10 CONCLUSION

10.1 Introduction

The Environmental Impact Assessment (EIA) process for the proposed new 400 kV powerline between the Tabor and Nzhelele Substations has been undertaken in accordance with the requirements of sections 24 and 24D of the National Environmental Management Act (NEMA) (Act 108 of 1998), as read with Government Notices R 543, 544 and 545 of NEMA.

The essence of any EIA process is aimed at ensuring informed decision-making and environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of NEMA (Act No. 107 of 1998), the commitment to sustainable development is evident in the provision that "*development must be socially, environmentally and economically sustainable…. and requires the consideration of all relevant factors…*". NEMA also imposes a duty of care, which places a positive obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take *reasonable steps* to prevent such damage. In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, Act No. 108 of 1996) should be anticipated and prevented, and where they cannot be altogether prevented, they must be minimised and remedied in terms of "*reasonable measures*".

In assessing the environmental feasibility of the proposed project, the requirements of all relevant legislation has been considered. This relevant legislation has informed the identification and development of appropriate management and mitigation measures that should be implemented in order to minimise potentially significant impacts associated with the project.

The conclusions of this EIA are the result of comprehensive assessments. These assessments were based on issues identified through the EIA process and the parallel process of public participation. The public consultation process has been extensive, and every effort has been made to include representatives of all stakeholders within the process.

10.1.1 Project Background

The Eskom Conversion Act, 2001 (Act No. 13 of 2001) establishes Eskom Holdings (SOC) Limited (Eskom) as a State Owned Enterprise (SOE), with the Government of South Africa as the only shareholder, represented by the Minister of Public Enterprises. The main objective of Eskom is to "provide energy and related services including the generation, transmission, distribution and supply of electricity, and to hold interests in other entities".

Electricity cannot easily be stored in large quantities and in general must be used as it is generated. Therefore, electricity is generated in accordance with supply-demand requirements. Eskom Holdings (SOC) Limited (Eskom) is responsible for the provision of reliable and affordable power to South Africa. Eskom's core business is the generation, transmission (transport), trading and retail of electricity. Eskom currently generates approximately 95% of the electricity used in South Africa. In terms of the Energy Policy of South Africa "energy is the life-blood of development". The reliable provision of electricity is critical for industrial development and related employment and sustainable development in South Africa.

Eskom Transmission Division plan to strengthen the Northern Grid in the areas north of the Soutpansburg with a new 400kV powerline between the Tabor Main Transmission Substation and the newly approved Bokmakirie (Nzhelele) Substation.

The Polokwane Customer Load Network (CLN), including the Tabor and Spencer power corridor, remains susceptible to voltage instability and is the weakest part of the Northern Grid network due to being operated beyond its reliability power transfer limit. In addition to this, the Polokwane CLN, i.e., Tabor and Spencer 275 kV and 132 kV network is susceptible to low voltages regardless the approved and commissioned network strengthening in year 2010 below:

- Tabor-Spencer 275 kV line, and
- 2nd 250MVA 275/132 kV transformer

Listed below is the approved 400 kV network re-enforcement in the Polokwane CLN which is expected for commissioning by the end of year 2012:

- Witkop-Tabor 400 kV line, and
- Tabor 500MVA 400/132 kV transformer.

The combined transformation capacity at Tabor and Spencer MTS end state of 846MW exceeds the installed and the approved transformation capacity of 712 MW. In addition to this, the low voltages and thermal constraints in the 132 kV Distribution network for both existing and planned network remains.

The Tabor and Spencer 275/132 kV transformation recorded peak in year 2010 was 280 MW and 210 MW, respectively. The exceeded Tabor 275/132 kV transformation firm will be restored once the Witkop-Tabor 400kV line and the 1st 500 MVA 400/132 kV transformer have been commissioned.

The Spencer 275/132 kV transformation firm capacity of 234 MW will be exceeded by 40 MW in year 2015. Therefore, compromising the network reliability by violating the set Grid Code N-1 transformation criteria.

The lengthy Tabor and Spencer 132 kV Distribution networks stretching 200 km from Polokwane to 50 km away form the Mussina border-post result in low voltages and thermal constraints during N-1 transformation and line contingencies in year 2011 and beyond.

The expected Tabor and Spencer 132 kV load growth is located 100km north of Tabor and 70 km from Spencer, therefore, the Transmission outreach constraint will cap the load growth.

Following the findings after an assessment of the Tabor and Spencer 400 kV, 275 kV and 132kV network constraints for the 20 year horizon, Grid Planning proposes the following:

- Establish 4 x 250 MVA 400/132 kV Nzhelele Main Transmission Station (MTS) (**this project**)
- Construct Tabor–Nzhelele 130 km 400 kV line (**this project**),
- Construct Borutho–Nzhelele 250 km 400 kV line (**being undertaken concurrently by Nzumbululo Heritage Solutions**), and
- Commission all the associated infrastructure by year 2017.

The proposed servitudes for the Tabor-Nzhelele and Borutho 400 kV lines are likely to be more challenging to acquire due to the Mapumgubwe mountain range which the lines will have to be built through to feed into the Nzhelele MTS. However, the planned commissioning date, i.e., 2017 take into account the EIA approval processes and challenges.

The above proposed network solution meets the 10 year Distribution load requirements in the Tabor and Spencer network area and it is also informed by the 20 year Transmission and Distribution load forecast in meeting the Transmission 20 year plan.

10.1.2 Description of the Study Area

The study area falls within the Limpopo Province between the Tabor Substation located just south of the Capricorn Toll Plaza approximately 67km north of Polokwane to the proposed new Bokmakirie (Nzhelele) substation approximately 45km south of Musina.

The regional location of the proposed project is indicated in **Figure 10.1**.

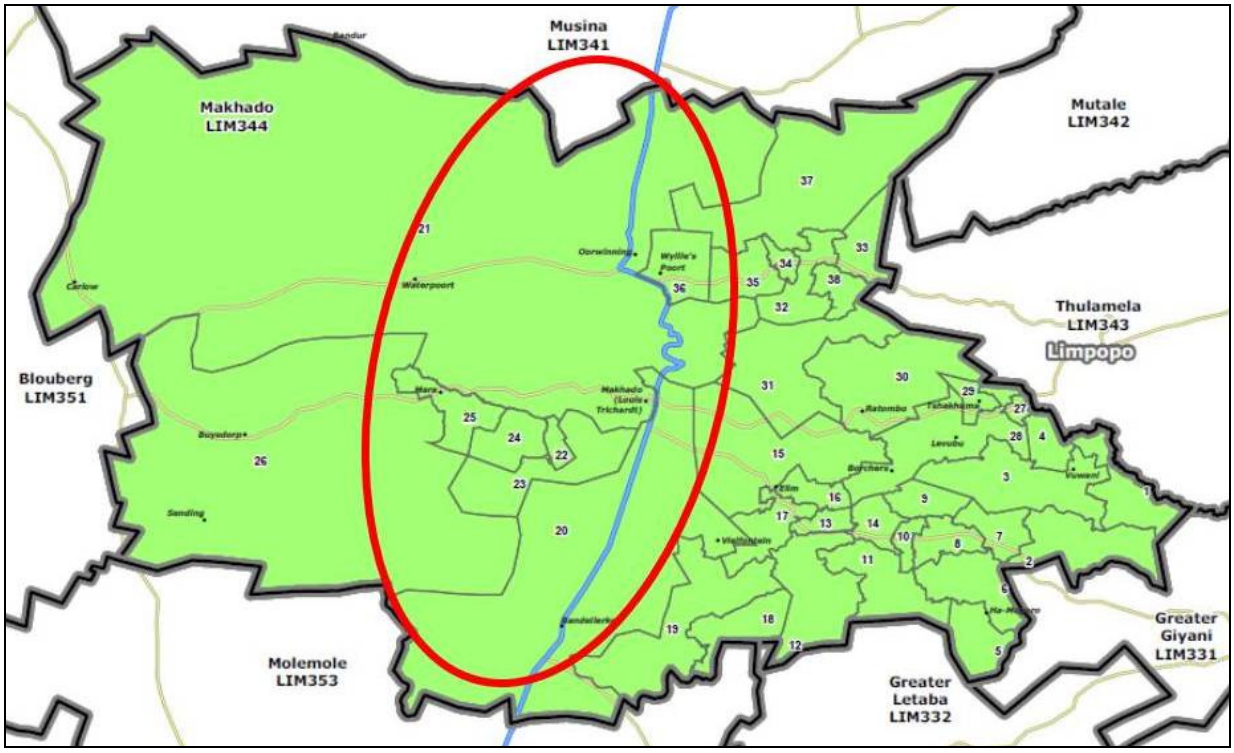

Figure 10.1: The location of the study area within the Makhado Local Municipality

Due to the fact that the EIA is a linear development, the Tabor- Nzhelele 400 kV power line EIA study area is a shown as a sphere starting and ending at the two specified substation (**Figure 10.1**). The study area is approximately 83 kilometres in length and includes a total of 94 different farms divided into 204 farm portions along the length of the various alternative alignments.

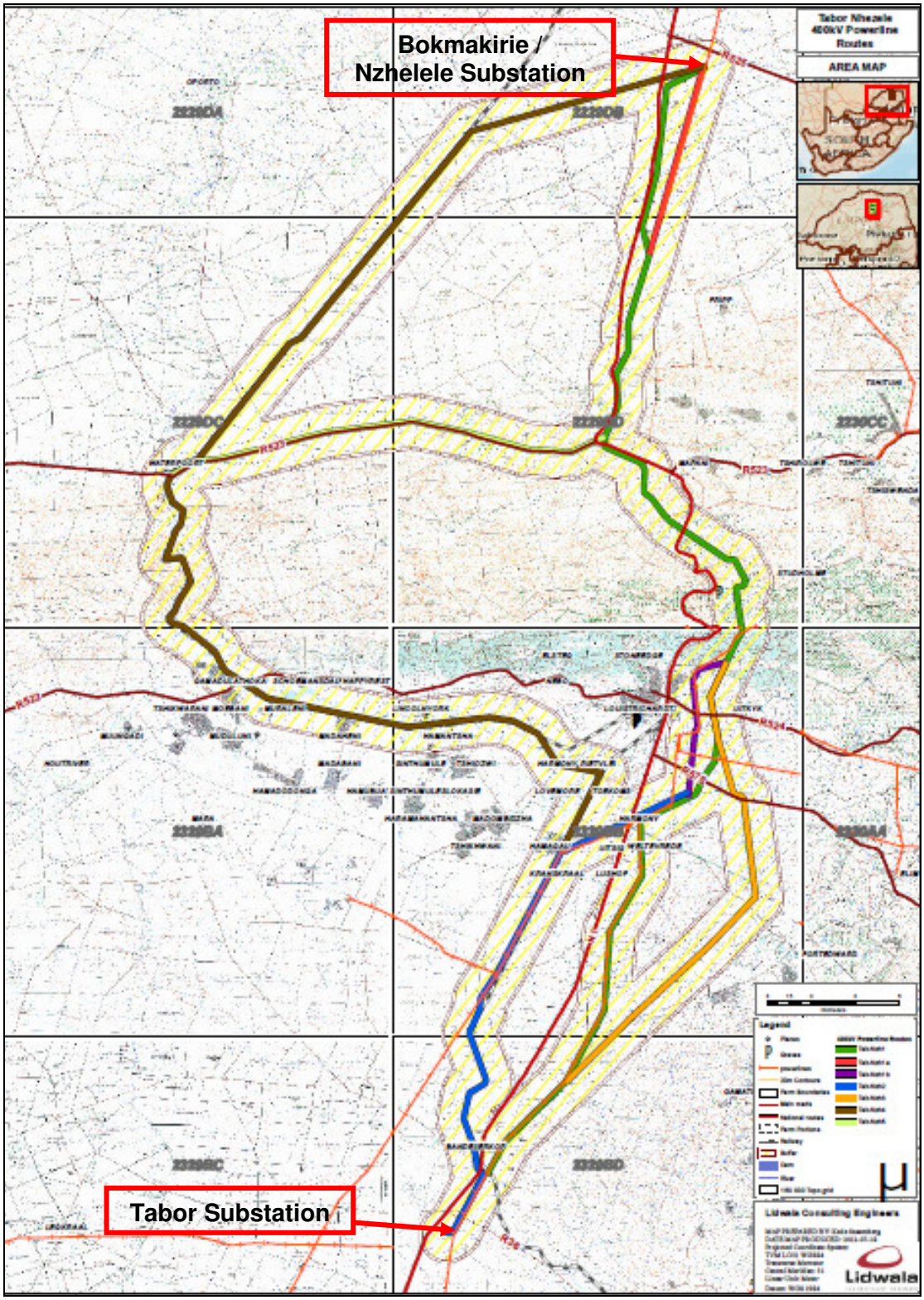

Figure 10.2: Proposed Alternative Alignments within the Study Area

10.2 Process to Date

The Environmental Impact Assessment (EIA) process for the proposed project is comprised of two main phases, namely the Scoping phase and Impact Assessment phase. This report documents the tasks which have been undertaken as part of the Impact

Assessment phase of the EIA. These tasks include the public participation process and the documentation of the issues which have been identified as a result of these activities.

To date, tasks that have commenced include the:

- Identification of stakeholders or I&APs;
- Notification and advertisements;
- Background Information Documents; and
- Ongoing consultation and engagement

Lidwala undertook the Scoping Phase of the project between **March** and **August 2012**. The public review of the Draft Scoping Report ran for a period of **40 calendar days** from **31 May to 9 July 2012**. The responses and comments from I&APs on the draft Scoping Report were captured in the Final Environmental Scoping Report. The final Environmental Scoping Report was submitted to DEA for review and acceptance on **24 August 2011** together with the Final Plan of Study for Environmental Impact Assessment (POS for EIA). The Final Scoping Report and POS for EIA were accepted by the DEA on **2 November 2012**.

The relevant authorities required to review the proposed project and provide an Environmental Authorisation were consulted from the outset of this study, and have been engaged throughout the project process. The National Department of Environmental Affairs (DEA) is the competent authority for this Project. The Department of Water Affairs (DWA), and the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) are noted as key commenting authorities.

The Impact Assessment Phase of an EIA serves to assess the potential impacts of a proposed project. The Environmental Impact Assessment Phase has been undertaken in accordance with the requirements of sections 24 and 24D of the National Environmental Management Act (NEMA) (Act 108 of 1998), as read with Government Notices R 543 of the 2010 EIA Regulations. The objectives of the EIA Phase are to:

- Ensure that the process is open and transparent and involves the Authorities, proponent and stakeholders;
- Address issues that have been raised during the preceding Scoping Phase;
- Assess alternatives to the proposed activity in a comparative manner;
- Assess all identified impacts and determine the significance of each impact; and
- Formulate mitigation measures.

The draft Environmental Impact Report was made available for review for a period of **40 days** from **7 March 2013** to **18 April 2013** at public locations within the study area, which were readily accessible to I&APs.

10.3 Alternatives

10.3.1 No-Go Alternative

In the context of this project, the no-go alternative implies that the powerlines linking the Tabor substation to the new Bokmakirie (Nzhelele) Substation in order to strengthen the northern grid or that the expansion of the Bokmakirie substation to accommodate the new 400kV infrastructure will not be constructed.

The no-go alternative can be regarded as the baseline scenario against which the impacts of the powerlines are evaluated. This implies that the current biophysical and socio-economic conditions associated with the proposed routes will be used as the benchmark against which to assess the possible changes (impacts) to these conditions as a result of the powerlines.

In most cases, the no-go alternative will imply that the identified negative impacts of proceeding with the project will not be incurred. Conversely, selection of the no-go alternative will also result in the benefits (including the potential economic development and related job creation, and increased security of electricity supply for the northern areas of the Limpopo Province) of the project not being realised.

The 'no go' alternative has, however, been investigated in the EIA phase as an alternative as required by the EIA Regulations.

10.3.2 Tower Design Alternatives

There are several tower design options available for use in the transmission line development, as described below. A variety or combination of tower designs are likely to be utilised for construction of the lines, depending on the characteristics and needs of the land and communities concerned. These can include:

- compact cross rope suspension tower
- cross rope suspension tower
- guyed suspension tower
- self supporting strain tower
- self supporting tower

The final tower design alternatives will be decided based on a walk down of the proposed corridors, and upon discussion with the relevant parties involved. The various tower designs can all be utilised for 400 kV powerlines.

In some cases particular towers are more appropriate for use, such as:

- Self supporting strain towers are always utilised on a turn or before and after particularly long spans, especially where mountainous terrain is concerned.
- The compact cross rope suspension and guyed suspension towers are preferred when grazing land or game farming occurs due to the small footprint area of the base of the tower.
- The self supporting tower is preferred on areas where crop farming occurs, due the fact that there are no guy ropes, which can make ploughing difficult

10.3.3 Access Roads

A formal section of access road is proposed to be constructed through the farms Clydesdale and Vlakfontein. Two sections of the road have been identified to be paved with a suitable surfacing material, such as bitumen or concrete, in order to reduce erosion due to the steepness of the slopes. This road is proposed not only as an access road for the proposed 400kV line alternative but also required for the existing 132kV line. Due to the fact that this road was proposed as a result of a direct request from the landowners, for use during the maintenance of the existing 132kV powerline, there are no alternatives and will require establishment even in the event that the proposed parallel 400kV alignment is not considered preferred. **Figure 10.3** gives an indication of the proposed route that has been investigated during the detailed studies.

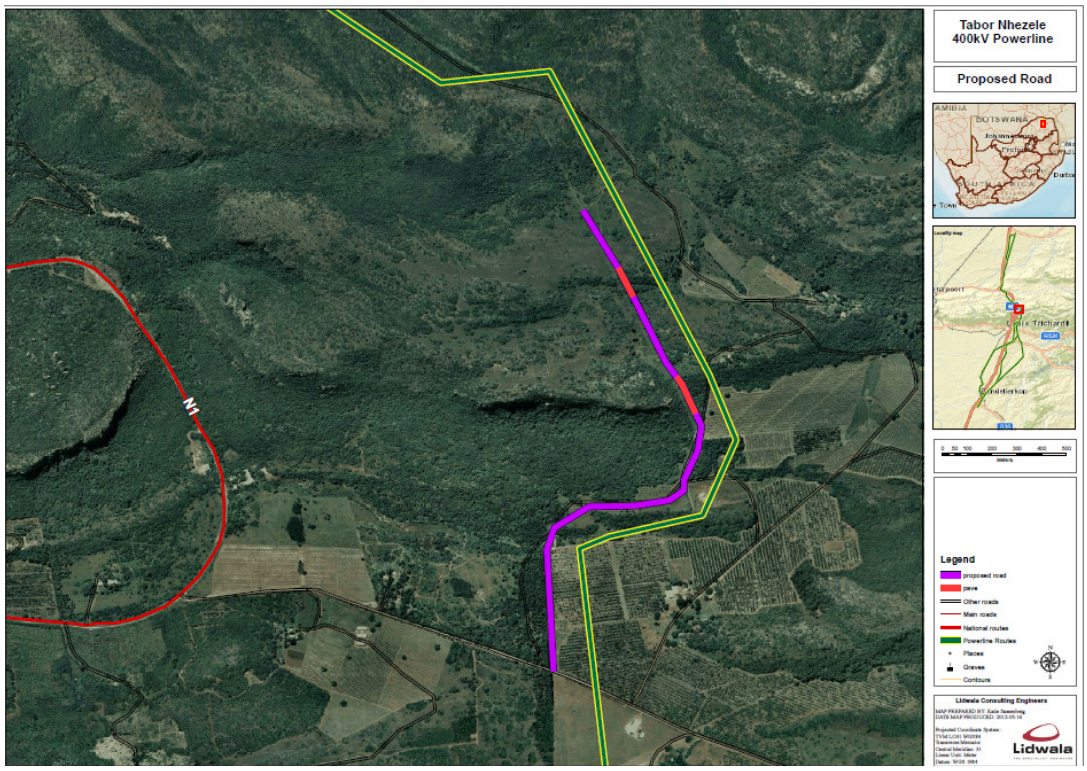

Figure 10.3: Proposed formal access road

In addition to the above access road a further 5 km of access road is proposed to be constructed between the N1 and the proposed new Nzhelele substation. **Figure 10.4**

gives an indication of the proposed route that has been investigated during the detailed studies.

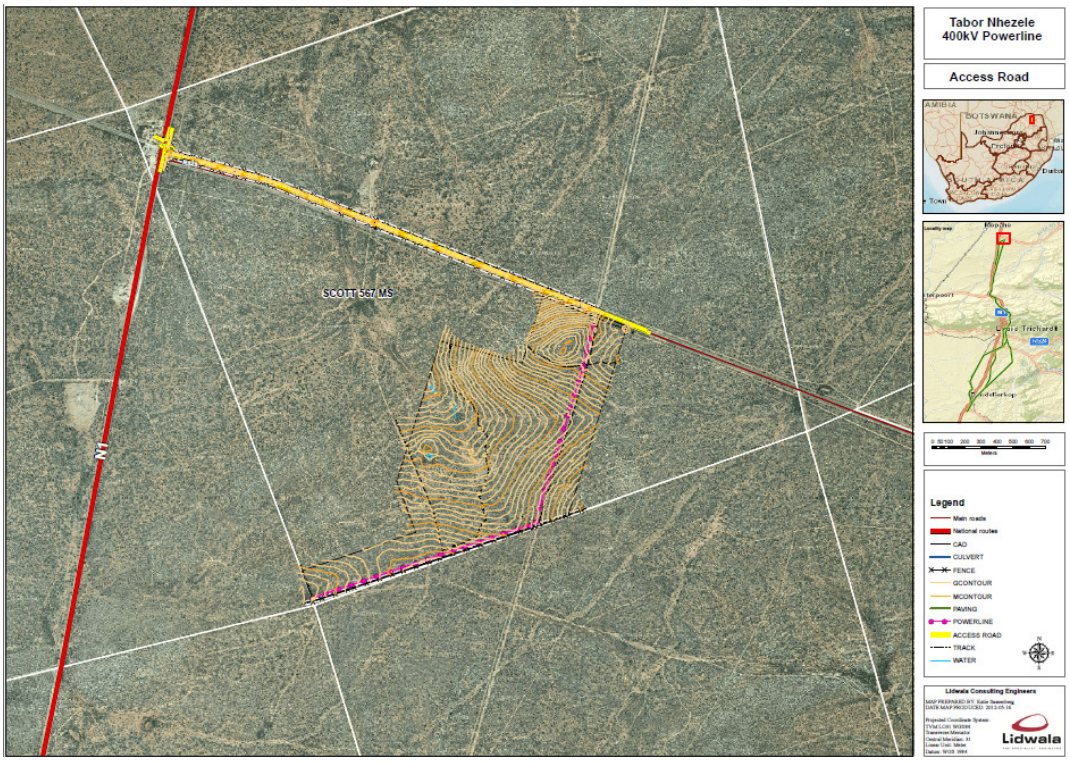

Figure 10.4: Proposed formal access road to the proposed new Nzhelele substation

10.3.4 Substation

The full scope of work for the substation includes:

- Expansion of Bokmakirie (Nzhelele) Substation with 4 X 250MVA 400KV/132KV transformers and associated infrastructure, including:
  - Terrace the Nzhelele 400kV yard for and end-state of 4x 400kV feeder bays,
  - Terrace the Nzhelele 132kV yard for and end-state of 8x 132kV feeder bays,
  - Establish the control building, telecommunication infrastructure, oil dam,

Although the Bokmakirie Substation is not yet built, it has received an Environmental Authorisation for the building of a Distribution size (2 ha) substation for the new 132 kV powerline that was recently established. The Bokmakirie Substation will be built on the Farm Scott 567MS Portion 2.

This project requires the expansion of the Bokmakirie Substation to allow for both the Tabor – Nzhelele Powerline and well as the Barutho – Nzhelele Powerline. The Bokmakirie Substation will need to be increased to a size of 25 ha to accommodate the above-mentioned infrastructure (**Figure 10.5**).

Due to the fact that the activities involved are expansion activities, there is no alternative site for the substation.

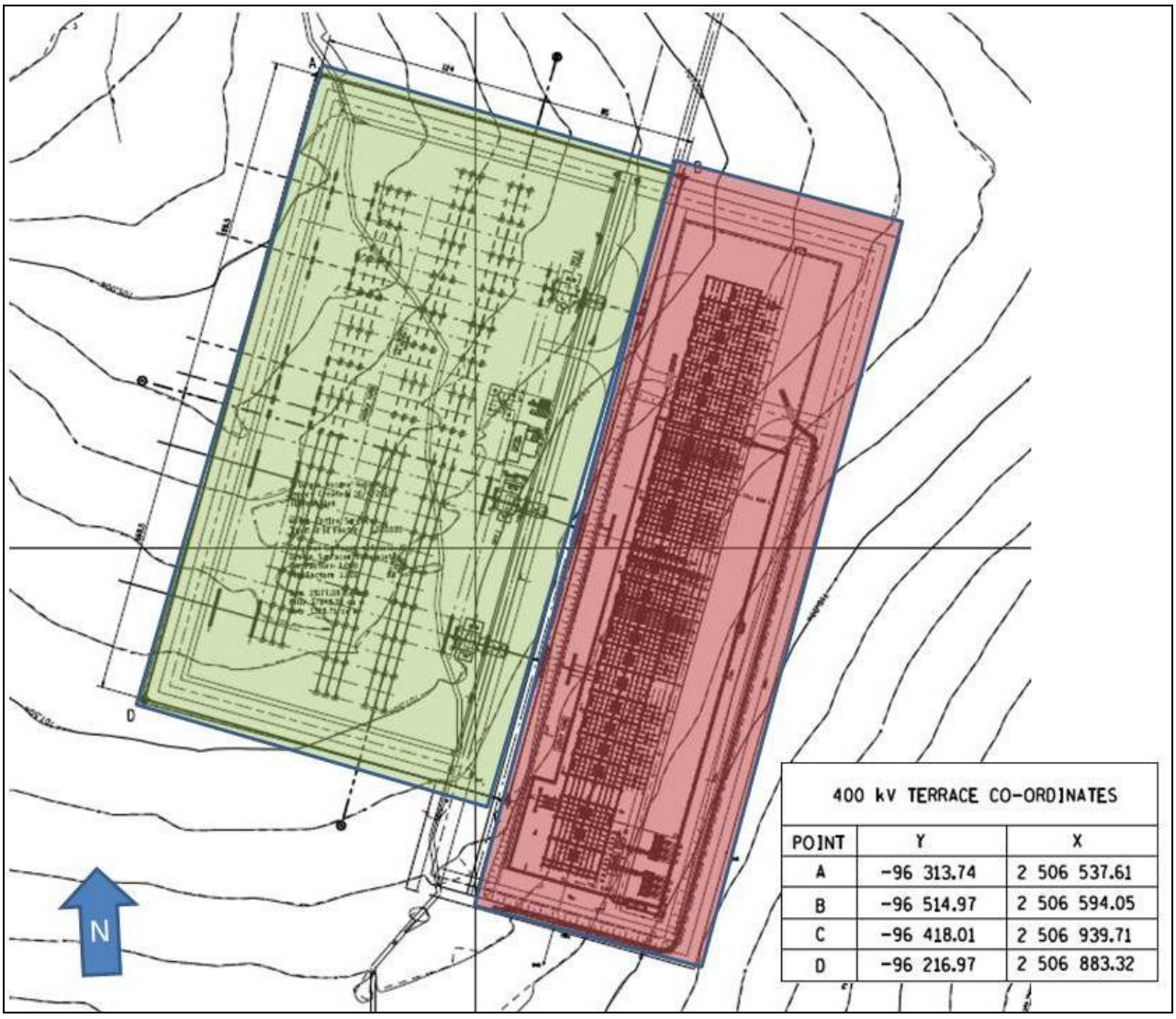

Figure 10.5: Proposed Nzhelele Transmission Substation expansion footprint versus the approved Bokmakirie Distribution Substation expansion footprint

10.3.5 Corridor Alternatives

The proposed powerline includes:

- One 400 kV powerline from the Tabor substation to the Bokmakirie (Nzhelele) substation.

Once the most suitable corridor(s) have been recommended and authorised, the exact alignment of the powerlines within the corridor(s) will be finalised.

Table 10.1 provides the summary of various sections of the five alternatives as illustrated in **Figure 10.6.**

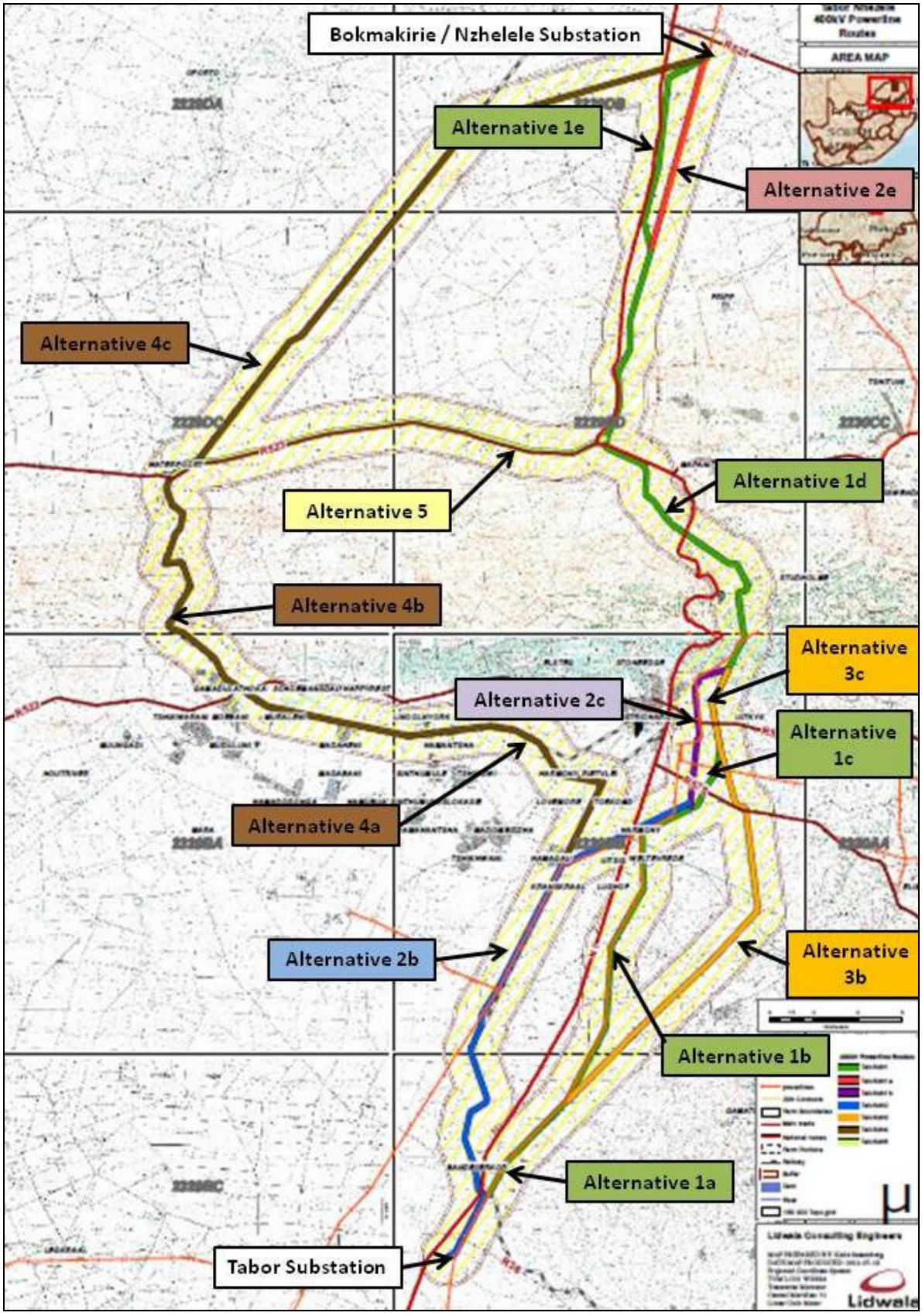

Figure 10.6: A map indicating the various sections of each alternative as described in Table 10.1

Table 10.1: Alternative Summary

Issue	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Length	93km	95km	95km	119.3km	126.1km
Number of Bend points	50	54	42	±32	±40
Number of Transmission Line Crossings	0	0	0	0	0
Number of Distribution Line Crossings	5	8	5	unknown	unknown
Number of National Road Crossings	2	4	2	2	2
Number of Railway Crossings	1	1	1	4-5	4-5
Land Use	Game farms, Agricultural, residential, veld	Game farms, Agricultural, residential, veld	Game farms, Agricultural, residential, veld	Game farms, Agricultural, residential, veld	Game farms, Agricultural, residential, veld
Topography	Flat and Undulating (including mountainous section north of Louis Trichardt)	Flat and Undulating (including mountainous section north of Louis Trichardt)	Flat and Undulating (including mountainous section north of Louis Trichardt)	Flat and Undulating (including mountainous section northwest of Louis Trichardt)	Flat and Undulating (including mountainous section northwest of Louis Trichardt)
Access	Good	Good	Fair	Fair	Fair

10.4 Impact Assessment

10.4.1 Alternative 1

During the **construction phase**, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented.

The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Heritage
    - Destruction of Heritage sites and features

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The majority of the impacts identified, associated with the **operational phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented.

The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Visual
    - Visual exposure to the Powerline Servitude, Conductor Cables and Towers, as well as the Nzhelele Substation

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The following **positive** impacts were assessed to be of high significance:

- Social
    - Increase in the voltage stability
    - Increase of electricity supply making it available for agriculture, tourism and other industries. The increase in electricity can also allow for the undertaking of other activities that may have been that may not have been possible prior to the improved electricity supply
    - No more backlogs in electricity Connections
    - The inadequate provision of electricity to services such as health facilities will cease
    - Electricity will be available to numerous rural settlements that do not have this service

The majority of impacts identified associated with the **de-commissioning phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. No impacts were assessed as having a high significance before the implementation of mitigation measures.

10.4.2 Alternative 1a

During the **construction phase**, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Heritage

- Destruction of Heritage sites and features

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The majority of the impacts identified, associated with the **operational phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Visual
  - Visual exposure to the Powerline Servitude, Conductor Cables and Towers, as well as the Nzhelele Substation

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The following **positive** impacts were assessed to be of high significance:

- Social
  - Increase in the voltage stability
  - Increase of electricity supply making it available for agriculture, tourism and other industries. The increase in electricity can also allow for the undertaking of other activities that may have been that may not have been possible prior to the improved electricity supply
  - No more backlogs in electricity Connections
  - The inadequate provision of electricity to services such as health facilities will cease
  - Electricity will be available to numerous rural settlements that do not have this service

The majority of impacts identified associated with the **de-commissioning phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. No impacts were assessed as having a high significance before the implementation of mitigation measures.

10.4.3 Alternative 1b

During the **construction phase**, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Heritage
    - Destruction of Heritage sites and features

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The majority of the impacts identified, associated with the **operational phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Visual
    - Visual exposure to the Powerline Servitude, Conductor Cables and Towers, as well as the Nzhelele Substation

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The following **positive** impacts were assessed to be of high significance:

- Social
    - Increase in the voltage stability
    - Increase of electricity supply making it available for agriculture, tourism and other industries. The increase in electricity can also allow for the undertaking of other activities that may have been that may not have been possible prior to the improved electricity supply
    - No more backlogs in electricity Connections
    - The inadequate provision of electricity to services such as health facilities will cease
    - Electricity will be available to numerous rural settlements that do not have this service

The majority of impacts identified associated with the **de-commissioning phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. No impacts were assessed as having a high significance before the implementation of mitigation measures.

10.4.4 Alternative 2

During the **construction phase**, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Heritage
    - Destruction of Heritage sites and features

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The majority of the impacts identified, associated with the **operational phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Visual
    - Visual exposure to the Powerline Servitude, Conductor Cables and Towers, as well as the Nzhelele Substation

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The following **positive** impacts were assessed to be of high significance:

- Social
    - Increase in the voltage stability
    - Increase of electricity supply making it available for agriculture, tourism and other industries. The increase in electricity can also allow for the undertaking of other activities that may have been that may not have been possible prior to the improved electricity supply
    - No more backlogs in electricity Connections
    - The inadequate provision of electricity to services such as health facilities will cease
    - Electricity will be available to numerous rural settlements that do not have this service

The majority of impacts identified associated with the **de-commissioning phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. No impacts were assessed as having a high significance before the implementation of mitigation measures.

10.4.5 Alternative 3

During the **construction phase**, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are

implemented. The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Flora
    - Destruction of pristine habitat
- Heritage
    - Destruction of Heritage sites and features

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The majority of the impacts identified, associated with the **operational phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Flora
    - Destruction of protected flora
    - Destruction of pristine habitat
    - Vegetation clearance
- Visual
    - Visual exposure to the Powerline Servitude, Conductor Cables and Towers, as well as the Nzhelele Substation

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The following **positive** impacts were assessed to be of high significance:

- Social
    - Increase in the voltage stability
    - Increase of electricity supply making it available for agriculture, tourism and other industries. The increase in electricity can also allow for the undertaking of other activities that may have been that may not have been possible prior to the improved electricity supply
    - No more backlogs in electricity Connections
    - The inadequate provision of electricity to services such as health facilities will cease
    - Electricity will be available to numerous rural settlements that do not have this service

The majority of impacts identified associated with the **de-commissioning phase** were considered to be of low to medium significance in the event that the appropriate

mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Flora
    - Destruction of pristine habitat

10.4.6 Alternative 4

During the **construction phase**, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Flora
    - Destruction of protected flora
    - Destruction of pristine habitat
    - Vegetation clearance
    - Treat to biodiversity
- Heritage
    - Destruction of Heritage sites and features

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The majority of the impacts identified, associated with the **operational phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Flora
    - Destruction of protected flora
    - Destruction of pristine habitat
    - Vegetation clearance
    - Threat to biodiversity
    - Soil erosion
- Visual
    - Visual exposure to the Powerline Servitude, Conductor Cables and Towers, as well as the Nzhelele Substation

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The following **positive** impacts were assessed to be of high significance:

- Social
    - Increase in the voltage stability
    - Increase of electricity supply making it available for agriculture, tourism and other industries. The increase in electricity can also allow for the undertaking of other activities that may have been that may not have been possible prior to the improved electricity supply
    - No more backlogs in electricity Connections
    - The inadequate provision of electricity to services such as health facilities will cease
    - Electricity will be available to numerous rural settlements that do not have this service

The majority of impacts identified associated with the **de-commissioning phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Flora
    - Destruction of protected flora
    - Destruction of pristine habitat
    - Vegetation clearance
    - Threat to biodiversity

10.4.7 Alternative 5

During the **construction phase**, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Flora
    - Destruction of protected flora
    - Destruction of pristine habitat
    - Vegetation clearance
    - Treat to biodiversity
- Heritage
    - Destruction of Heritage sites and features

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The majority of the impacts identified, associated with the **operational phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Flora
  - Destruction of protected flora
  - Plant encroachment
  - Threat to biodiversity
- Visual
  - Visual exposure to the Powerline Servitude, Conductor Cables and Towers, as well as the Nzhelele Substation

After the implementation of mitigation measures the intensity levels of all impacts reduced.

The following **positive** impacts were assessed to be of high significance:

- Social
  - Increase in the voltage stability
  - Increase of electricity supply making it available for agriculture, tourism and other industries. The increase in electricity can also allow for the undertaking of other activities that may have been that may not have been possible prior to the improved electricity supply
  - No more backlogs in electricity Connections
  - The inadequate provision of electricity to services such as health facilities will cease
  - Electricity will be available to numerous rural settlements that do not have this service

The majority of impacts identified associated with the **de-commissioning phase** were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented. The following **negative** impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Flora
  - Destruction of protected flora
  - Destruction of pristine habitat
  - Vegetation clearance
  - Threat to biodiversity

10.4.8 No-Go Alternative

In general, no impacts were identified to be associated with the No-Go Alternative, due to the fact that in the event that the transmission line is not constructed, no impacts will occur as the status quo will remain.

However, a number of **negative** impacts were identified to be of High significance from a social point of view in the event that the powerline is not constructed:

- Social
    - No increase and assurance of electricity supply making it unavailable for agriculture, tourism and other industries as well as allowing for the undertaking of other activities that may not have been possible before. The absence of an increase in electricity may also hinder the undertaking of other activities that may only be possible with electricity supply
    - Continuation of the inadequate provision of electricity to critical services such as health facilities
    - Continuation of the unavailability of electricity in numerous rural settlements
    - Continuation of backlogs in electricity connections
    - No increase in the voltage stability

10.4.9 Cumulative Impacts

The majority of **cumulative impacts** identified and associated with the project were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented.

The following **negative** impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Flora
    - Plant encroachment
    - Soil erosion
- Fauna
    - Loss of faunal habitat
- Visual
    - Increased visual exposure to Power Line Infrastructure
- Social
    - Poaching of game impacting on the loss of game and in turn affecting the tourism industry of the Municipality and that of the country at large

With regards to the proposed new powerline a total of two (2) cumulative impacts were assessed as having a high significance before the implementation of mitigation measures.

After the implementation of mitigation measures the intensity levels of all impacts were reduced.

10.5 Route Preference Ranking

In order to identify which of the alternative routes is deemed preferred, the specialists were requested to rank the alternatives routes according to a route ranking methodology. The route preference rating system is applied to each discipline, and the rating of each site was conducted according to the following system:

1 = Not suitable for development / No-Go (impact of very high significance - negative)
2 = not preferred (impact of high significance - negative)
3 = acceptable (impact of moderate significance - negative)
4 = Preferred (impact of low or negligible significance - negative)

While each specialist study was required to have the Route Preference as an outcome, how they evaluated each route varied from discipline to discipline and the description of their specific approaches are outlined in each specialist report (refer **Appendix J to P**).

The route preference results for each route from each specialist study were entered into a matrix and added together. The route with the highest value is then considered the most preferable. **Table 10.2** shows the final route preference matrix.

Table 10.2: Final Route Ranking Matrix

Study	Alt 1	Alt 1a	Alt 1b	Alt 2	Alt3	Alt 4	Alt 5
Fauna	3	3	4	4	3	2	3
Avifauna	3	3	3	4	2	1	1
Flora	4	4	4	4	1	2	1
Soils and Agricultural Potential	4	3	4	3	3	2	3
Social	4	3	1	3	3	2	3
Visual	3	3	3	3	2	2	2
Heritage	3	3	3	3	3	2	2
Total	**24**	**22**	**22**	**24**	**17**	**13**	**15**

From the above route raking assessment, it is clear that the preferred corridor would involve a combination of Alternatives 1, 1a, 1b and 2. Alternatives 3, 4 and 5 are not deemed to be acceptable. It can be noted that Alternative 1 and 2 have the same final value, however, Alternative 2 was identified as the more preferred route in the south due to the fact that the individual scores for biodiversity issues (i.e. flora, fauna and avifauna) were higher for Alternative 2 than for Alternative 1. Alternative 2 also does not cut through the Ben Lavin Nature Reserve.

Alternative 2 is approximately 10km from the eastern boundary of the Makhado Air Force Base with the line running more or less perpendicular to the extended centre line of the Makhado Air Force Base runway. According to Part 139 of the Civil Aviation Regulations, 2011 the following 2 items are of specific relevance:

- All objects, whether temporary or permanent, which project above the horizontal surface within a specified radius of 8 kilometres as measured from the aerodrome reference point should be marked as specified in Document SA-CATS 139
- No buildings or objects higher than 45 metres above the mean level of the landing area, or, in the case of a water aerodrome or heliport, the normal level of the water, must without the approval of the Director be erected within a distance of 8 kilometre measured from the nearest point on the boundary of an aerodrome or heliport

Due to the fact that the preferred corridor is situated more than 10 km from the end of the runway and that the towers will be less than 45 m metres in height there should be no reason why the powerline can not be built within the preferred corridor.

However, due to the fact that powerlines do constitute a hazard to aircraft and the associated pilots and passengers it is recommended that the following is undertaken by Eskom in terms of mitigation:

- Eskom must inform the Commissioner about the plans for the proposed powerline as per the Civil Aviation Regulations
- It is recommended that the section of the powerline that runs perpendicular to the air force runway (as agreed with the Air Force) is constructed utilising the shortest tower available i.e. self supporting towers (30m in height)
- It is also recommended that the section of the powerline that runs perpendicular to the air force runway (as agreed with the Air Force) is marked as required by the commissioner which could include the relevant aviation marker spheres as well as the marker lights (either red or strobes as required).
- Due to the fact that the Makhado Air force base specialises in low level flight manoeuvres and that the powerline corridor falls within the Makhado Air force Control Zone (CTR[1]), it is recommended that Eskom also consult the Air force with regards to suitable and appropriate marking requirements and tower heights.

In addition to the above aviation requirements, the corridor was requested to be widened in along two sections, namely:

- Just north of the mountains to accommodate the proposed mining infrastructure of Coal of Africa. The preferred corridor currently follows a route that traverses over one of the planned open cast pits as well as a railway line. Therefore, the corridor has

[1] CTR – Control Tower Region – an area of controlled air space extending upwards from ground level to specified upper limit (in this case 8000 feet)

been widened in this area to accommodate these future developments, in order to avoid having to move the powerline at a later stage (red circled area on **Figure 10.7**).

- Just south of Louis Trichart along a section of Alternative 1b, a landowner is a private aviator and has requested that the final alignment of the new powerline be investigated to north of the existing powerline. Therefore, the corridor has been widened slightly to accommodate this northern area (Yellow circled area on **Figure 10.7**).

Lastly, in terms of design alternative, landowners on the farms Clydesdale and Vlakfontein made the following suggestions:

- Use the existing servitude, or
- Build the new 400kV powerline next to the existing servitude and then later when the network is stable remove one of the two 132kV powerlines and rehabilitate the servitude

It is recommended that the merits of these suggestions are considered during the design phase of the project.

The final corridor is shown in **Figure 10.7** below.

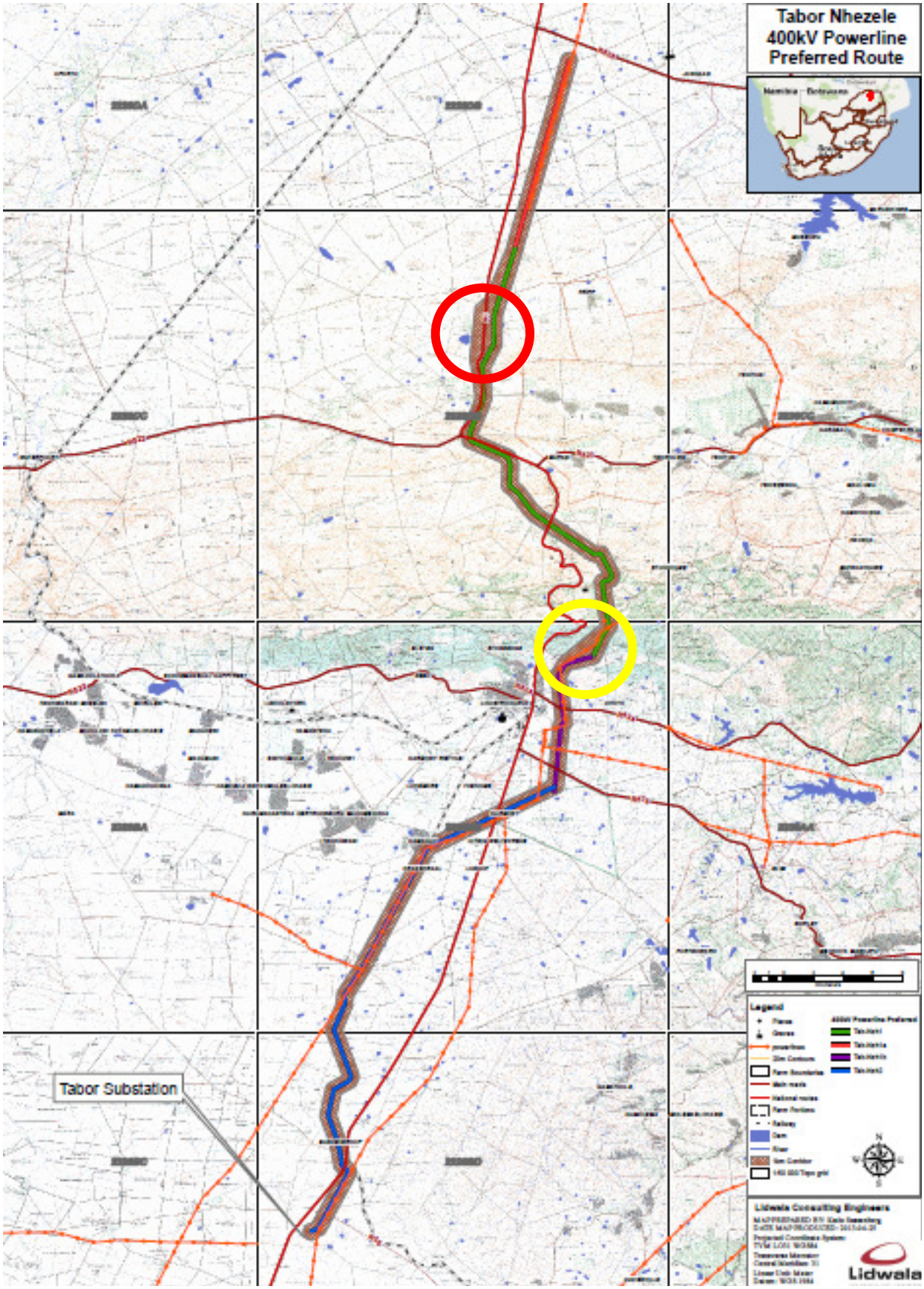

Figure 10.7: Final Preferred Corridor

10.6 Environmental Impact Statement

The impact assessment phase of this project identified and assessed the potential impacts that the proposed 400 kV powerline and associated infrastructure may have the proposed alternative routes and on the surrounding areas. Through this assessment mitigation measures have been recommended in order to reduce or eliminate any impacts that were identified.

The EIA has concluded that the legislative requirement to consider alternatives during the EIA process is focussed strongly on feasible and reasonable alternatives that meet the requirements of the proposed project.

In terms of the 'no go' option, it was concluded that if the 400 kV powerline was not established it would contribute negatively to the provision of reliable electricity supply to the northern grid through strengthening. It will result in continued power outages, backlogs in connections, and voltage instability. It is important to note that the strengthening of the northern grid will facilitate future economic growth in the region.

A more detailed discussion of the alternatives relative to this project is included in **Chapter 4**.

During the construction phase, the majority of impacts identified were considered to be of low to medium significance in the event that the appropriate mitigation measures are implemented.

The final recommended preferred route follows the least impacted route due to the fact that it follows existing powerline infrastructure for the majority of its length, thereby reducing the overall impact of the new powerline.

As with the construction phase, the majority of impacts identified associated with the operational and decommissioning phases are considered to be of low of medium significance in the event that the appropriate mitigation measures are implemented.

All identified impacts have been based on normal operation conditions and all impacts identified were analysed according the following criteria, a summary of which is included in **Chapter 9**:

- Nature of the impact;
- Extent of the impact;
- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Impact non-reversibility;
- Cumulative impacts;

- Impact on irreplaceable resources; and
- Confidence level.

10.7 Conclusions and Recommendations

In the view of the environmental assessment practitioner, that once final, the information contained in this report and the documentation attached thereto will be sufficient for the National DEA to make a decision in respect of the activities applied for with respect to the proposed new 400 kV Powerline between the Tabor and Nzhelele Substations.

This EIA provides an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed new powerline. The findings of the assessment conclude that identified significant impacts can be addressed with relevant mitigation measures, therefore, in the view of the EAP, no environmental fatal flaws should prevent the proposed project from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA have been included within a Preliminary Construction and Operational Environmental Management Programme (EMPR) which has been included in **Appendix E.** It is recommended that this EMPR is updated once the final alignment of the powerline has been identified and surveyed. A final walk-down of all proposed tower positions, by all relevant specialists, must be undertaken and tower specific recommendations and mitigation measures included into the update EMPR. This EMPR will then form part of the contract with the contractors appointed to construct and maintain the proposed infrastructure. The EMPR would be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPR for key life cycle phases (i.e. construction and operation) of the proposed project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

It is also recommended that the process of communication and consultation with the community representatives and landowners is maintained after the closure of this EIA process, during the construction and operational phases associated with the proposed project.