ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

FOR THE

PROPOSED ESKOM 400/132KV HOUHOEK TRANSMISSION SUBSTATION INCLUDING THE BACCHUS-PALMIET LOOP-IN AND LOOP-OUT POWER LINES, WESTERN CAPE PROVINCE

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

FINAL
SCOPING REPORT

March 2013

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Eskom Holdings SOC Limited

Reference Number: 4501334088

TITLE	:	ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR THE PROPOSED ESKOM 400/132KV HOUHOEK TRANSMISSION SUBSTATION INCLUDING THE BACCHUS-PALMIET LOOP-IN AND LOOP-OUT POWER LINES, WESTERN CAPE PROVINCE
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For BKS (PTY) LTD

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PURPOSE OF THE SCOPING REPORT AND PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

Eskom Holdings SOC Limited has commissioned an Environmental Impact Assessment (EIA) process to investigate the potential environmental impacts for the proposed Houhoek Eskom Transmission Substation project (DEA Reference Number: 14/12/16/3/3/2/401 and NEAS Reference Number: DEA/EIA/0001397/2012).

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 the Houhoek Transmission Substation 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 first phase of the EIA process, the Scoping Phase, is an important part of an EIA process. This is the phase during which issues and concerns are identified in order to focus the specialist studies and to provide a framework within which the assessment is to be undertaken.

The accompanying Plan of Study for EIA sets out the tasks that will be undertaken as part of the impact assessment process and the manner in which such tasks will be conducted. It outlines the methodology for the EIA and includes the specialist studies that will be undertaken. The details of the ongoing public participation, which was started during the Scoping Phase, are also included in the Plan of Study for EIA.

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 invited to review the Draft Scoping Report (SR) to verify that their contributions are captured and correctly understood. Issues raised by I&APs to date have been used, together with issues identified by the specialists, to define the terms of reference for the Specialist Studies to be undertaken in the detailed Environmental Impact Assessment Phase. The public will also have the opportunity to review the Draft EIA Report and Specialist Studies.

The comments received during the Draft SR review period were incorporated into the Final SR, and submitted to the DEA. The DEA will consider the proposed scope of the Specialist Studies, after which these studies will proceed as part of the EIA Phase. An outcome of the EIA phase, as informed by the specialist studies, is a site-specific Environmental Management Programme (EMPr), which will describe the measures that need to be undertaken by the Applicant to mitigate the environmental impacts assessed.

EXECUTIVE SUMMARY

PROJECT DESCRIPTION

Eskom Holdings SOC Limited has applied for environmental authorisation from the National Department of Environmental Affairs (DEA) for the proposed development, herein referred to as, the Houhoek Transmission Substation project. The proposed project entails the construction of the 400/132kV Houhoek Eskom Main Transmission Substation (MTS), linking to the existing 132kV Houhoek Eskom Distribution Substation, and, the loop-in and loop-out (LILO) connecting power lines from the MTS into the existing Bacchus-Palmiet 400kV Transmission power line and back to the MTS. The existing 132kV Houhoek Eskom Distribution Substation is 4.5 hectares in area.

The project site is located approximately 1km south-west of the town of Botrivier, a ward in the Theewaterskloof Local Municipality, in the Western Cape Province.

BKS (Pty) Ltd was appointed by Eskom as the Environmental Assessment Practitioner (EAP) to undertaken the required EIA process for the development of the Houhoek Transmission Substation project. BKS meets the requirements for the independent EAP in terms of Section 17 of the EIA Regulations (GN R543 of 18 June 2010, as amended).

STUDY AREA AND ALTERNATIVES

The Houhoek Transmission Substation project requires the following activities:

- A 2×500MVA, 400/132kV MTS of approximately 12 hectares in area that needs to link into the existing 132kV Houhoek Eskom Distribution Substation.
- LILO power lines that connect the existing Bacchus-Palmiet 400kV Transmission power line to the proposed Houhoek Eskom MTS. This would entail 2 adjoining 400kV Transmission power lines. The distances of these power lines will depend on where the LILO lines will connect to the Bacchus-Palmiet 400kV Transmission power line.
- A 132kV Distribution power line that connects the proposed Houhoek Eskom MTS to the existing Houhoek Eskom Distribution Substation. The distances of these Distribution power lines depend on the location of the proposed Houhoek Eskom MTS.
- The construction of the LILO 400kV Transmission power lines could require the construction of related access roads.

The EIA process requires the identification and analysis of alternatives in order to satisfy the need of the Houhoek Transmission Substation project. Therefore, the following items have been identified and are included as part of this Scoping Report (SR):

- The following macro alternatives have been considered:
    - No-Go Alternative
    - Demand-side Management
- The following site and layout alternatives have been considered as per **Figure 10-1**:
    - Site Alternative 1 is located ±200m to the west of the existing Houhoek Eskom Distribution Substation, across the R43 road. Within this Site Alternative there are two layout alternatives that will be considered (350×320m and 450×250m).

  - Site Alternative 2 is located ±1.6km north of Site Alternative 1, and to the north-west of the existing Houhoek Eskom Distribution Substation. Due to the topographical constraints on the site, only one layout alternative (350×320m) will be considered.
  - Site Alternative 3 is located north and adjacent to the existing Houhoek Eskom Distribution Substation. Within this Site Alternative there are two layout alternatives that will be considered (350×320m and 450×250m).

- The following design alternatives will be considered:
  - Pylon Tower Structure Types
  - Optimisation of Existing Servitudes
  - Underground Transmission power lines

ENVIRONMENTAL SCOPING STUDY

The aim of the scoping study is to identify, to record and to examine the issues raised by stakeholders and specialists concerning the Houhoek Transmission Substation project in the context of the wider environment (biophysical, social and economic environmental facets). This identification and examination enables the EIA Team to focus on the Specialist Studies required and provides a framework for the EIA Phase, addressing the effects of the Houhoek Transmission Substation project on the environment, as well as the effects from the surrounding environment on the Houhoek Transmission Substation project.

The specialists were appointed to provide preliminary inputs into the SR. Their inputs related to the baseline information and the identification of environmental issues and potential impacts, according to their respective fields of expertise. Their inputs formed the basis for the Plan of Study (PoS) for EIA, which forms part of this SR.

As such, Site Alternative 2 and Site Alternative 3 have been dismissed based on technical and environmental criteria during the scoping phase and 2 distinct corridors have been identified for the 400kV LILO Transmission power lines.

As legally required, the Final SR and PoS for EIA have been compiled in accordance with Section 28 of GN R543.

POTENTIAL SIGNIFICANT IMPACTS IDENTIFIED

A new layout alternative for Site Alternative 1 has been identified during the Scoping Phase for further investigation in the EIA Phase. The following potential significant impacts were identified by specialists and stakeholders during the Public Participation Process (PPP) for Site Alternative 1 (including 2 layout alternatives) and for LILO Routes 1 and 2, for further investigation in the EIA Phase:

- Kogelberg Sandstone Fynbos and Western Rûens Shale Renosterveld 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 reserves and the areas with high botanical and avifaunal sensitivity.
- Freshwater ecosystems within the study area, including the dam located on LILO alternative Route 2.
- 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 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 Houhoek Transmission Substation 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 the effect of the proposed road infrastructure upgrades and the tolling of the N2. 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 LUPO process on the proposed Houhoek MTS. Town planning rezoning requirements in terms of the Land Use Planning Ordinance (LUPO) from agricultural to industrial.
- 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.

ENVIRONMENTAL STUDIES AND PUBLIC PARTICIPATION

The need for the following specialist studies has been identified during the Scoping Phase for consideration in the EIA Report:

- Geotechnical Investigation
- Soil and Agricultural Assessment
- Freshwater Ecosystems Assessment
- Ecological Assessment
- Avifaunal Assessment
- Social Impact Assessment
- Visual Impact Assessment
- Heritage Impact Assessment
- Traffic Impact Assessment
- Town Planning Assessment

All the issues and concerns that have been raised by the I&APs through the various channels during the Scoping Phase, including I&AP registration forms and e-mail communications, have been captured in an Issues and Response Report (IRR). Comments received during the Public Open Day, held on 6 December 2012, and the Focus Group Meetings from 5-7 December 2012 with the relevant I&APs were included in the Final SR, after the public review of the Draft SR was completed.

THE WAY FORWARD

The Draft SR and PoS for EIA was made available for review by the public and stakeholders over 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**. The Final SR and the PoS, including all comments from the stakeholders and public, was submitted to the DEA as the

competent authority, for consideration and potential acceptance. The revised study area, as shown in **Figure 10-1**, will be considered in further detail in the EIA Phase.

Thereafter, the detailed specialist studies will be undertaken for the study area in accordance with Section 32 of GN R 543. Subsequently, the EIA Report will be compiled in terms of Section 31 of GNR543 and will include:

- A detailed description of the project, together with a motivation for the need and desirability of the project and details of the alternatives that were investigated.
- A description of the general environment that may be affected by the Houhoek Transmission Substation project (social, biophysical, political, etc.).
- Details of the public participation process conducted.
- Identification and analysis of alternatives (i.e. the no-go development and alternative substation layouts 1 and 2, as well as LILO route corridors 1 and 2) advantages and disadvantages that the alternatives may have on the environment and the community that may be affected by the alternatives.
- A summary of the findings and recommendations of each specialist study.
- A description of all environmental issues that were identified during the EIA process, including the significance of each issue and an indication of the extent to which the issue could be mitigated.
- An assessment of each identified potentially significant impact according to standard assessment criteria (nature, extent, duration, intensity, probability and significance). These impacts will be assessed with and without taking cognisance of recommended mitigation measures, the degree to which each impact can be reversed and the degree to which the impact may cause irreplaceable loss of resources.
- An environmental impact statement which contains a summary of the findings and recommended mitigation measures, the Public Participation Process report, draft Environmental Management Programme (EMPr) and required Specialist Study reports will be collated as appendices.

The site-specific EMPr will be compiled in terms of Section 33 of GN R543, taking into account Section 24N (EMPr) and Section 28 (Duty of Care) of the National Environmental Management Act (No. 107 of 1998) as well as the requirements from the DEA and other regulatory authorities.

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amsl	above mean sea level
BA	Basic Assessment
BID	Background Information Document
CAPE	Cape Action for People and the Environment
CFR	Cape Floristic Region
CLN	Customer Load Network
D/C	Double Circuit

DEA	Department of Environmental Affairs
DEA&DP	Western Cape Provincial Department of Environmental Affairs & Development Planning
DMR	Department of Mineral Resources
DoA	Department of Agriculture
DoE	Department of Energy
DoT	Department of Transport and Public Works
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Electro-Magnetic Fields
EMPr	Environmental Management Programme
FEPA	Freshwater Ecosystem Priority Areas
GN R	Government Notice Regulation
HIA	Heritage Impact Assessment
HSA	Hazardous Substances Act (No. 15 of 1973)
HV	High Voltage
I&AP(s)	Interested and affected party (-ies)
IBA	Important Bird Areas
IDP	Integrated Development Plan
IRR	Issues and Responses Report
km	kilometre
kV	kilovolt
LILO	Loop-in and Loop-out
m	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
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
SIA	Social Impact Assessment
SOC	State Owned Company
S/S	Substation
SR	Scoping Report
TLM	Theewaterskloof Local Municipality
VIA	Visual Impact Assessment
WEF	Wind Energy Facility

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 (hereafter to referred to as Eskom) has applied for an environmental authorisation from the National Department of Environmental Affairs (DEA) for the proposed development, herein referred to as the Houhoek Transmission Substation project (DEA Reference Number: 14/12/16/3/3/2/401 and NEAS Reference Number: DEA/EIA/0001397/2012).

The Houhoek Transmission Substation project entails the construction of the 400/132kV Houhoek Eskom Main Transmission Substation (MTS), linking to the existing 132kV Houhoek Eskom Distribution Substation, and, the loop-in and loop-out (LILO) 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. The existing substation is located approximately 1km south-west of the town of Botrivier, Theewaterskloof Local Municipality in Western Cape Province. The study area being considered for the development of the MTS is located in close proximity to Botrivier close to the existing Houhoek Eskom Distribution Substation.

The Houhoek Transmission Substation project requires the following activities:

- A 2×500MVA, 400/132kV Main Transmission Substation (MTS) of approximately 12 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 Houhoek 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.
- A 132kV Distribution power line that connects the proposed Houhoek Eskom MTS to the existing Houhoek Eskom Distribution Substation. The distance of this Distribution power line depends on the location of the proposed Houhoek Eskom MTS.
- The construction of the LILO 400kV Transmission power lines could require the construction of related access roads.

BKS (Pty) Ltd was appointed by Eskom as the Environmental Assessment Practitioner (EAP) to undertake the required EIA process for the Houhoek Transmission Substation project. BKS meets the requirements for the independent EAP in terms of Section 17 the EIA Regulations (GN R543 of 18 June 2010, as amended).

The EIA process for the Houhoek Transmission Substation project will be undertaken in accordance with Section 24 of the NEMA and sections 26 to 35 of the EIA Regulations (2010). The formal application for environmental authorisation and a declaration of independence of the EAP was submitted to the DEA on 15 August 2012.

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 Houhoek Transmission Substation project.

The Houhoek Transmission Substation project falls under the ambit of the EIA Regulations (2010) 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 (3) phases:

- The Scoping Phase.
- The Environmental Impact Assessment (EIA) Phase.
- The Decision-Making Phase.

The main purpose of the Scoping Phase of the project is to identify and define the issues that need to be addressed in the EIA Phase. In the continuing EIA process, the environmental team will then assess the identified impacts during the EIA Phase and recommend mitigation measures to prevent or minimise the possible impacts.

1.3 METHODOLOGY OF THE SCOPING REPORT

Input from the technical team, the interested and affected parties (I&APs) and the authorities have been considered and integrated in this Final Scoping Report (SR). The purpose of this SR is to document all the issues that were identified during the Scoping Phase of the EIA process and the feedback from the Public Participation Process (PPP).

A **site visit** was undertaken on **26-27 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 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 Draft 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 8.1**) was undertaken on 6 February 2013, to determine the final inputs of the specialists into this Final SR. The workshop was also used to determine the scope of works for the specialist studies to be undertaken in the EIA phase.

1.4 STRUCTURE OF REPORT

The following information, in accordance with Section 32 of GN R543, is included in this report:

- Project team details (**Chapter 2**).
- An overview of the Houhoek Transmission Substation project, the extent of the study area and any assumptions/limitations/constraints linked to the Scoping study (**Chapter 3**).
- A description of the project alternatives (**Chapter 4**).
- A description of the affected environment (**Chapter 5**).
- Legislation and guidelines that pertain to the project (**Chapter 6**).
- A description of the environmental issues and potential impacts to be assessed in the EIA Phase (**Chapter 7**).
- A scoping phase analysis of the alternatives (**Chapter 8**).
- A description of the methodology followed for the EIA process including the PPP (**Chapter 9**).
- A plan of study for the EIA Phase (**Chapter 10**).
- Conclusions and Recommendations (**Chapter 11**).

2 PROJECT TEAM

2.1 APPLICANT

Details of the Applicant are as follows:

Applicant	Eskom Holdings SOC Limited Transmission Division: Land and Rights
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2.2 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Details of the Environmental Assessment Practitioner (EAP) are as follows:

Environmental Consultant	BKS (Pty) Ltd
Environmental Assessment Practitioner	Mr Peter Teurlings
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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 Chapter of the International Association of Impact Assessments (IAIA). 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.

Bronwen Griffiths has handed over project management duties to Bharat Gordhan as of 31 December 2012.

Bharat Gordhan, a Senior Environmental Scientist at BKS, is responsible for managing this project from 1 January 2013 and compiling the Scoping and Environmental Assessment Reports. Bharat holds a BSc (Geography and Environmental Management) and specialises in environmental assessment processes. He has been involved in a variety of EIA processes, including Eskom Transmission power lines, 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 fourteen 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 (as a Managing Member) an Environmental Technical Services company providing specialist input/services to local and national governmental organisations and in the capacity of Principal Environmental Manager, oversaw some of the large construction activities in southern Africa. Currently, he is employed by BKS as Chief Environmental Scientist: EMPr and ECO, where his focus has 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 a number of African languages, will also be an asset during consultation with I&APs. Mamokete is a trained scientist and will bring this ability to the project team.

Mamokete will oversee the day to day roll out of the PPP and will be a primary contact point for the community.

2.4 GEOTECHNICAL, SOIL AND AGRICULTURAL POTENTIAL

Dirk van Rooyen from Geotechnics Africa Western Cape is a professional natural scientist (Registration No 400207/84). 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 ARC-Institute for Soil, Climate and Water. His fields of speciality are soil classification and mapping, soil interpretations, soil surveys and land capability, and ground penetrating radar. Garry will be providing a detailed consideration of the soils and the potential limitations imposed thereby for the Houhoek Transmission Substation project sites and their alternatives.

2.5 FRESHWATER ECOSYSTEMS, ECOLOGICAL AND AVIFAUNAL

Dean Ollis from Freshwater Consulting is a professional natural scientist (Registration No 400102/06) **and a member of the Southern African Society of Aquatic Scientists.** 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. Deon will provide a consideration of the presence of either watercourses (including seep-lines) or wetlands that may be impacted on by the Houhoek Transmission Substation project for each site alternative.

Nick Helme is a registered professional natural scientist (Registration No 400045/08) **at Nick Helme Botanical Surveys.** He specialises in the diverse flora of the South Western Cape and the Cape Floristic Region. He has done over 1000 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 & Rutherford, 2006) and guidelines for biodiversity offsets in the Western Cape (DEA&DP, 2007). **Nick has also worked on the Ecological Assessment for an Eskom power line from the Hermanus to the**

existing Houhoek Substation (2004) and the Ecological Assessment from Houhoek to Stikland (2004). Nick will provide a consideration of the biodiversity and ecological functionality of each of the site alternatives as they may be impacted on by the Houhoek Transmission Substation project.

Chris van Rooyen has 16 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 co-operative 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 several wind generation EIA processes and risk assessments on existing power lines and power stations. Chris also works outside the electricity industry and has completed a wide range of bird impact assessment studies associated with various residential and industrial developments. Chris left the services of the Endangered Wildlife Trust in November 2007 and has since operated as a free-lance ornithological consultant.

2.6 SOCIAL, VISUAL, AND HERITAGE

Ingrid Snyman has a BA Honours in Anthropology and is an experienced social scientist that has 14 years' experience in implementing Social Impact Assessments (SIA). 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 Substation. Ingrid will gather the social related information, including that obtained through the PPP, and will integrate this and consider it formally in a SIA for the project area, including consideration of the various site alternatives.

Stephen Stead (PrLArch) of VRM Africa CC is registered with the Association of Professional Heritage Practitioners (APHP) Western Cape as an independent professional visual impact practitioner to facilitate Visual Impact Assessments (VIA). 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. Stephen and his team will be

considering the existing visual characteristics of each site alternatives, and then the implications of the Houhoek Transmission Substation project thereon.

Tim Hart (MA) of the Archaeology Contracts Office (ACO) at the University of Cape Town is a registered professional archaeologist (principal investigator level) and registered generalist/specialist heritage impact assessor, with 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. Tim is a member of the Association of Southern African Professional Archaeologists and its Cultural Resource Management section. Tim will be considering the heritage aspect of the Houhoek Transmission Substation project on the site alternatives under consideration – this will include consideration of archaeological and paleontological considerations, as well as other facets relating to heritage.

2.7 TRAFFIC AND TOWN PLANNING

Colin Tichauer, Department Manager for Transport Planning in the Western Region, is a **registered Technologist**. 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, a Principal Town and Regional Planner at AECOM SA, 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 (PRASA), 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 Scoping Report has been provided by **Gillian Arenstein**, Associate of Warburton Gunn Attorneys, a firm of attorneys specialising in the sustainability of projects. Gillian will be providing a consideration of the documentation as generated for submission and checking for legal compliance, potential oversights, etc. from an environmental specialist legal point of view.

2.9 PEER REVIEW

In order to ensure that the reports as generated from the EIA process are deemed to be (a) unbiased, (b) comprehensive, (c) appropriate and compliant to the legislative framework (i.e. meeting the letter and spirit of the law), (d) meet the procedural requirements of the

legislation, and (e) are in line with best practice in South Africa, the reports were reviewed in detail by an acknowledged environmental assessment specialist. Edits to the Draft SR were made according to the peer review (**Appendix E**), this Final SR produced, and submitted to the DEA for consideration.

2.10 GEOGRAPHICAL INFORMATION SYSTEMS

All data provided by the above-mentioned specialist studies will be captured on a Geographical Information System (GIS) **tool by Vee Cowie of EcoGIS**. This will allow the project team to recommend a location for the construction of the Houhoek Substation upgrade and a route alignment for the 400kV Bacchus-Palmiet LILO project. This data will also support the Scoping and EIA Reports by producing various maps to indicate the different scenarios.

The process of capturing the information and mapping will be undertaken within the parameters of a standardised GIS format. This adds value to the process as all available data sets would then be consistent with each other, resulting in the delivery of relevant, timely, accurate information for decision-making purposes.

2.11 SUMMARY

The senior EAP and his team at BKS are supported by other BKS personnel and a range of specialists (listed in **Table 2-1**). Input from Eskom Transmission is important for the completeness of the process and accuracy of project-related information. An enviro-legal peer review is also undertaken to ensure the legality of the process. The *curriculum vitae* of the project team members have been included in **Appendix D**.

Table 2-1: Project Team

NAME	ROLE ON TEAM	COMPANY
Peter Teurlings	Project Director, EAP & Professional Natural Scientist	BKS (Pty) Ltd
Dr David de Waal	Public Participation Facilitator	BKS (Pty) Ltd
Bharat Gordhan	EAP's Project Manager & Environmental Scientist	BKS (Pty) Ltd
Robin Swanepoel	EMPr compilation & Environmental Technician	BKS (Pty) Ltd
Marti le Roux	Public Participation Manager	BKS (Pty) Ltd
Mamokete Maimane	Public Participation Officer	BKS (Pty) Ltd
Elsje Greyling	Project Administrator	BKS (Pty) Ltd
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

NAME	ROLE ON TEAM	COMPANY
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
LEGAL REVIEW		
Gillian Arenstein	Enviro-Legal Review	Warburton Gunn Attorneys
Bryony Walmsley	Independent Peer Review	Southern African Institute for Environmental Assessment
ESKOM TRANSMISSION		
Rudzani Ranwedzi	Eskom Senior Environmental Advisor	Eskom Transmission
Lindi Haarhoff	Eskom Project Manager	Eskom Transmission
Ndangi Muthadi	Eskom Planning Engineer	Eskom Transmission
Dalton Matshidza	Chief Engineer Grid Planning	Eskom Transmission
Boitumelo Mosiane	Eskom Senior Engineer (Planning)	Eskom Transmission
Sipho Shabalala	Eskom Senior Surveyor	Eskom Transmission
Derrick Angrove	Eskom Senior Electrical Engineer (Line Designer)	Eskom Transmission
Cass Naidoo	Eskom Electrical Design Engineer (Substations)	Eskom Transmission
Fred Grové	Eskom Senior Design Engineer (Geotechnical)	Eskom Transmission
Solly Phalanndwa	Eskom Senior Civil Design Engineer (Geotechnical)	Eskom Transmission
Pumza Jizana	Eskom Senior Negotiator	Eskom Transmission
ESKOM DISTRIBUTION		
Henk Landman	Eskom Senior Supervisor	Eskom Distribution
Muzafar Ebrahim	Eskom Senior Network Planner	Eskom Distribution
Ebrahim Ismail	Eskom Manager Capital Expansion	Eskom Distribution

3 OVERVIEW OF THE PROJECT

3.1 BULK SUPPLY OF ELECTRICITY IN SOUTH AFRICA

Eskom is divided into 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 between 765kV to 132kV from power stations at high voltages across the country to Main Transmission Substations (MTS). 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 nature of bulk supply of electricity in South Africa is illustrated in **Figure 3-1**.

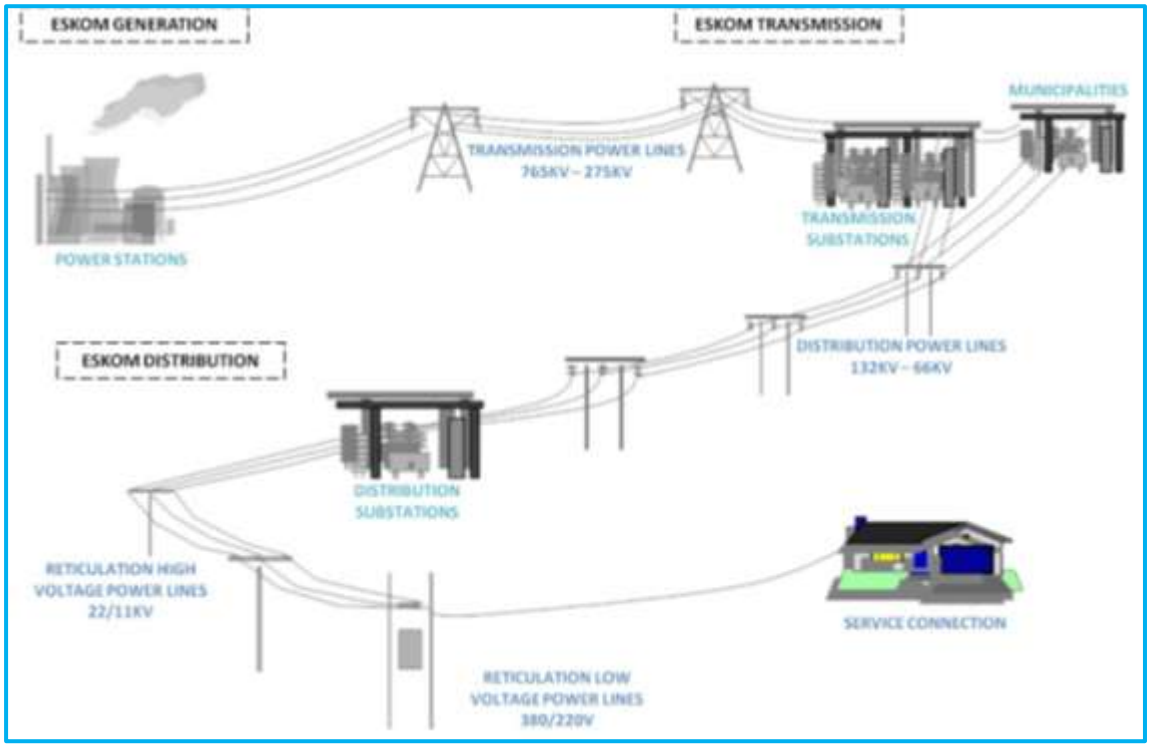


Figure 3-1: Nature of bulk electricity supply in South Africa

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 (CLNs) 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 (400kV, 220kV and 132kV). The 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 is also received from the Stikland MTS (via the Firgrove MTS) and Muldersvlei MTS. 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**).

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 re-configured to withstand a further outage. During the time taken to re-configure, the network is at risk.

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

In addition, the new Houhoek MTS will be able to supply the long-term future load growth anticipated in the Southern Cape CLN. The anticipated growth can also be attributed to Wind Energy Facilities that are currently being explored by Independent Power Producers in this region.

3.3 TECHNICAL DETAILS

3.3.1 Proposed Houhoek Main Transmission Substation

The proposed Houhoek MTS will be approximately 12 hectares, in extent. Initially two alternative layout options would be considered, i.e. 320m × 350m (11.2ha), and 450m x 250m (11.25ha). In addition, three (3) location alternatives will be considered.

The proposed Houhoek MTS will thus contain the following infrastructure:

- 500MVA MTS;
- 2 × 400kV line bay for the 400kV LILO from the Bacchus-Palmiet 400kV Transmission power line;
- Electrical Transformers;
- Circuit breakers or line termination structures;
- High voltage switchgear;
- Medium voltage switchgear;
- Telecommunication high mast;
- Surge and lightning protection equipment;
- Control and metering equipment;
- Office and ancillary buildings;
- Approximately 3.5m high fencing around the substation site;
- Security lighting in and around the perimeter of the substation site;
- Platforms; and
- Access Roads.

3.3.2 Loop-in and Loop-out Transmission Power Lines

The project intends establishing two adjoining 400kV Transmission power lines to 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 250m.
- 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 3-2**) 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.

No additional pylon alternatives will be considered because of the technical requirements of the 400kV LILO Transmission power lines.

Figure 3-2: Self-supporting Pylon

3.3.3 Distribution Power Line

The project intends establishing a 132kV Distribution power line to link the proposed Houhoek 400kV MTS and the existing Houhoek 132kV Substation.

The type of pylon structures or the extent of the Distribution Power Line to be considered has not been determined at this stage of the EIA process.

3.3.4 Linkage of proposed project into Eskom network

The existing Houhoek 132kV Substation and High Voltage (HV) Line configuration is indicated in **Figure 3-3**.

The context of the proposed development is given in the sections that follow.

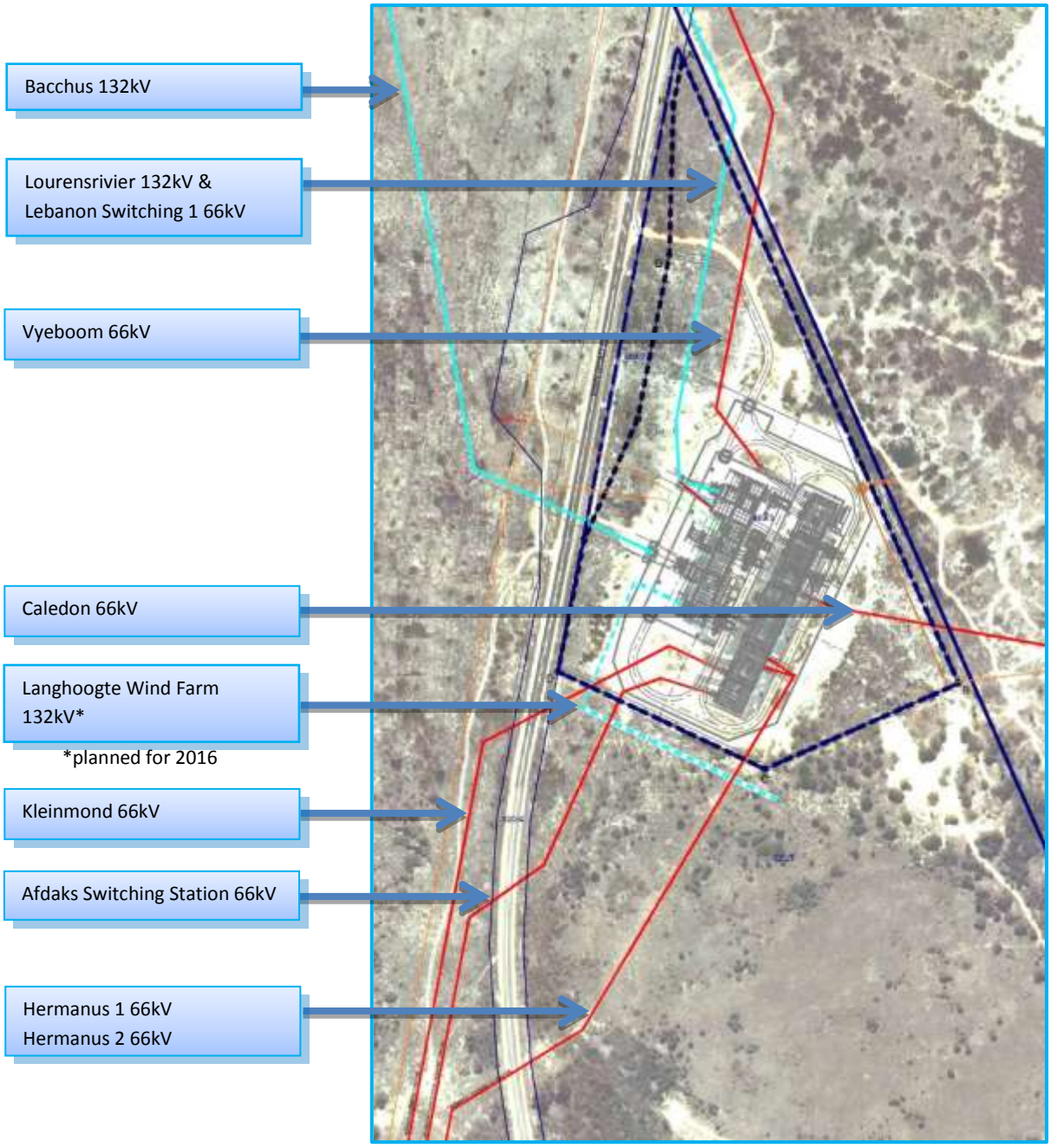


Figure 3-3: Power lines connected to the existing Houhoek Substation

a) 132kV Lines

The existing Houhoek substation is supplied via the 132kV Bacchus single circuit line, and from the 132kV Lourensrivier circuit.

The 132kV Lourensrivier circuit shares a 132kV double circuit (D/C) line with the Lebanon Switching 1 circuit which is running at 66kV. This D/C line runs parallel to the decommissioned Lebanon2 66kV line.

b) 66kV Lines

The Houhoek 132/66kV substation feeds:

- 2x Hermanus circuits via a 66kV D/C 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 D/C line running North-West; and
- Vyeboom via a 66kV line running North.

c) Future Developments

There are two wind farm applications currently awaiting approval; the Langhoogte Wind farm and Caledon Wind. Each approaches the existing Houhoek substation (S/S) from a different direction; Caledon from the North, and Langhoogte from the South. The routes proposed for the wind farms are shown in **Figure 3-4** below; Caledon Wind will have to find a route for a double circuit from the north to Houhoek S/S.

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 network as the network stands at this time.

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 Lebanon2 66kV line could be brought back into commission to accomplish that.

Figure 3-4: Linkages of surrounding Eskom infrastructure into existing Houhoek Substation

The initial site visit carried out as part of this EIA process to determine which sites, identified as Site Alternatives in this document, could be technically feasible, revealed the options as shown in **Figure 3-5**.

In the scenarios presented by the development of the new 400/132kV Houhoek Eskom MTS on one of the proposed footprints, a total of 12 available 132kV feeder bays will be made available, this will serve:

- 2 lines to the current Houhoek substation;
- Take in the Bacchus-Houhoek line;
- Take in the Houhoek-Lourensrivier 132kV line, on a double circuit with provision for the 66kV to 132kV upgrade of Houhoek-Lebanon Switching 1;
- Wind double circuit, either Caledon or Langhoogte, the other will remain on Houhoek substation;
- Bredasdorp double circuit, future strengthening;
- Hermanus double circuit, future upgrade from 66kV to 132Kv; and
- Space for two future 132kV feeder bays.

3.4 SERVITUDE AGREEMENT

The servitude width required to accommodate the towers on which the Transmission power line will be strung is 55m wide, depending on the type of pylon tower required. 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:

- The horizontal clearance to cater for Transmission power line swinging in adverse climatic conditions.
- 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.
- 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.

Minimum clearance distances for the 132kV Distribution power line is not known at this stage of the process.

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 **Section 9.5.1.**

3.5 STUDY AREA OF PROJECT

The study area is located approximately 92km east from Cape Town within the Theewaterskloof Local Municipality (TLM). The TLM 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 3-5** for a locality map of the 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**). The Transmission power line is for a servitude width of 55m, with the Distribution power line servitude width at 22m.

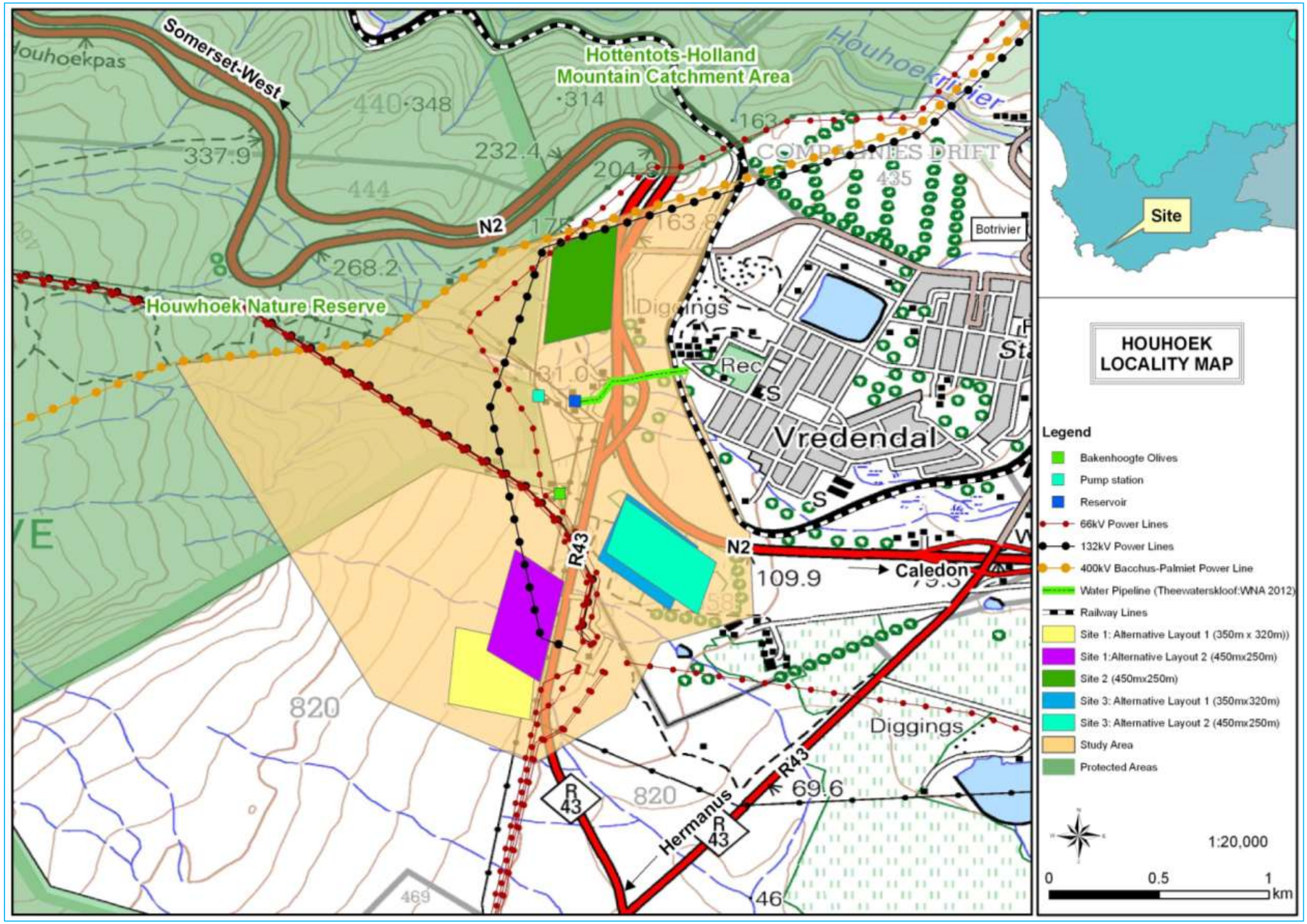


Figure 3-5: Locality Map of study area

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 3-5**). 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 an 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). All construction activities, materials, equipment and personnel will be restricted to within the area specified. The site camp may not be located on any of the environmentally sensitive areas, such as nature reserves, Critical Biodiversity Areas or wetlands.

All materials are stored at the construction camp, with the exception of concrete and the steel towers (which may come direct from the factory). Generally, in a rural area there is one construction camp per 100km of Transmission power line. Therefore, only **one construction camp** will be used for the construction of the proposed Houhoek MTS project. **Figure 3-6** shows photographs of typical construction camps.

Figure 3-6: Examples of typical construction camps

3.6.2 Construction Process for the Proposed Houhoek Transmission Substation

The construction of the Houhoek 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
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 Houhoek MTS will be undertaken over 12 months.

b) Access/Service Roads

Eskom requires access/service roads for the construction and maintenance phases. As the recommended alignment will be along existing road infrastructure, no new access roads should be required for this project. However, this will be confirmed in the EIA phase.

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).

3.6.3 Construction Process for Transmission Power Line

The construction process outlined in **Table 3-1** will be followed for the route of the 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 line.

Construction of this line will take approximately 12 months to complete, and is expected to begin towards the end of 2014 after approximately the negotiation process (**Section 4.3.1**).

Table 3-1: Construction Process for Transmission Power Lines

Activity		Approximate Team Size	Approximate Duration of Activity
1	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 co-ordinates of each bend in the line • Undertake an aerial survey to obtain an accurate profile of the area • Identify optimal tower sizes and positions	-	2 months
3	Final design of power line	-	2 – 3 months
4	Issue tenders and award contract to construction company / companies	-	3 – 6 months
5	Find suitable location for the construction camp	-	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 Environmental Management Programme) 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 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

	Activity	Approximate Team Size	Approximate Duration of Activity
10	• Vegetation clearance (tower positions) • Clear four strips (40m × 40m square for Cross Rope Suspension (CRS) 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 local site conditions
11	• Foundation nominations for main structure and anchors (heavy vehicle access is required) • 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 3-8**)	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 • 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	20	30 days
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 3-9**)	5	1 day

	Activity	Approximate Team Size	Approximate Duration of Activity
	• Mark access roads to ensure the correct tower is delivered to each site (towers are designed as unique for each location)		
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 3-10**.	20	2 days
18	• 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
19	• 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
20	• 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 3-7: Foundations drilling

Figure 3-8: Cover for foundations

Figure 3-9: On-site erection of towers

Figure 3-10: 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
132kV	31 – 36m	6.3m	3.8m
220kV	47m	6.7m	4.2m
275kV	47m	7.2m	4.7m
400kV	40 – 55m	8.1m	5.6m
765kV	80m	10.4m	8.5m

Although it could not be confirmed at this time, it is doubtful that Eskom will allow overhead irrigation under Transmission power lines. Although not directly relevant to this project, it is interesting to note that it would not be possible to use pivot irrigation if the Transmission power line intersects the pivot circle. Drip and micro-irrigation are possible under the Transmission power line, but Eskom needs to confirm this in the servitude agreement with the specific landowner (see **Section 9.5.1** for the Servitude Negotiation Process).

The servitude is required to ensure safe construction, maintenance and operation of the Transmission power line and Eskom will be entitled to unrestricted access. The servitude width required to accommodate the towers on which the Transmission power line will be strung varies from 40m to 55m, depending on the type of pylon tower required and the space available for the servitude (e.g. in urban areas a servitude width of 40m could be accommodated).

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.

3.8 ASSUMPTIONS, LIMITATIONS AND CONSTRAINTS

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

- 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 on 26 June 2012 to identify the alternative sites and consider which alternatives to be considered within the EIA process.

- Public Participation Process: every effort was made to contact all stakeholders within the study area and within 100m of the study area. Information presented by the stakeholders is presumed to be accurate and has been presented timeously in the study.
- Gaps in knowledge and limitations were identified during the scoping phase in accordance with Regulation 24(4)(b) of the EIA Regulations (GN R543 of 18 June 2010). Attempts will be made during the EIA phase to close the following known gaps in knowledge:
  - The route alignments for the 400kV Transmission power line LILO and the 132kV Distribution power line have not been determined during the Scoping Phase.
  - The pylon positions for the 400kV Transmission power line LILO and the 132kV Distribution power line have not been determined during the Scoping Phase.
  - The information available for Site Alternative 2 is limited due to the limitation on access to the property, as imposed by the property owner. A focus group meeting will be arranged with the landowner in order to obtain access to undertake detailed studies for this site alternative.
- Ecological Assessment:
  - In-depth surveys of the study area were not undertaken for this SR, but the sensitive sections were examined in more detail.
  - Accurate development footprints (e.g. actual footing positions) were not provided by Eskom for the power line routing as this will come later, but as this is one of the primary development impacts this means that from a vegetation point of view only an overview is appropriate at this stage.
  - Many plants are only seasonally evident or identifiable, and it is thus best to use a habitat approach, where habitat type (e.g. rarity, threat, etc.) and quality is used as a surrogate for species data.
  - There are a number of limitations imposed by Eskom, such as a pre-defined alien clearing methodology, and very often a non-negotiable construction period and physical envelope (i.e. substations are extant and therefore there is limited potential to change turn-in layout for the lines).
  - The study area as shown in **Figure 3-5** is shown to be accurate to within approximately 20m. Most of Site Alternative 3 had been burnt approximately 6 months before the preliminary site inspection (on 26 June 2012), making it difficult to assess the vegetation accurately. Whereas, Site Alternative 1 and Site Alternative 2 contained more mature vegetation to assess. It is noted that less than a 20% portion of Site Alternative 1 was burnt in the previous year.
  - Plant and animal species were noted in the field, as well any rare or threatened species / habitats. Voucher specimens were taken, where necessary.
  - The professional experience of work undertaken in the area (±20 years) 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 (NSBA) (Rouget, *et al.*, 2004).
  - National List of Threatened Ecosystems (DEA, 2011).
  - Overberg CBA Maps (Holness & Bradshaw, 2010).
  - Various faunal references in the text.

- Freshwater Ecosystems Assessment:
  - An initial, desktop-based map of freshwater ecosystems in relation to the study area and the proposed substation sites was compiled. This initial map was ground-truthed during a site visit to the study area on 16 November 2012. The positions of any additional freshwater ecosystems identified during the site visit were captured using a hand-held GPS unit and the initial GIS map was updated to include these ecosystems.
  - Site Alternative 2 was not assessed during the site visit to the study area due to access constraints. Several rivers that have been delineated on the 1:50 000 map (3419AA) require validation in this area, as the desktop mapping that was undertaken indicated that some of these rivers have been incorrectly mapped. This validation, as well as a general survey of aquatic ecosystems at Site Alternative 2, could not be conducted during the field visit. Visual observation of the landscape setting and vegetation of the property on which Site Alternative 2 is located from the adjacent N2 freeway did indicate that there may be hillslope seepage wetlands in close proximity to the site, but this could not be verified. The majority of the western portion of the site was also not assessed during the site visit due to the mountainous nature of the topography in this area and a lack of access roads and paths. Thus, the presence of freshwater ecosystems in this area was not properly ground-truthed.
  - It should be noted that the quality of the aerial photographic imagery, which forms the backdrop of the freshwater ecosystems map (**Figure 5-7**), was not ideal in that images were captured in summer, when wetlands are least visible given the winter-rainfall climate of the area. Furthermore, the resolution of these images made it difficult to discern the presence of wetlands. This limitation was ameliorated to some degree by systematic scanning of the study area using high-resolution Google Earth satellite imagery, which had the further benefit of being captured during the winter wet season. Furthermore, the ground-truthing of freshwater ecosystems undertaken during the site visit to the study area significantly ameliorated this desktop mapping limitation for those areas that could be accessed.
  - 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.
  - 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.
  - 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.

- Visual Impact Assessment:
  - The use of Google Earth Pro for mapping is licensed for use in the VIA Report.
  - The information for the terrain used in the 3D computer model on which the visibility analysis is based on is 1:50 000 contour data, South African Provincial Survey General Data.
  - 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, shape files 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.

- This study assesses the proposed layout only. There could be future expansion of the Houhoek MTS and Distribution power lines, which will be addressed in terms of cumulative impacts during the EIA Phase. However, the lack of information on future Eskom development in the area is a limitation.
- In terms of best practice, the following guidelines were referred to:
  - Internationally, the U.K. Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Landscape and Visual Impact Assessment'
  - the 'Guideline for Involving Visual and Aesthetic Specialists in EIA Processes' (Oberholzer, 2005).
- '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 minimize visual intrusion or obstruction of views within a particular area' (Oberholzer, 2005).

- Heritage Impact Assessment:
  - Site Alternative 2 could not be field proofed as landowner permission was not in place. On Site Alternative 3, dense vegetation impeded visibility in many areas. Visibility at Site Alternative 1 (both layouts) was good. The proposed power line routes will be decided on after the scoping phase of the study. The power line corridors will be surveyed during the EIA phase.
  - Site alternatives 1 and 3 were comprehensively field proofed by Tim Hart (MA) and Lita Webley (PhD). All the team specialists had the opportunity to pool and compare their findings at a project integration workshop (refer to **Chapter 8.1**). Tim Hart has considered the findings of Steven Stead who conducted the Visual Impact Assessment.

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 Houhoek MTS
  - Layout Alternatives for the Houhoek MTS
  - Route Alternatives for LILO 400kV Transmission power lines and for 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 Houhoek Transmission Substation 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 the proposed development in the region (including the Wind Energy Facilities that are currently being explored) 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, and this would not be 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. 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 Distribution Substation needs to connect to the proposed Houhoek 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 to be placed underground. However, the existing Houhoek Substation currently contains an overhead configuration for the 132kV Distribution power line link with the proposed Houhoek 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 Distribution Substation to accommodate the change in configuration, resulting in a non-supply to some of Eskom Distribution's clients in the region. Therefore, this alternative cannot be considered further for this project.

4.4 TECHNICAL ALTERNATIVES

4.4.1 Site Alternatives for Houhoek Transmission Substation

The following site alternatives of 350m × 320m will be considered:

- **Site Alternative 1** is located ±200m to the west of the existing Houhoek 132kV Distribution Substation, across the R43 road. **Site Alternative 1** is presented as a **blue** and a **purple** (for the 2 layout alternatives) pair of coloured square blocks in **Figure 3-5.**
- **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 **brown** coloured square block in **Figure 3-5.**
- **Site Alternative 3** located north and adjacent to the existing Houhoek Eskom Distribution Substation. **Site Alternative 3** is presented as a **light blue / turquoise** and a **yellow** (for the 2 layout alternatives) pair of coloured square blocks in **Figure 3-5.**

4.4.2 Layout Alternatives for Houhoek Transmission Substation

Layout alternatives of the proposed Houhoek Transmission Substation site will be considered, due to the topography of the study area, and the limited availability of flat land for the placement. Due to the topographical constraints of the property, only 1 layout will be considered for **Site Alternative 2**, i.e. the standard layout of **350m × 320m**. 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** in this Scoping Report.

Detailed drawings of the layout alternatives are not available during the scoping phase as they are dependent on the outcome of the alternatives assessment during the Impact Assessment Phase, and should be included in the Final EIA Report.

4.4.3 Site integration options linked to Site Alternatives

The integration plan for each site is outlined below. These will be investigated in more detail as part of the EIA phase of the project.

a) Site Alternative 1, Layout 1 Scenarios

Site Alternative 1, Layout 1 is the preferred option from 132kV line integration perspective (as detailed in **Table 4-1** below).

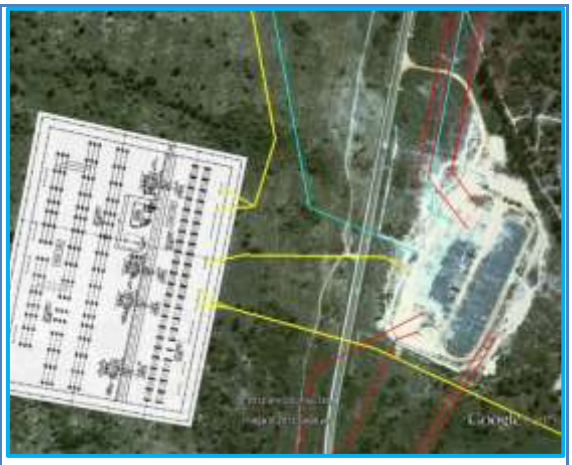
This scenario allows for better integration of future 132kV lines. More space is available to take future 132kV lines out of the MTS.

From a technical point of view, this site will thus be able to support more future renewable energy projects favourable to the environment in many respects such as reducing Eskom's carbon footprint.

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 small olive farm near to the substation.

Table 4-1: Technical scenario A – Site Alternative 1, Layouts 1 and 2

(i) Move the southern wind farm linkage from Houhoek S/S to the proposed new Houhoek MTS, freeing up a 132kV feeder bay at the existing site.	
(ii) Disconnect the northern wind farm at Houhoek S/S and disconnect at the crossing point. (iii) Reroute the Lourensrivier circuit into the proposed Houhoek MTS using the disconnected portion of Caledon wind farm D/C line. (iv) Connect the Caledon wind farm onto the Houhoek S/S via the portion of Lourensrivier circuit which is no longer in use.	

(v) Build a 132kV circuit on a D/C line from the proposed Houhoek MTS to supply the existing Houhoek S/S.	
(vi) Reroute the Bacchus-Houhoek line into the proposed Houhoek MTS, leaving an open 132kV feeder bay at the existing Houhoek S/S.	
(vii) Add in an additional 132kV circuit from the proposed Houhoek MTS to supply the existing Houhoek S/S on the old Bacchus feeder bay.	
(viii) Provisioned to allow double circuit 132kV to the northern wind farm from the existing Houhoek S/S 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 D/C 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.	

(ix) Provisioned to reroute the Hermanus 66kV feeder to the MTS when increased to 132kV in the future. (x) Provisioned to build a 132kV line to Bredasdorp.	

b) Site Alternative 1, Layout 2 Scenario

This site layout, **Site Alternative 1, Layout 2**, offers the same integration points as the previous Site Alternative 1 layout (refer to **Table 4-1** above), 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 current Houhoek substation.

c) Site Alternative 2 Scenario

The site has several disadvantages resulting in it not being a preferred option from a 132kV line integration perspective:

- Three additional 132kV servitudes required from the MTS affecting a larger area environmentally;
- The 132kV servitudes will cross site 1 in any case having the same environmental impact as Site Alternative 1 (both layouts);
- Additional future 132kV lines not indicated could impact a very large area where Site Alternative 1 (both layouts) is located; and
- Integration of the 400kV line would require crossing the N2.

The integration plan is presented below in **Table 4-2**.

Table 4-2: Technical scenario B – Site Alternative 2

(i) Cut in/out Bacchus-Houhoek live to feed Houhoek S/S from MTS, break down 132kV line between the in and out points.	
(ii) Cut in/out Caledon Wind, connecting Caledon wind directly to the proposed Houhoek MTS and provide alternate supply to the existing Houhoek S/S. (iii) Rebuild the old Bacchus-Houhoek as a double circuit Tern line.	
(iv) Build a 132kV D/C line to feed Lourensrivier directly from the proposed Houhoek MTS. This allows the disconnected Lourensrivier line to be broken down if 66kV is supplied via the disconnected Lebanon2.	

(v) Provisioned to reroute the Hermanus 66kV feeder to the proposed Houhoek MTS when increased to 132kV in the future. (vi) Provisioned to build a 132kV D/C line to Bredasdorp from the old Caledon wind farm line alongside the Langhoogte wind farm line.	

d) Site Alternative 3, Layouts 1 and 2 Scenario

These Site Alternative layouts offer similar integration requirements and are grouped together with the following integration plan presented in **Table 4-3**.

- Site Alternative 3 is restricted as to future 132kV lines that can be taken out of the proposed Houhoek MTS. Future renewable energy generation will thus be restricted with Site Alternative 3 partly defeating the purpose of the proposed MTS (which is also needed for future economic developments in the Overberg area of supply);
- The 400kV lines will either pass across the small olive farm or impact the town of Botrivier with its crossing; and
- Site 3 will impact the Toll gate and also affect the small olive farm.

Table 4-3: Technical scenario C – Site Alternative 3 Layouts 1 and 2

(i) Build a new 66kV D/C line to reroute the Houhoek-Vyeboom and Lebanon Switching 1 lines as shown in the diagram.	

(ii) Build two 132kV double circuits to Lourensrivier-Houhoek, to bypass a portion of the 132kV circuit. Providing alternate supply to the existing Houhoek S/S. (iii) Break down the double circuit 132kV Lourensrivier-Houhoek line between the newly built bypass.	
(iv) Reroute Bacchus-Houhoek into the proposed Houhoek MTS. (v) Provisioned to reroute the Hermanus feeder to the proposed Houhoek MTS when increased to 132kV in the future.	
(vi) Provisioned to build a 132kV D/C line to southern routed Langhoogte wind farm. (vii) Provisioned to build a 132kV D/C line to Bredasdorp alongside the southern wind farm line.	

4.4.4 Route Corridor Alternatives for Power Lines

This EIA process will consider the proposed 400kV Transmission LILO power line and the 132kV Distribution power line within the study area. As such, **the corridor within which these power lines are considered is presented as an orange shaded area in Figure 3-5**. 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 400kV Transmission LILO and the 132kV Distribution power lines will only be considered within this specified area.