the lower-lying lands to the east and the limited current development footprint on most of the site, the ZVI of the site was rated high.

The Zone of Visual Influence for **LILO 1** site was rated high. Its elevated location on the side of the hill overlooking the valley to the east as well as the open valley to the north causes the viewshed to be high. The current power line corridor is small in size and scale and currently does not generate high levels of visual contrast. The VAC of the area was defined as medium. The proposed ZVI is high. The power line route is aligned along a ridgeline, skyline views seen by Houwhoek Pass receptors would increase the potential for visual intrusion.

The Zone of Visual Influence for **LILO 2** site was rated high. Although the local VAC is higher than that for LILO 1 due to the closer proximity to the existing power lines, water tower and alien vegetation, the nature of the proposed project requires multiple crossings over existing power lines, each with two towers, would enlarge the ZVI significantly.

The Zone of Visual Influence for **LILO 3** site was rated medium. It is located at a lower elevation than LILO 1, but still generates a high viewshed due to the site being elevated above lower-lying valley areas to the east. Existing powerline, water tower and alien vegetation along the corridor increases VAC levels and moderates the ZVI.

10.8.2 Scenic Quality

Scenic quality was assessed for all sites using the VRM scenic quality criteria of landform, vegetation, water presence, colour, adjacent scenery, scarcity of the landscape within the surrounds and existing cultural modifications. These criteria were rated from 1 (low value) to 5 (high value) and then assigned a Scenic Quality Category based on the total score. During the rating process, each of these factors is ranked on a comparative basis with similar features in the region.

The scenic quality for Layout Alternative 1 was rated medium to low. This is due to the site being situated on shallow sloping ground facing west with degraded vegetation. In addition, no incidence of water lowers the scenic quality. Alien vegetation dominates, which reduces colour variation. Although adjacent to the Houwhoek Nature Reserve, views to the west are currently screened by alien vegetation and the main view focus is to the east towards the existing substation. This degrades the scenic value of the site. Such landscapes are fairly common in the region, but the close proximity to the Nature Reserve increases the visual significance of the site. Cultural modifications are limited to alien vegetation growth which does reduce scenic quality somewhat. The total score from the VRM scenic quality criteria was 10 and the site was defined as having a Category C scenic quality.

The scenic quality for Layout Alternative 3 was rated low for similar reasons to those of Layout Alternative 1. The shallow sloping ground facing west, degraded vegetation and no incidence of water lowers the scenic quality. Colours are muted by the prevalence of alien vegetation which reduces colour variation. Although adjacent to the Houwhoek Nature Reserve, views to the west are currently screened by alien vegetation and the main view focus is to the east towards the existing substation. This degrades the scenic value of the site. The site is fairly common in the region but the close proximity to the Nature Reserve increases the visual significance of the site. The site differs from Layout Alternative 1 in that cultural modifications are not only limited to alien vegetation growth, a single 132kV power line also crosses the site. The combined effect of the alien vegetation, the power line and the close proximity to the existing substation further reduces the visual appeal of the site. The total score from the VRM scenic quality criteria was 6 and the site was defined as having a Category C scenic quality.

The scenic quality for LILO 1 site was rated medium to high. The upper sections of LILO1 are located within the Houwhoek Nature Reserve. The reserve has interesting and varied landform, vegetation and colour which add value to the overall scenic quality and has a higher scarcity value. Adjacent scenery is mainly related to the nature of the reserve but also includes the N2 pass and the two power line corridors. These detract from the overall scenic quality value and reduce the cultural modifications rating. The total score from the VRM scenic quality criteria was 15 and the site was defined as having a Category B scenic quality.

The scenic quality for LILO 2 site was rated low. Located on moderately undulating landform adds value to the scenic quality. The vegetation is degraded which limits the colour

variation. Adjacent scenery is dominated by power lines and the water tower. The scarcity value of the site is low. The site is on private land and is in close proximity to the N2 highway. The cultural modifications of the power lines and degraded vegetation detract from the scenic quality. The total score from the VRM scenic quality criteria was 7 and the site was defined as having a Category C scenic quality.

The scenic quality for LILO 3 site was rated medium to low. In most aspects LILO 3 has similar characteristics to LILO2. However, the more pristine vegetation increases the colour variation. The adjacent scenery value is lowered by the site's close proximity to the power line corridors. The value given to cultural modifications on the site is moderated by the degraded vegetation at the southern sections of the routing. Using the VRM matrix, the site was defined as having a Category C scenic quality. The total score from the VRM scenic quality criteria was 10.

10.8.3 Receptor Sensitivity

The receptor sensitivity to landscape change was assessed making use of the VRM questionnaire. The criteria assessed were exposure, type of users, the amount of use, public interest, adjacent users concern for visual integrity and if the area is proclaimed and has a special land use zoning.

The receptor sensitivity to landscape change at Layout Alternative 1 was rated moderate to high. The R43 receptors are located 120 m from the site, a high exposure distance zone. The other main receptor is the N2 westbound. Receptors here would see the site within the context of their first views of Botrivier town and valley, at a distance of approximately three kilometres. Both routes are recognised scenic view corridors and carry large volumes of traffic. As the receptors include tourists, the type of users category was rated as high sensitivity to landscape change, and high for amount of use. The importance of tourism for the greater Botrivier community is a factor that would increase the public interest. Even though the site is adjacent to the existing substation, there is public concern that the proposed landscape modification will significantly deteriorate the overall scenic quality. Receptor sensitivity is rated moderate. Adjacent users include the Bakenhoogte Olive Farm to the north, which offers a tourist destination selling olive oil to the passing public, viticulture (Barden Wine Estate) to the south, as well as the Houwhoek Nature Reserve to the east where Cape Nature, like the other land owners, would place a high priority on maintaining the scenic quality of their lands. The site is rated low for special areas as it does not have special zoning or protected status.

Receptor sensitivity to landscape change for Layout Alternative 3 was rated moderate to high. Due to the close proximity of this site to Layout Alternative 1, the ratings for all receptor sensitivity criteria were the same.

Receptor sensitivity to landscape change at LILO 1 site was rated moderate to high. The N2 Houwhoek Pass receptors are located 800 m to the north and have moderate exposure. As indicated in the substation section, the type of users and amount of use criteria for the N2 are rated as high. As the site is located within the Houwhoek Nature Reserve, it is likely that public interest would be higher. The adjacent landuser is Cape Nature who have a mandate to protect the natural environment and as such their concern for maintenance of visual

quality of their lands would be high. The site does fall within the Nature Reserve and is rated high as a special zoned area.

The receptor sensitivity to landscape change at LILO 2 site was rated moderate to high. Exposure to the N2 eastbound receptors is high and sensitivity to further landscape deterioration of the site would be higher. As the site is located at lower elevations and partially obscured by trees adjacent the N2, the amount of use is moderated. Previous plantation growth has resulted in the alien plant invasion of parts of the site. Landscape decay, in conjunction to the many power lines, are visible near the site. Adjacent landusers along the route include the Bakenhoogte Olive Farm which is a tourist destination, and the Houwhoek Nature Reserve. Adjacent users concern for visual quality was rated high.

Receptor sensitivity to landscape change at LILO 3 site was rated moderate to high. Due to its close proximity to the LILO 2 site, the ratings are the same, with the exception of the special areas. The LILO 2 site is located within the Houwhoek Nature Reserve and as such is rated high as a special zoning area.

10.8.4 Visual Resource Management

In terms of the VRM methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and distance of the proposed landscape modification from key receptor points. The overall objective is to maintain a landscape's integrity. This can be achieved at varying levels, called VRM Classes, based on landscape character. The proposed sites are categorised into one of four VRM Classes by using a matrix developed by the Bureau for Land Management.

The Class I visual objective is to preserve the existing character of the landscape, where the level of change to the characteristic landscape should be very low, and must not attract attention. Class I is assigned to those areas where a specialist decision has been made to maintain a natural landscape. As no specialists have defined any fatal flaws relating to the sites, no Class I areas were defined in the project area.

The Class II visual objective is to retain the existing character of the landscape and the level of change should be low. Management activities may be seen, but should not attract the attention of the casual observer. Due to moderate to high scenic qualities, high receptor sensitivity to landscape change and the site being located within the foreground region of the receptor where a change in sense of place is more noticeable, the LILO 1 site was classified as VRM Class II. The overall landscape quality is important for the maintenance of the local and regional tourism industry. In order for the current landscape character to remain unchanged, the contrast generated by the proposed site landscape modification should be weak.

The Class III objective is to partially retain the existing character of the landscape, where the level of change should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Due to lower scenic qualities of the site, but with receptors still having higher sensitivity to landscape change, and being located in the foreground distance zone where change to landscape character is more easily recognised, both layout alternatives and LILO 2 & 3 were classified as VRM Class III.

The sites for Substation Alt 1 and Alt 3 were categorised as Class III areas due to their low inherent scenic qualities combined with high receptor sensitivity to landscape change, and the close proximity to the N2 and R27 view corridors, whilst recognising the importance of the overall landscape for the maintenance of the local and regional tourism industry needs to be recognised. LILO 2 & LILO 3 sites were categorised as Class III areas due to low inherent scenic qualities combined with high receptor sensitivity to landscape change, recognising the importance derived from the overall landscape for the maintenance of the local and regional tourism industry and the close proximity to the N2 and R27 view corridors.

The Class IV objective is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the landscape can be high. Due to the proximity of the proposed sites to the N2, R43 and Botrivier tourist activities, no Class IV sites were defined.

10.8.5 Key Observation Points

The assessment of the DoC is a systematic process undertaken from KOPs surrounding the project site, and is used to evaluate the potential visual impacts associated with the proposed landscape modifications. KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations are important in terms of the VRM methodology, which requires that the Degree of Contrast that the proposed landscape modifications will make to the existing landscape is measured from these critical locations, or receptors, surrounding the property. Two KOPs were identified for Site Alternative 1: Layout Alternative 1:

- R43
- N2 westbound

10.8.6 Recommendations

The following recommendations are noted:

- For Asteria Eskom MTS Site Alternative 1: Layout Alternative 1 the significance of the construction and operation phases without mitigation is rated high and is not recommended. With mitigation includes adjusting the footprint, cutting two platforms into the ground, using the fill to generate a screening berm, and utilisation of grey-brown rocks in gabion retaining walls. The visual significance of the change to the surrounding landscape character for construction and first five years of the operation phases will be high, but over a longer period of time with the establishment of the medium sized screening trees, the proposed landscape modification visual significance could be reduced to medium to high. These impacts statements are based on the assumption that the final Eskom layout could incorporate the mitigations. Due to ~~space constraints on all sides~~ the prominence of the site which offers clear views to the surrounding valley, future expansion of the site is not recommended. In order to reduce the resultant landscape degradation of the remaining northern and western extents of the property attracting other industrial type landuses, it is recommended that these portions are included into the adjacent Houwhoek Nature Reserve (or the

implementation of strict planning bylaws which would restrict development in these areas).

- Without mitigation, the significance of the construction and operation phases of Site Alternative 1: Layout Alternative 3 is rated as visually fatally flawed and is not recommended as the site is prominent and located in frontal views of the N2 Highway, a recognised significant tourist view corridor. Due to the prominence of the site which is located with direct frontal views of the N2 Highway, mitigation of the magnitude of the visual impact is limited. The visual significance for mitigation remains high and is also not recommended.
- The construction of the LILO 1 would establish a dominant and visually defined multi line power line corridor in a clear and direct central view of the N2 receptors travelling westbound. ~~This would degrade the value of the N2 entrance to the Houwhoek pass. For this reason this routing is not recommended.~~ The visual significance of LILO 1 would be high without mitigation, but could be reduced to medium with mitigation. Mitigation would require that only a single power line routing using lattice structures be located along this corridor. The pylons should not be located on rocky outcrops which would increase their prominence.
- Without mitigation, the significance of the construction and operation phases of LILO 2 is rated as fatally flawed and is not recommended as the route would require six crossings of existing power lines. Each crossing would require two monopoles to lower the power line under the raised power line. As mitigation of the magnitude of the visual impact is limited due to the tower type structure required for a power line crossing, the visual significance for mitigation remains high and is also not recommended.
- The visual significance of LILO 3 without mitigation is rated high and is not recommended as there are some prominent rocky outcrops which would, if utilised, for tower location would generate higher levels of visual intrusion as seen from the N2 Highway with high exposure views. With mitigation, the visual significance could be reduced to medium as the route is located in a valley and mainly viewed from the east against the mountain background with some structures (water reservoir, and existing transmission towers), located in the vicinity which increases the visual absorption capacity of the site.
- Due to the visual prominence of the proposed sites and existing multitude of power line corridors, the cumulative visual impacts of the substation with a further LILO Transmission power line option as well as future power lines routed to the proposed Asteria Eskom MTS are predicted to be high. Due to the limited mitigation potential to reduce the visual intrusion of the power lines, the likely consequence for the surrounding area is visual sterilisation of the surrounding landscapes. This negative landscape effect could result in the attraction of industrial type land uses to the vicinity and further deterioration of the visual resources of this section of the Houwhoek Mountain Range and the N2 National Highway views. Possible scenarios to mitigate the high cumulative visual impacts of the site are the purchasing the greater property by Eskom and investigate the possibility of incorporating this property into the Houwhoek Nature Reserve, where their developmental potential would be restricted, and the current alien vegetation infestation effectively managed. The resultant surrounding landscape sterilisation could also be used to motivate for the area to be upgraded into a

larger substation facility. This would definitely exceed the carrying capacity of the locality and is strongly not recommended. If future expansion of the substation is planned, the recommendation is to place the substation in a less prominent and visually strategic location with greater potential for future expansion (further from the intersection of the N2 and R43 routes).

Due to the importance of the effectiveness of rehabilitation in reducing the visual intrusion of the proposed substation, it is recommended that VRM Africa personnel (or other independent Visual Resource specialist) are incorporated into the monitoring of the effectiveness of the rehabilitation, and the signing-off of key phases of the mitigation design, implementation and finalisation. This will also allow for an efficient mechanism for implementing feedback on the effectiveness of the resultant landscape modifications to the authors and the authorities. Monitoring and signing-off would require a brief status report to be submitted to HWC, DEA and DEA&DP for the following phases:

- Landscaping design of the berm and plantings;
- Completion of construction phase; and
- 5th year of operation.

10.9 HERITAGE ASSESSMENT

The study area lies within a rural context – in part natural, in part agricultural. In terms of the UNESCO guidelines (2013) it is an organically evolving landscape. It is situated along the N1 at the descent of the Houwhoek Pass and the gateway of the Cape Town metropolitan area. The N2 is considered a scenic route which has been described by (Winter & Oberholzer, 2013) as being of overall significance as **Grade III (significant at a local level)**. The Houwhoek Mountains have been given a Grade II status (which means that the context is of regional or provincial significance). Winter and Oberholzer (2013) has not determined what division of Grade III applies however given the scenic context **Grade IIIA is possibly appropriate**. Although there are recent intrusions on the landscape (new roads, power lines) the area still retains scenic value. It marks the exit and entry into the Cape Town metropolitan area, the grand entry into the Overberg and Southern Cape with views across the region.

Indications are that impacts to palaeontological and archaeological heritage will be of low significance. However, the impacts of the proposed activities in terms of the aesthetics of the area are of concern. Strictly in terms of heritage, there are no elements within the study area that will be impacted in any way by the proposals and the various alternatives suggested. While there are heritage resources in Bot River, the impact will not affect their context or setting. In terms of impacts to the scenic qualities of the site and surrounds, the findings of the VIA are supported. The accumulative impact of the construction of an additional substation and Transmission power lines, together with the threat of further development and associated infrastructure with respect to proposed future WEFs, will have a degrading effect on the scenic values of the region.

Site Alternative 1 (either layout) contains no archaeology. Indications are that the site can be screened and planted to limit visual impacts from the N2. Site Alternative 1 (both layouts) is

transformed land with verified low archaeological potential. The proposed activity is considered acceptable in heritage terms.

Most preferred:

- **Alternative 1 (layout 1)** contains no archaeology or other historic elements. The ranking proposed in the VIA is supported.
- **LILO 3** is the most preferred as it goes over land that has been transformed in part. In terms of visual impacts it is consider the best of the three options.

LILO 2 runs parallel to the N2 however the need to cross an existing 132kV line will create unsightly electrical clutter. Much of the route has been transformed by prior planting. Therefore, this alternative is ranked as intermediate.

Least preferred:

- **Alternative 1 (Layout 3)** is situated in a more prominent area. The ranking proposed in the VIA is supported.
- **LILO 1** runs through indigenous vegetation and will further sterilise a scenic portion of the steeper terrain of the Houwhoek Nature Reserve. The ranking proposed in the VIA is supported.

While admittedly the system for grading landscapes is under development in the Western Cape, the landscape qualities which are widely valued may be "tested" against the proposed activity (Baumann, *et al.*, 2005). In its present state, although the landscape has both topography and setting that should impart a high heritage status, the locality, while scenic, is no longer pristine – there are notable intrusions such as alien vegetation, the 132kV Houhoek Distribution Substation, Transmission and Distribution power lines, a busy N2 national road and a number of buildings. These detract from the status of the locale lowering it from Grade II to Grade IIIA. It is a possibility that the weight of proposed new developments will drop the grading of the area a notch down to Grade IIIB. The mitigation suggested in the VIA (**Appendix E-8**) is supported, and if implemented will assist in maintaining the present heritage grading.

10.10 Traffic Assessment

None of the LILO alternatives are affected by traffic conditions and have thus not been considered.

The sensitivity of traffic conditions on the proposed development of each of the alternative sites of the Asteria Eskom MTS are:

- Site Alternative 1: Layout 1
    - Due to the horizontal alignment constraints on this section of the R43 adjacent to Site Alternative 1: Layout 1 and the proximity of the site to the future toll plaza on the R43 it is recommended that access be obtained opposite the access to the existing substation. This will require an access road to be constructed parallel to the R43. This access would need to be incorporated into the toll plaza design similar to the way provision has been made for the access to the existing substation on the eastern side of the R43.

- Under the upgrading of the R43 for the establishment of the toll and toll facilities on the N2 and R43, the access to the private property located some 300m north of the proposed R43 toll plaza from the R43 will be closed. Alternative access is proposed by the N2 Toll Consortium through the construction of a driveway from the toll plaza. The access to the site will need to be incorporated with the driveway.
- The land requirements for the upgrading of the R43 potentially conflicts with the land requirements for this alternative.

- Site Alternative 1: Layout 3
  - The position of the proposed substation would be set back from the existing road reserve boundary of the R43 by 100 metres to ensure that substation would not be impacted by the future upgrading of the R43.
  - Due to the vertical and horizontal alignment constraints on the section of the R43 adjacent to Site Alternative 1: Layout 3 it is recommended that access be obtained opposite the access to the existing substation. The proposed toll plaza will be located at this location and thus the access will need to be incorporated into the toll plaza design similar to the way provision has been made for the existing access. Provision has already been made for access to private property on the western side of the R43 from the proposed toll plaza and the access to Site Alternative 1: Layout 3 will need to be incorporated into the design.

Site Alternative 1: Layout 3 is preferred from a traffic engineering perspective. With the site being set back 100m from the R43, it will have no effect on the proposed location of the Toll Plaza. The access for either layout alternative will have to be incorporated into the toll plaza design similar to the way provision has been made for the existing access.

11 COMPARATIVE ALTERNATIVES ANALYSIS

A summary of the sensitivities of each specialist study is presented in **Table 11-1** for the proposed Asteria Substation and the LILO Corridors. The result of the comparative alternatives analysis is that **Substation Alternative 1: Layout Alternative 1** and **LILO 3** are recommended.

Table 11-1: Summary of Sensitivities Identified by each Specialist Study for the Substation and LILO Corridors

	Ecological Assessment	Freshwater Ecosystem Assessment	Avifauna Assessment	Soil & Agricultural Potential Assessment	Social Impact Assessment	Visual Impact Assessment	Geotechnical Assessment	Heritage Impact Assessment	Traffic Impact Assessment	Town Planning Assessment	TOTAL	AVERAGE	WEIGHTED TOTAL	WEIGHTED AVERAGE
WEIGHTING	**2**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**1**	**2**				
Substation 1 Layout 1	1	1	1	2	1	3	1	2	1	2	**15**	**1.5**	**23**	**2.3**
Substation 1 Layout 3	2	1	2	1	2	3	1	3	1	2	**18**	**1.8**	**28**	**2.8**
LILO 1	3	2	2	2	1	3	1	3	0	1	**18**	**1.8**	**28**	**2.8**
LILO 2	2	1	1	1	2	3	1	3	0	1	**15**	**1.5**	**24**	**2.4**
LILO 3	3	1	2	1	1	3	1	2	0	1	**15**	**1.5**	**24**	**2.4**

Further analysis was undertaken for the location of the pylon positions profiled by Eskom, as shown in **Table 11-2**.

The following specialist studies were assigned a weighting of 2 for the proposed pylon positions:

- **Ecological Assessment:** The vegetation types, rare and endangered Fynbos species would require preservation. The location of pylon positions would have an effect on the specific vegetation that would be affected.
- **Avifauna Assessment:** The habitat for birds is determined by the vegetation types described in the Ecological Assessment.
- **Social Impact Assessment:** Wine estates in the region are dependent on tourism. The Bakenhoogte Olive Farm is potentially impacted by the LILO Transmission power lines. There is also additional infrastructure proposed in the region (i.e. widening of the R43 and toll gate on the N2). These issues may impact on the social fabric of Botrivier.
- **Visual Impact Assessment:** The visual integrity of the Houwhoek Pass and the surrounding areas is documented in the region's planning documents. Electricity infrastructure must be assessed while considering the visual appeal of the study area and surrounds. The risk exists that the area becomes cluttered with power lines.
- **Heritage Impact Assessment:** The heritage of the study area is intrinsically linked to the visual integrity of the study area and is thus closely linked to the results of the Visual Impact Assessment.

These specialist studies were assigned a weighting of 1:

- Freshwater Ecosystem Assessment: the pylon positions proposed avoid the watercourses and associated 50 m buffer zones.
- Soil and Agricultural Assessment.

These specialist studies were not considered as part of the analysis as the pylon position locations will not be influenced by their results:

- Traffic Impact Assessment.
- Town Planning Assessment.

Table 11-2: Summary of Sensitivities Identified by each Specialist Study for the Proposed Pylon Locations

	Ecological Assessment	Freshwater Ecosystem Assessment	Avifauna Assessment	Soil & Agricultural Potential Assessment	Social Impact Assessment	Visual Impact Assessment	Geotechnical Assessment	Heritage Impact Assessment	Traffic Impact Assessment	Town Planning Assessment	TOTAL	AVERAGE	WEIGHTED TOTAL	WEIGHTED AVERAGE
WEIGHTING	**2**	**1**	**2**	**1**	**2**	**2**	**2**	**2**	**-**	**-**				
Pylon 1	1	1	2	1	1	0	1	0	-	-	**7**	**0.88**	**12**	**1.50**
Pylon 2	1	1	2	1	1	0	1	0	-	-	**7**	**0.88**	**12**	**1.50**
Pylon 3	3	2	2	1	1	1	1	1	-	-	**12**	**1.50**	**21**	**2.63**
Pylon 4	2	1	2	1	1	3	1	3	-	-	**14**	**1.75**	**26**	**3.25**
Pylon 5	1	1	1	2	1	1	1	1	-	-	**9**	**1.13**	**15**	**1.88**
Pylon 6	1	1	1	1	1	1	1	1	-	-	**8**	**1.00**	**14**	**1.75**
Pylon 7	1	1	2	1	1	0	1	0	-	-	**7**	**0.88**	**12**	**1.50**
Pylon 8	1	1	2	1	1	1	1	1	-	-	**9**	**1.13**	**16**	**2.00**
Pylon 9	2	2	2	1	1	1	1	1	-	-	**11**	**1.38**	**19**	**2.38**
Pylon 10	2	1	2	1	2	3	1	3	-	-	**15**	**1.88**	**28**	**3.50**
Pylon 11	1	1	1	2	2	1	1	1	-	-	**10**	**1.25**	**17**	**2.13**
Pylon 12	1	1	1	1	1	1	1	1	-	-	**8**	**1.00**	**14**	**1.75**

12 SITE-SPECIFIC ENVIRONMENTAL MANAGEMENT PROGRAMME

A Site-Specific Draft Environmental Management Programme (EMPr) details conditions for the implementation of the environmental management component for all personnel executing the project. As such, the EMPr outlines how the project will be managed through its lifecycle and is designed to mitigate negative environmental impacts assessed in the EIA.

The Site-Specific Draft EMPr as presented in **Appendix G** is based on the construction phase and serves as a guide for best practice construction methods, within particular specifications of Eskom. In addition, this Site-Specific Draft EMPr is compiled with the intention of promoting best practice construction methods and as a precautionary measure to comply with Section 28 of the NEMA.

The Site-Specific Draft EMPr was submitted with the Draft EIA Report as mentioned in **Chapter 6.10**.

The Site-Specific Draft EMPr outlines the impacts and mitigation measures for the planning, design, construction, operational, rehabilitation and eventual decommissioning phases. The roles, responsibilities and reporting procedures have also been identified in the Site-Specific Draft EMPr. The following details are covered in the Site-Specific Draft EMPr:

- **Description of the Asteria Eskom MTS Site Alternative 1: Layout Alternative 1 and Recommended Route Alignment for the LILO 400kV Transmission power line:** from the proposed Asteria Eskom MTS Site Alternative 1: Layout Alternative 1 to the existing Bacchus-Palmiet 400kV Transmission power line via LILO 3.
- **Summary of Impacts:** A summary of the predicted negative environmental impacts for which mitigation is required. Positive impacts requiring enhancement will also be listed.
- **Description of Mitigation Measures:** The Site-Specific Draft EMPr identifies feasible and cost-effective mitigation measures to reduce significant negative environmental impacts to acceptable and legal levels. Mitigation measures are described in detail and accompanied by designs, equipment descriptions, and operating procedures, where appropriate. The technical aspects of implementing the mitigation measures are also described.
- **Description of a Monitoring Programme:** Environmental performance monitoring was designed to ensure that mitigation measures are implemented. The monitoring programme clearly indicates the links between impacts, indicators to be measured, measurement methods and definition of thresholds that will signal the need for corrective actions.
- **Emergency Action Plan:** The identification of accidents that could occur during construction and operational phases of the project, with measures on how these could be prevented and/or managed.
- **Incorporation** of Eskom's Environmental Guidelines for vegetation management (including changes required by the Ecological Specialist) and Eskom's Agricultural Policy.
- **Institutional Arrangements** depict and define the responsibilities for mitigation and monitoring actions.

- **Legal Enforceability:** The key legal considerations with respect to the Site-Specific Draft EMPr are:
  - Legal framework for environmental protection; and
  - Legal basis for mitigation.
- The **Implementation Schedule and Reporting Procedures** that specify the timing, frequency, and duration of the mitigation measures.
- A **Description of Requirements** for record keeping, reporting, review, auditing and updating of the Site-Specific Draft EMPr will be provided.

The DEA requested the following to be included in the Site-Specific Draft EMPr (as per **Appendix A-3**):

- All recommendations and mitigation measure to be recorded in the Final EIA Report.
- A plant search, rescue and protection plan, which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a botanist familiar with the site in consultation with the ECO and be implemented prior to commencement of the construction phase.
- An open space management plan to be implemented during the construction and operation of the facility.
- The re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility, including timeframes for restoration, which must indicate rehabilitation within the shortest possible time after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.
- A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include construction of appropriate design measure that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water runoff.
- An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.
- An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.
- A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimise impacts on local commuters e.g.

limiting construction vehicles travelling on public roadways during the morning and later afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.

- An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
- Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts, including the direct and indirect spillage of pollutants.

The Draft Site-Specific EMPr for the proposed power line deviations is presented in **Appendix G**.

13 ENVIRONMENTAL IMPACT STATEMENT

The key impacts identified and assessed during the EIA process included:

- No high agricultural potential soils were identified and no arable agriculture is taking place on any of the alternative sites.
- Ecological impacts related to the critically endangered vegetation types within the study area. This includes the Houwhoek Nature Reserve and the areas with high botanical and avifaunal sensitivity.
- Freshwater ecosystems within the study area will not be impacted on if mitigation measures are strictly adhered to. Pylon positions proposed remain outside of the 50 m buffer prescribed by the Freshwater Ecosystems Report (**Appendix E-3**).
- Visual sensitivity of the study area is very high, but has also been assessed in relation to heritage and social aspects as well. The visual integrity of the proposed developments in relation to their mountainous surrounding environment will have been compromised.
- The heritage grading of the site is rated as Grade IIIA, with the potential to drop to Grade IIIB, based on the proposed new developments for the area.
- The proposed developments are located on agricultural land (including land suitable for viticulture), which could also relate to the geotechnical viability of the site.
- The presence of farms and homesteads in the vicinity of the proposed developments has negative impacts on the social fabric of Botrivier.
- The cumulative impact of the proposed Asteria Eskom MTS project on the proposed WEFs in the region can be considered as medium if one of the WEFs will link to the existing Houhoek Eskom Distribution Substation and the other to the Asteria Eskom MTS.

Based on the results of the specialist studies (**Chapter 10**), the best practicable environmental option for the location of the proposed Asteria Eskom MTS is on **Site Alternative 1: Layout Alternative 1**. The 400kV LILO Transmission power lines should also follow the recommended **LILO 3 corridor** along the proposed pylon positions. Pylon 3 is not recommended and the conductor should be strung via helicopter between Pylon 2 and Pylon 4.

This alignment of the proposed infrastructure would allow for a limited impact on:

- The more sensitive Kogelberg Sandstone Fynbos vegetation within the study area.
- The watercourse (including a 50 m buffer) that runs through the middle of both assessed alternatives.
- It is noted that the Soil & Agricultural Potential Assessment (**Appendix E-2**) has identified that Layout Alternative 3 is more preferred. But, Layout Alternative 1 is not entirely undevelopable and does not present a fatal flaw. The potential effect of the loss of land for viticulture would need to be considered by an agricultural economist during the landowner negotiation process.
- Visual integrity and heritage importance of the study area – interlinked concepts, as explained earlier in the report. Both alternative layouts for Site Alternative 1 were considered visually flawed by the VIA specialist. Even though the VIA specialist considered Site Alternative 3 (dismissed during the Scoping Phase) less visually intrusive,

this site was not preferred by the TWK LM or Eskom (due to the challenge of connecting the 132kV Distribution power line to the existing 132kV Houhoek Eskom Distribution Substation site).

- The Bakenhoogte Olive Farm that has residential dwellings and touristic potential.

The following specific mitigation measures should be undertaken by Eskom to ensure that the environmental impacts are limited:

- An independent Visual Resource specialist should monitor the effectiveness of rehabilitation and sign-off key phases of the mitigation design, implementation and finalisation. A brief status report should be submitted to the HWC, DEA and DEA&DP for landscaping design of the berm and planting, completion of the construction phase and the 5th year of operation.
- Any security lights and floodlights should take into account the fact that lighting can have a significant negative impact on insects, especially if the light has a high UV component. Floodlights should either be high pressure sodium lamps or red, amber or yellow LEDs, and the security lights should ideally be red, amber or yellow LEDs, which have the significant added advantage of being much more energy efficient than more conventional lighting.
- The 25 m overhead mast lights are not recommended from a visual perspective. It is suggested that the security lighting be plaeed so that the lights are more frequently placed, directional lighting of 5 m in height.
- The security fencing should not be palisade type fencing. Clearview fencing should be used and be black in colour and set back from the R43 so as not to dominate the views of the casual observer.
- The construction of the line in certain areas (steep, rocky or some high sensitivity areas) may necessitate the use of helicopters instead of terrestrial access, and this should be determined by the botanist at the walk-down stage. This measure should receive particular attention for the area surrounding Pylon 3.

14 ACTIVITIES APPLICABLE TO NEMA PRINCIPLES

According to NEMA, development must be socially, environmentally and economically sustainable. This section assesses the impacts of the proposed development with respect to the NEMA Principles on Sustainable Development, which must be adhered to (**Table 14-1**).

Table 14-1: Environmental Impacts Specific to NEMA Principles – Sustainable Development

DESCRIPTION		EIA APPLICABILITY TO ACTIVITY
(i)	Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.	The sensitive Kogelberg Sandstone Fynbos vegetation and watercourses have been identified as part of the Ecological Assessment (**Appendix E-4**) and the Freshwater Ecosystems Assessment (**Appendix E-3**). Refer to the Site-Specific Draft EMPr (**Appendix G**) for the management of the impacts associated with Site Alternative 1 (Layout Alternative 1) and LILO 3. Overall, the recommended substation location and LILO route alignment would have the least impact on the ecosystems and loss of biological diversity.
(ii)	Pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied.	Degradation of the environment cannot be avoided as the proposed Asteria Eskom MTS projectentails the construction of an MTS and power lines. However, the substation location and LILO route alignment recommended will limit the degradation of the environment and mitigation measures are prescribed. Refer to the Site-Specific Draft EMPr (**Appendix G**).
(iii)	Disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or, where it cannot be altogether avoided, is minimised and remedied.	The HIA (**Appendix E-9**) undertaken does not identify any known cultural heritage resources that will be affected by the Asteria Eskom MTS project. However, if there are any heritage resources unearthed during the construction phase, mitigation measures are prescribed. Refer to the Site-Specific Draft EMPr (**Appendix G**)
(iv)	Waste is avoided, or, where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner.	An integrated waste management plan is proposed for the construction of the proposed Asteria Eskom MTS project. Refer to the Site-Specific Draft EMPr (**Appendix G**) for the management of waste, specifically during the construction phase.
(v)	Use and exploitation of non-renewable natural resources is responsible, equitable and considers the consequences of the depletion of the resource.	No non-renewable resources will be used for the proposed Asteria Eskom MTS project.
(vi)	Development, use and exploitation of renewable resources and the ecosystems, of which they are part, do not exceed the level or 'critical limits' beyond which their integrity is jeopardised.	No renewable resources will be used for the proposed Asteria Eskom MTS project. Development, use and exploitation of the various ecosystems have been limited by the recommended substation location and LILO route alignment.

15 CONCLUSION AND RECOMMENDATIONS

The EAP believes that Eskom Holdings SOC Limited has followed due environmental process during the undertaking of this EIA process and associated PPP. The identification of key issues during the EIA process has not shown any negative impacts that may be considered as fatal flaws.

Following the review period of the Draft EIA Report, the issues raised by I&APs and regulatory authorities were highlighted in green and presented in this Final EIA Report. The Final EIA Report will then be submitted to the competent approving authority, the DEA, for consideration and decision-making on the environmental authorisation.

It is, therefore, the EAP's professional opinion that the DEA accept this EIA Report and issue an environmental authorisation for the proposed Asteria Eskom MTS on **Site Alternative 1: Layout 1**. It is further the opinion of the EAP that the loop-in and loop-out Transmission power lines along the ~~corridor named **LILO 3**~~ 12 pylon positions of approximately 2km in length be authorised with the following conditions:

- ~~The LILO 3 corridor is ±2km in length and 150m in width, while the servitude for the LILO 3 should be limited to 110m.~~
- Pylons 1, 2, 8 and 7 are located within the existing 55 m servitude area of the existing Bacchus-Palmiet 400kV Transmission power line.
- Pylons 4, 5, 6, 9, 10, 11 and 12 are located within the assessed LILO 3 corridor.
- No pylons are to be located within the watercourse and the prescribed 50 m buffer zone.
- Pylon 3 is not recommended and the conductor should be strung via helicopter between Pylon 2 and Pylon 4. Site-specific ecological impacts must be considered at the walk-down stage.
- Maintenance and construction of pylons should be undertaken with a helicopter, where there are no existing access roads. No roads or tracks should be constructed or opened up (even temporarily) to access pylons.
- The construction of the line in certain areas (steep, rocky or some high sensitivity areas) may necessitate the use of helicopters instead of terrestrial access, and this should be determined by the botanist at the walk-down stage. This measure should receive particular attention for the area surrounding Pylon 3.
- The location of the pylon positions should be subject to a walk-down by an ecologist, geotechnical specialist, hydrologist and a heritage practitioner.
- The potential effect of the loss of land for viticulture would need to be considered by an agricultural economist during the landowner negotiation process.
- An independent Visual Resource specialist should monitor the effectiveness of rehabilitation and sign-off key phases of the mitigation design, implementation and finalisation. A brief status report should be submitted to the HWC, DEA and DEA&DP for landscaping design of the berm and planting, completion of the construction phase and the 5th year of operation.
- Any security lights and floodlights should take into account the fact that lighting can have a significant negative impact on insects, especially if the light has a high UV

component. Floodlights should either be high pressure sodium lamps or red, amber or yellow LEDs, and the security lights should ideally be red, amber or yellow LEDs, which have the significant added advantage of being much more energy efficient than more conventional lighting.

- The 25 m overhead mast lights are not recommended from a visual perspective. It is suggested that the security lighting be plaeed so that the lights are more frequently placed, directional lighting of 5 m in height.
- The security fencing should not be palisade type fencing. Clearview fencing should be used and be black in colour and set back from the R43 so as not to dominate the views of the casual observer.

In addition, the EAP is also of the opinion that the DEA include the following specific conditions in the environmental authorisation:

- Eskom shall be obliged to consult with all landowners (governmental, non-governmental and private) affected by the proposed Asteria Eskom MTS project during the servitude negotiation process. The potential effect of the loss of land for viticulture would need to be considered by an agricultural economist during the landowner negotiation process.
- The recommendations of each specialist study shall be adhered to.
- The recommended site for the proposed Asteria Eskom MTS would have to be rezoned to "Authority Zone: Government (AU)" (from "Agricultural Zone 1") in terms of the LUPO.
- The location of the pylon positions should be subject to a walk-down by an ecologist, geotechnical specialist, hydrologist and a heritage practitioner.
- The Site-Specific Draft EMPr must be made legally binding on the developer, owners and their Contractors. The Site-Specific Draft EMPr shall be finalised with inclusions of the specific conditions of the Environmental Authorisation, before the start of construction.
- A full-time independent ECO should be contracted to oversee the implementation of and undertake monthly audits based on the Site-Specific Draft EMPr before the start of the construction phase of the project.
- Eskom shall also appoint an Environmental Manager to ensure compliance to the operational and maintenance aspects of the Site-Specific Draft EMPr.
- The construction camp shall be located within the ~~boundaries of the proposed Asteria Eskom MTS property on the Remainder of Farm 820 Caledon RD~~ assessed Site Alternative 1: Layout Alternative 3 and remain less than 1 hectare in extent.

16 REFERENCES

Almond, J., 2012. *Palaeontological specialist report for the proposed Langhoogte Wind Energy Facility,* s.l.: Natura Viva cc for Arcus Gibb (Pty) Ltd.

Animal Demography Unit, 2013. *The Virtual Museum @ ADU.* [Online] Available at: http://vmus.adu.org.za [Accessed February 2013].

ARC, 1979. *Soil Association Map of the Western Cape.* Pretoria: unpublished.

ARC, 1985. *1:250 000-scale Land Type Map 3319 Worcester.* Pretoria: Agricultural Research Council - Institute for Soil, Climate and Water.

Arcus Gibb, 2012. *Langhoogte Wind Farm Draft EIA,* Johannesburg: Arcus Gibb (Pty) Ltd.

ASTER GDEM. METI / NASA, 2011. *Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model Version 2,* s.l.: Ministry of Economy, Trade and Industry (METI) of Japan and United States National Aeronautics and Space Administration (NASA).

Barnes, K. N., 1998. *The Important Bird Areas of Southern Africa.* Johannesburg: BirdLife South Africa.

Barnes, K. N., 2000. *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.* Johannesburg: BirdLife South Africa.

Bates, M. F. *et al.*, in press. *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland,* Pretoria: South African National Biodiversity Institute.

Baumann, N., Winter, S. & Aikman, H., 2005. The Horns of a Dilemma: Housing and Heritage. In: *VASSA Guidelines for Proceedings from a Workshop Studies and Debates in Vernacular Architecture in the Western Cape.* Cape Town: s.n.

Burdge, R. J., 1995. *A community guide to Social Impact Assessment.* s.l.:s.n.

Bureau of Land Management, 2004. *Visual Resource Management Manual 8400,* s.l.: US Department of Interior.

DEA&DP, 2011. *Information Document on Biodiversity Offsets: EIA Guideline and Information Document Series,* Cape Town: Western Cape Department of Environmental Affairs and Development Planning.

DEA, 2011. *Threatened Terrestrial Ecosystems in South Africa.* Volume 1002: No. 34809 National Printer ed. Pretoria: Government Gazette.

Department van Landbou en Waterwese, 1989. *Riglyne vir Grondgebruikspeplanning (in Afrikaans),* Elsenburg: s.n.

Driver, A. *et al.*, 2011. *Implementation Manual for Freshwater Ecosystem Priority Areas.* WRC Report No. 1801/1/11 ed. Pretoria: Water Research Commission.

Du Toit, S. J., 2004. *Spore oor die Overberg: Geskiedkundige anecdotes uit die Overberg.* Cape Town: ABC Drukkers.

DWAF, 1999. *Resource Directed Measures for Protection of Water Resources: River Ecosystems,* Pretoria: Department of Water Affairs and Forestry.

DWAF, 2005. *A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas,* Pretoria: Department of Water Affairs and Forestry.

EWT, 2004. *Little Red Data Book of the Mammals of South Africa: A Conservation Assessment.* Johannesburg: Endangered Wildlife Trust.

Harrison, J. A. *et al.*, 1997. *The atlas of Southern African birds.* Vol 1 & 2 ed. s.l.:BirdLife South Africa.

Hart, T., 2010. *Heritage Impact Assessment: Proposed Wind Energy Facility near Caledon,* s.l.: Unpublished Report for Savannah Environmental (Pty) Ltd.

Helme, N., 2004. *Botanical Assessment of Proposed Changes to Eskom Line Between Houhoek and Hermanus Substations,* Scarborough: Unpublished Report for Eskom Distribution, Brackenfell.

Hockey, P. A. R., Dean, W. R. J. & Ryan, P. G., 2005. *Robert's Birds of Southen Africa.* Seventh Edition ed. Cape Town: Trustees of the John Voelcker Bird Book Fund.

Holness, S. & Bradshaw, P., 2010. *Critical Biodiversity Areas of the Overberg District Municipality.* [Online]
Available at: http://sites.google.com/site/overbergcba/Home/ [Accessed 2012].

Jenkins, A. R., Smallie, J. J. & Diamond, M., 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. *Bird Conservation International,* Volume 20, pp. 263-278.

Kaplan, J., 2006. *Phase 1 Archaeological Impact Assessment: Proposed Development of Portion 5 of Farm 436 Caledon,* s.l.: Unpublished Report by Agency for Cultural Resources Management.

Kaplan, J., 2006. *Phase 1 Archaeological Impact Assessment: Proposed Housing Development on Portion 25 of the Farm Compagniesdrift 436 Caledon,* s.l.: Unpublished Report by Agency for Cultural Resource Management.

Kaplan, J., 2007. *Phase 1 Archaeological Impact Assessment: Proposed Overberg Gateway Development (Phase 1 and 2),* s.l.: Unpublished Report by Agency for Cultural Resource Management.

Kleynhans, C. J., Thirion, C. & Moolman, J., 2005. *A Level 1 River Ecoregion Classification System for South Africa, Lesotho and Swaziland.* Report No. N/0000/00/REQ0104 ed. Pretoria: Resources Quality Service (DWAF).

Lampbrechts, J. J. N., Schloms, B. H. A. & Ellis, F., 1992. *Soil Survey of the Farm Keerweer, Botrivier.* s.l.:s.n.

Lange, E., 1994. *Integration of computerized visual simulation and visual assessment in environmental planning,* s.l.: Landscape and Urban Planning.

Manning, J. & Goldblatt, P., 2012. Plants of the Greater Cape Floristic Region 1: The Core Cape Flora. In: *Streletzia 29.* Pretoria: South African National Biodiversity Institute.

Measy, G. J. (., 2011. *Ensuring a future for South Africa's Frogs: A strategy for conservation research,* Pretoria: SANBI Biodiversity Series 19.

Minter, L. *et al.*, 2004. *Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland.* SI/MAB Series #9 ed. Washington D C: Simithsonian Institution.

Monadjem, A., Taylor, P. J., Cotterill, F. P. D. & Corrie-Schoeman, M., 2010. *Bats of Southern and Central Africa - A Biogeographic and Taxonomic Thesis,* Johannesburg: Wits University Press.

Mucina, L. & Rutherford, M. C., 2006. *The vegetation of South Africa, Lesotho and Swaziland.* Strelitzia 19 ed. Pretoria: South African National Biodiversity Institute.

Net-Focus Interactive, 2012. *SA-Venues.com.* [Online] Available at: http://www.sa-venues.com/attractionswc/botrivier.php

Oberholzer, B., 2005. *Guideline for involving visual and aestehtic specialists in EIA processes.* CSIR Report No ENV-S-C 2005 053 F. Edition 1 ed. Cape Town: Western Cape Department of Environmental Affairs & Development Planning.

Oberholzer, B., 2005. *Guideline for involving visual and aestehtic specialists in EIA processes.* CSIR Report No ENV-S-C 2005 053 F. Edition 1 ed. Cape Town: Western Cape Department of Environmental Affairs & Development Planning.

Overberg Online, 2012. [Online] Available at: http://www.overbergonline.co.za/botrivier.php

Overberg Website, 2006. *Overberg.co.za.* [Online] Available at: http://www.overberg.co.za/ [Accessed February 2013].

Overstrand Heritage Landscape Group, 2009. *Overstrand Heritage Survey,* s.l.: Unpublished Report for the Overstrand Municipality.

Raimondo, D. *et al.*, 2009. *Red List of South African Plants.* eds. 2009 ed. Pretoria: Strelitzia 25. South African National Biodiversity Institute.

Roberge, P. R., 2011. *Corrosion Doctors.* [Online] Available at: http://corrosion-doctors.org/ [Accessed 25 July 2011].

Rouget, M. *et al.*, 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report.* Volume 1: Terrestrial Component ed. Pretoria: South African National Biodiversity Institute.

SANBI, 2009. *Further Development of a Proposed National Wetland Classification System for South Africa.* Final Primary Project Report ed. s.l.:Freshwater Consulting Group for SANBI.

SANS-10160-4, 2011. *Part 4: Seismic Actions and General Requirements,* s.l.: ISBN 978-0-626-26431-4.

Schoefield, N. C., 2007. *Commodity Derivatives: Market Applications.* West Sussex: John Wiley & Sons Ltd.

Sheppard, S. R. J., 2005. Validity, reliability and ethics in visualization. In: I. Bishop & E. Lange, eds. *Visualization in Landscape and Environmental Planning: Technology and Applications.* London: Taylor and Francis, pp. 79-97.

Spoon Press, 2002. Guidelines for Landscape and Visual Impact Assessment. *U.K. Institute of Environmental Management and Assessment,* Issue Second Edition, p. 44.

StatsSA, 2007. *Community Survey 2007,* s.l.: Basic Results Municipalities.

Theewaterskloof Local Municipality, 2011. *Integrated Development Plan 2011-2016: 3rd Generation IDP,* s.l.: s.n.

Theewaterskloof Local Municipality, 2012. *Spatial Development Framework Volume II,* s.l.: s.n.

van Rooyen, C. S., 2007. *Eskom-EWT Strategic Partnership: Progress Report April-September 2007,* Johannesburg: Endangered Wildlife Trust.

Vosloo, H. F., 2009. *Transmission Vegetation Management Guidline,* s.l.: Eskom Transmission.

Webley, L. & Halkett, D., 2011. *Heritage Impact Assessment for the Caledon Wind Farm, Western Cape Province,* s.l.: Unpublished Report for Arcus Gibb (Pty) Ltd.

Winter, S. & Oberholzer, B., 2013. *Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape Heritage and Scenic Resources,* Cape Town: Western Cape Provincial Spatial Development Framework.

Young, D. J. *et al.*, 2003. *Big Birds on Farms. Mazda CAR Report (1993-2001),* Cape Town: Avian Demography Unit. University of Cape Town.

GLOSSARY OF TECHNICAL TERMS

Best Practicable Environmental Option (BPEO)	This is the option that provides the most benefit, or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long-term as well as the short term.
Cumulative Impact	The impact on the environment, which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.
Kilovolt:	A unit of potential differences equal to 1000 volts.
Loop-in and Loop-out (LILO)	This is a type of power line that connects a substation to an existing power line with two power lines next to each other in order to close the circuit.
No-go area:	An area in which the Asteria Main Transmission Substation, Transmission or Distribution power line cannot be routed due to resulting significant environmental, social and technical impacts.
Pylon:	A large vertical steel tower-like structure supporting high voltage electrical cables.
Route:	The exact servitude in which the Transmission power line could be built.
Route Alignment:	The alignment of the servitude within which the Transmission or Distribution power line could be built.
Route Corridor:	A passage on either side of a corridor – in this case amounts to 500m on either side of the route alignment of the Transmission or Distribution power lines.
Servitude Right:	A real right in favour of the servitude holder allowing the erection and maintenance of structures and cables to transmit electricity over portions of land and restricting any activities that could pose a hazard to the transmission of electricity, the environment and/or the safety of human and other living beings.
Study area:	The area that will be covered by the Environmental Authorisation process within which possible route alignment alternatives for the Transmission or Distribution power lines, and location and layout alternatives for the Asteria Eskom MTS will be investigated.
Substation:	A collection of equipment for the purpose of raising, lowering and regulating the voltage of electricity.