

**PROPOSED MOOKODI-MAHIKENG 400KV POWER  
LINE, NALEDI, KAGISANO-MOLOPO, RATLOU AND  
MAHIKENG LOCAL MUNICIPALITIES, NORTH-WEST  
PROVINCE**

**Phase 1 Heritage Impact Assessment**

**20 April 2018**

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## EXECUTIVE SUMMARY

### INTRODUCTION

The existing Watershed Main Transmission Substation (MTS) is currently un-firm and has insufficient capacity to support the forecasted load in the Watershed MTS area, which includes Lichtenburg and extends to Mahikeng town. Hence there is a need for further network expansion through establishing a new transmission substation in Mahikeng and connecting the existing Mookodi MTS with the new Mahikeng substation. This report deals with the establishment of the proposed Mookodi – Mahikeng 400kV powerline. The proposed powerline is approximately 180 km in length. There are four alternative route options to be assessed. A 2 km servitude for each route alternative applies (1km on each side) which allows for any possible deviation from the current proposed alignment of the powerline within the corridor which may be necessary

The proposed powerline is approximately 180 km in length hence the development triggers section 38 (1) (a) of the National Heritage Resources Act (NHRA) that refers to the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length. This Phase 1 Heritage Impact Assessment (HIA) was undertaken to identify any heritage resources that may be impacted by the proposed powerline development.

### LOCATION

The project is located within several local municipalities, namely, the Naledi Local Municipality (LM), Kagisano-Molopo LM, Ratlou LM, and Mahikeng LM. The proposed alternative routes for the powerline start at the existing Mookodi MTS on the southern outskirts of Vryburg and travel in a north-east direction to end near Mahikeng at the future Mahikeng substation site.

Much of the proposed powerline options cross private farm land where cattle, maize and wild game farming takes as well as crossing communal land where there are numerous villages and subsistence farming practices taking place.

### METHODOLOGY

A survey of literature, including previous HIAs that were undertaken in the immediate and surrounding area, was undertaken in order to gain an understanding of potential heritage resources in the project area. A site inspection was undertaken from 3 – 6 April 2018. Representative samples of the four alternative routes were inspected and, where possible, sections of the four routes were surveyed on foot.

## SITE INSPECTION RESULTS

The termination point for the proposed powerline (including the future site for the Mahikeng substation) was inspected on foot. The landscape was largely undisturbed and the area was covered with a thick layer of grass interspersed with pockets of shrubs. Several fence posts were observed indicating that the area is being used for the grazing of animals. A rudimentary gravel road provides access to the future substation site. The inspection revealed no visible heritage resources.

A foot survey was undertaken for the area south of the termination point of the proposed powerline routes, through several villages including Moletsamongwe and Phadima. There were a number of settlements in the area as well as undeveloped tracts of land where goat and cattle farming takes place with some subsistence farming occurring near dwellings. Residential structures encountered were fairly recently built. The remains of a several structures were also observed in this area.

Throughout the communal land area, many informal cemeteries were found. Some were small in size but several were very large with one cemetery containing around 100 graves. Many of the graves have legible headstones; however, there were many graves made from mounds of calcite and/or rocks that are unmarked (without headstones). Some of the graves are very recent but many are older than 60 years therefore protected by section 36 of the NHRA.

Several buildings that are older than 60 years were found along the route options. These buildings are protected by section 34 (1) of the NHRA and must therefore not be impacted by the proposed powerline.

The powerline options that pass on the eastern side of Vryburg (Option 2 and 4) will cross an undisturbed rocky outcrop situated just off the R34 road. Rocky outcrops are often archaeological sensitive and should, accordingly, be treated with care and avoided where possible by the powerline. Several pans and borrow pits (quarries) were observed along the powerline route options. These sites can contain archaeological material. However, most of the pans and borrow pits were full of water from recent rains as well as thickly vegetated making archaeological material difficult to detect.

## ASSESSMENT OF IMPACTS & STATEMENT OF IMPACT SIGNIFICANCE

An assessment of the potential impacts that the proposed powerline could have on graves, cemeteries and protected buildings indicated that the impact would have a medium ranking (without mitigation) but that the impact could be reduced to a low impact (with mitigation). In terms of archaeological sites, the pre-mitigation assessment indicated that the impact would be high but that with mitigation measures, the ranking could be reduced to a low impact.

The impact significance of the powerline on graves and cemeteries is low as graves and cemeteries are generally easily visible and the proposed walk-down of the selected route option should locate all graves and cemeteries prior to construction.

The impact significance of the powerline on protected structures is low as the structures are easily visible and therefore can be avoided. The proposed walk-down of the selected route option will identify structures to be avoided.

The impact significance of the proposed powerline on archaeological material is rated as a high impact. This is largely due to the nature of archaeological remains where many occur below the ground level making such sites difficult to detect. Impacts are more likely to occur in such cases. However, the threshold of significance will not be exceeded as the project area is not in pristine condition; secondly, if the mitigation measures, such as the walk-down of the selected route option by an archaeologist is applied then significant archaeological sites can be identified prior to the construction process.

## SELECTION OF ROUTE OPTION

Four powerline route options were provided as alternatives for the proposed 400kV powerline. The environment that the four powerline options cross is largely the same for all the options and during the site inspection, heritage sites were found along or close to all the options. Hence, the length of the route options is important as the longer the length of a powerline is, the higher the risk or possibility that the powerline could impact on heritage resources. Route option 2 is shorter than the other routes and is therefore the preferred route from a heritage perspective. For this reason, Option 2 is the Best Practicable Environmental Option (BPEO) in the opinion of the heritage specialist.

## RECOMMENDATIONS AND CONCLUSION

The following recommendations are made to mitigate potential impacts on heritage resources:

- Route Option 2 is the preferred option from a heritage perspective as it is shortest in length;

- A walk-down of the selected route option by a heritage specialist, preferably an archaeologist, must be undertaken prior to construction in order that all heritage sites are identified and recorded prior to construction;
- All heritage sites identified along the route option and in close proximity must be protected with a 20 m buffer so that the construction process does not impact these sites; and
- A desktop palaeontological assessment must be undertaken as the project area falls into an area of both medium and low fossil sensitivity. The project may only proceed once the desktop palaeontological assessment has been undertaken.

No fatal flaws were identified during this study hence the construction of the proposed powerline can proceed from a heritage perspective as long as the recommendations and mitigation measures contained in this report and in the desktop palaeontological assessment are implemented where necessary.

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Appendix 1: Heritage sensitivity map

## AUTHOR DETAILS

Name	Qualifications	Professional Registration
Jean Beater	MA (Heritage Studies)  MSc (Environmental Management)	Member of Association of South African Professional Archaeologists (No. 349)  Member of IAIAAsa (No. 1538)

## 1. BACKGROUND AND INTRODUCTION

The existing Watershed Main Transmission Substation (MTS) is currently un-firm and has insufficient capacity to support the forecasted load in the Watershed MTS area, which includes Lichtenburg and extends to Mahikeng town. Hence there is a need for further network expansion through establishing a new transmission substation in Mahikeng and connecting the existing Mookodi MTS with the new Mahikeng substation. The proposed Mahikeng substation will undergo a separate Environmental Impact Assessment (EIA) Process. This report deals with the establishment of the proposed Mookodi – Mahikeng 400kV powerline (Nemai Consulting 2018:2).

The proposed 400kV powerline is approximately 180km in length. There are four alternative route options to be assessed. The start point of the line is at the existing Mookodi MTS. The proposed alternative routes for the line travel in a north-east direction and end at the future Mahikeng substation site. A 2km servitude for each route alternative applies (1km on each side) which allows for any possible deviation from the current proposed alignment of the powerline within the corridor which may be necessary (Nemai Consulting 2018:2).

## 2. LEGISLATIVE BACKGROUND

The proposed powerline is approximately 180 km in length hence the development triggers section 38 (1) (a) of the National Heritage Resources Act (Act No. 25 of 1999) that lists developments that may require a HIA. This subsection refers to the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length which the proposed powerline clearly exceeds.

In addition, the construction of the powerline may result in impacts to graves, structures, archaeological and palaeontological resources that are protected in terms of sections 34, 35, and 36 of the National Heritage Resources Act (NHRA).

In terms of Section 3 of the NHRA, heritage resources are described as follows:

- (a) places, buildings, structures and equipment of cultural significance;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features of cultural significance;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and paleontological sites;
- (g) graves and burial grounds, including—



- (i) ancestral graves;
  - (ii) royal graves and graves of traditional leaders;
  - (iii) graves of victims of conflict;
  - (iv) graves of individuals designated by the Minister by notice in the *Gazette*;
  - (v) historical graves and cemeteries; and
  - (vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- (h) sites of significance relating to the history of slavery in South Africa;
- (i) movable objects, including:
- (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
  - (ii) objects to which oral traditions are attached or which are associated with living heritage;
  - (iii) ethnographic art and objects;
  - (iv) military objects;
  - (v) objects of decorative or fine art;
  - (vi) objects of scientific or technological interest; and
  - (vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

This Phase 1 Heritage Impact Assessment (HIA) was undertaken to identify any heritage resources that may be impacted by the proposed powerline development.

### **3. LOCATION AND DESCRIPTION OF EXISTING CONDITION OF PROJECT AREA**

The project is located within several local municipalities, namely, the Naledi Local Municipality (LM), Kagisano-Molopo LM, Ratlou LM, and Mahikeng LM which are all situated in the North West Province. The proposed alternative routes for the powerline start at the existing Mookodi MTS on the southern outskirts of Vryburg and travel in a north-east direction to end near Mahikeng at the future Mahikeng substation site. The route alternatives for the project, as listed below, are also indicated on **Figures 1-5**: Option 1 (depicted in yellow); Option 2 (red); Option 3 (green) and Option 4 (turquoise) (Nemai Consulting 2018:2-4).

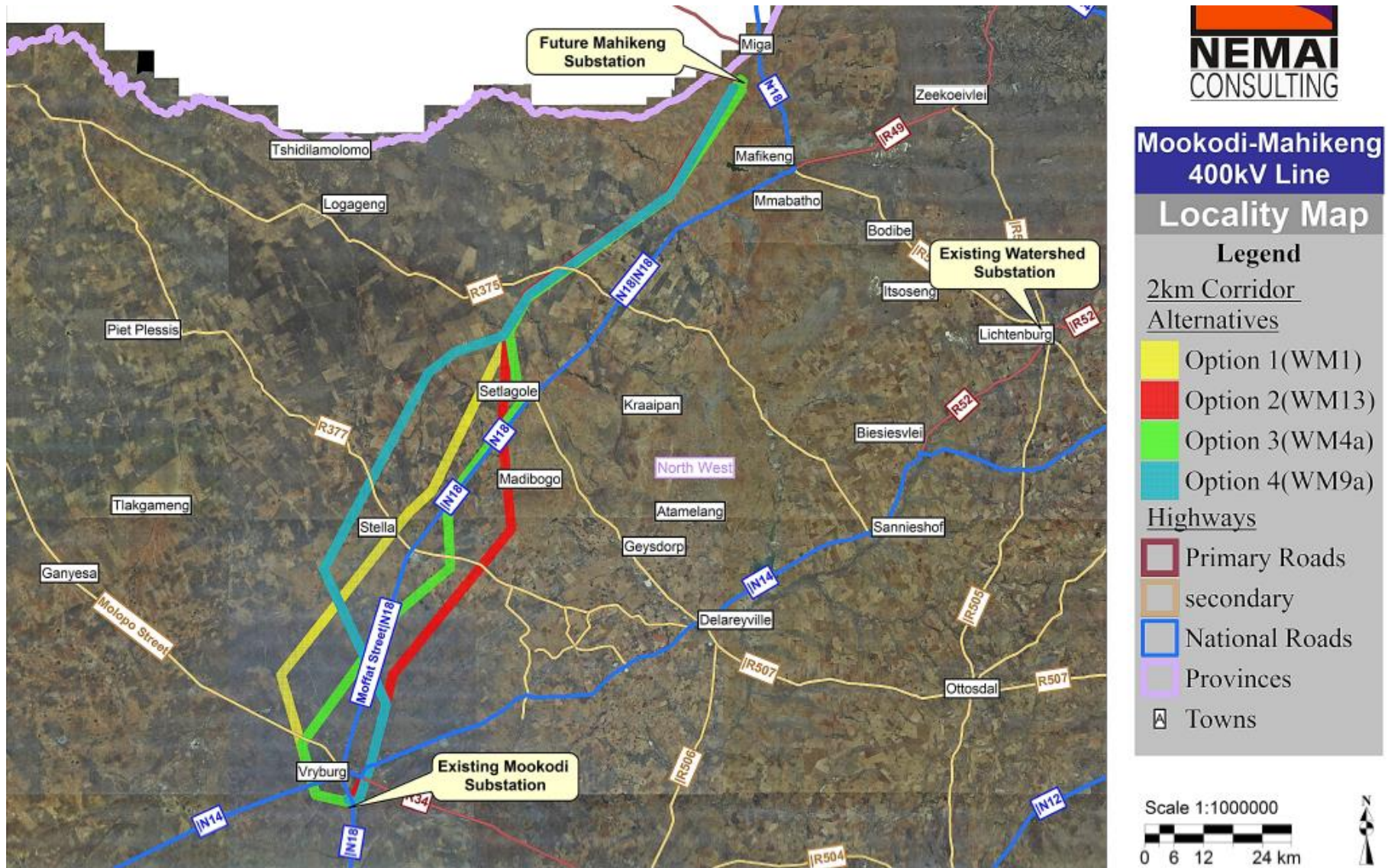


Figure 1: Locality map

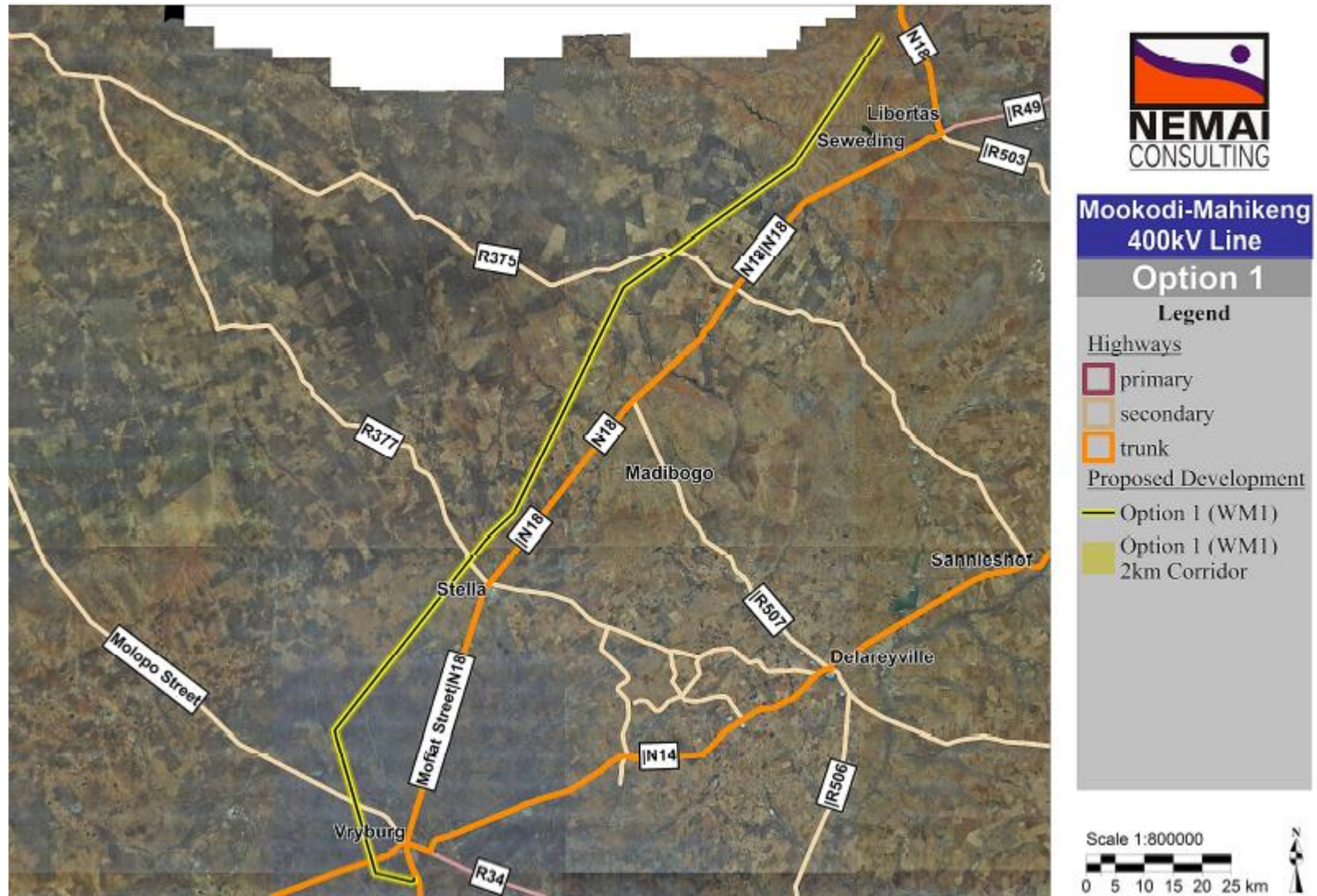


Figure 2: Option 1



Figure 3: Option 2



Figure 4: Option 3

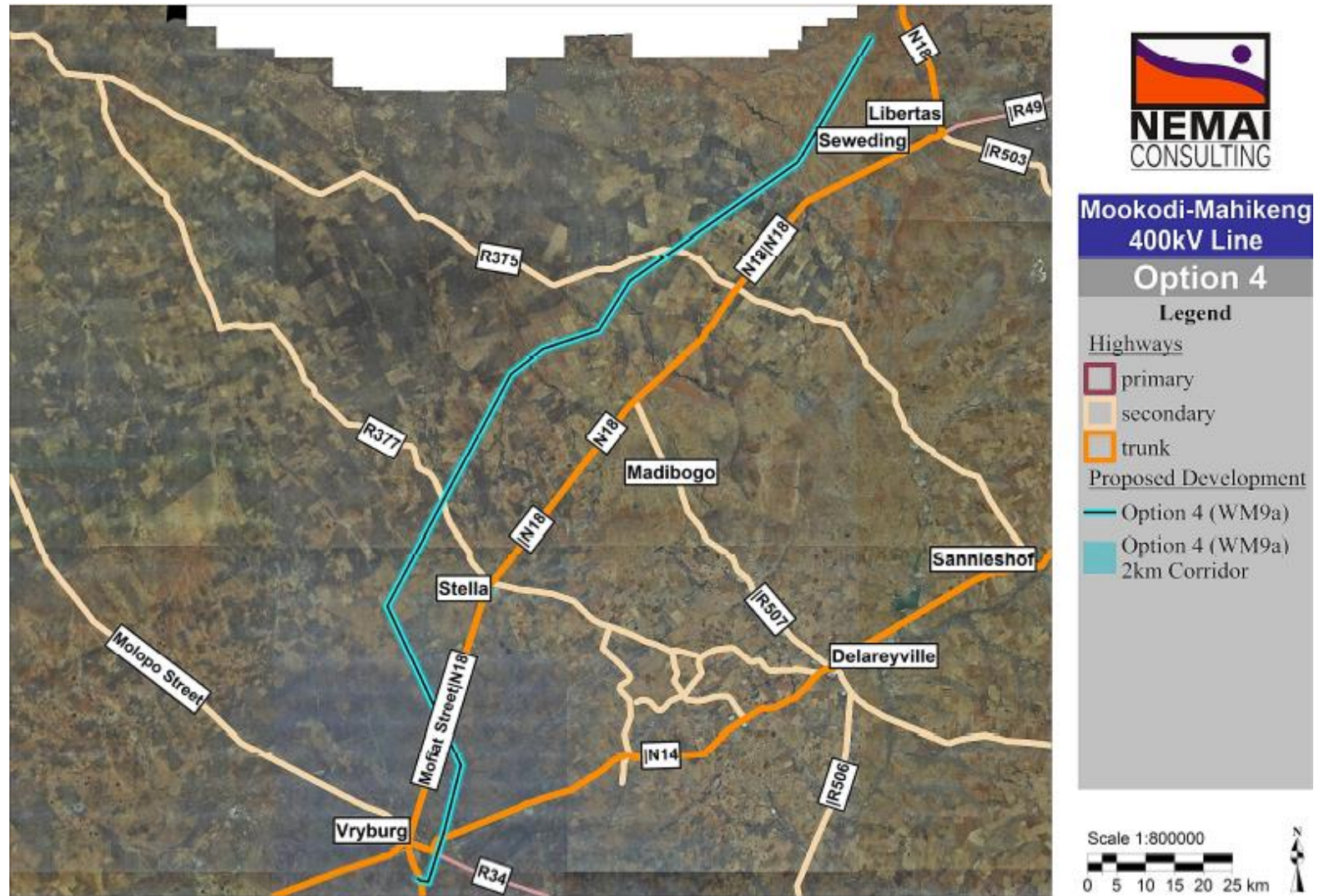


Figure 5: Option 4

The powerline options cross private farm land where cattle, maize and wild game farming takes place which has most likely resulted in the destruction of some heritage resources such as archaeological sites and graves.

In addition, the powerline options also crosses communal land where there are numerous villages and some subsistence farming practices. Again, the growth in villages and associated farming practices will have negatively impacted heritage resources in these areas.

#### **4. APPROACH TO HERITAGE STUDY**

- Undertake a HIA in accordance with the NHRA (Act No. 25 of 1999);
- Identify and map all heritage resources in the project area as defined in Section 2 of the NHRA, including archaeological and palaeontological sites on or close (within 100m) of the proposed developments;
- Undertake a desktop palaeontological assessment (evaluate site in terms of SAHRIS);
- The assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations;
- Assessment of the impact of development on such heritage resources;
- An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- Prepare a heritage sensitivity map (GIS-based), based on the findings of the study;
- Prepare a desktop palaeontological sensitivity map and recommend if a palaeontological study is required;
- Identify heritage resources to be monitored;
- Comply with specific requirements and guidelines of North-West Provincial Heritage Resources Agency (NWPHRA);
- Submit the HIA to NWPHRA and the SA Heritage Resources Agency (SAHRA) (as requested by the NWPHRA);
- Assess the impacts (direct, indirect and cumulative) in terms of their significance (using suitable evaluation criteria) and suggest suitable mitigation measures. In accordance with the mitigation hierarchy, negative impacts should be avoided, minimised, rehabilitated (or reinstated) or compensated for (i.e. offsets), whereas positive impacts should be enhanced. A risk-averse and cautious approach should be adopted under conditions of uncertainty;
- The provision of a statement of impact significance for each issue, which specifies whether or not a pre-determined threshold of significance (i.e. changes in effects to the environment which would change a significance rating) has been exceeded, and whether or not the impact

presents a potential fatal flaw or not. This statement of significance should be provided for anticipated project impacts both before and after application of impact management actions;

- Recommend a monitoring programme to implement mitigation measures and measure performance; and
- Appraisal of alternatives (including the No-Go option) by identifying the Best Practicable Environmental Option (BPEO) with suitable justification.

## **5. METHODOLOGY**

A survey of literature, including previous HIAs that were undertaken in the immediate and surrounding area, gleaned from the SAHRIS database, was undertaken in order to gain an understanding of potential heritage resources in the project area. The SAHRIS database is updated with new HIA reports on a daily basis thus providing users with the most recent HIAs undertaken throughout South Africa.

A site inspection was undertaken from 3 – 6 April 2018. Representative samples of the four routes were inspected and, where it was possible, sections of the four routes were surveyed on foot. A Garmin Etrex hand-held GPS was used to capture the coordinates of heritage sites identified during the site inspection.

## **6. ASSUMPTIONS AND CONSTRAINTS**

This assessment assumes that all the information provided by the Environmental Assessment Practitioner (EAP) regarding the powerline route options are correct and current.

Access to some private farms was, at times, not possible as entrances to farms were often prevented by locked gates.

In addition, heavy rain on the evening of 4 April 2018 made some of the gravel access roads to the route options inaccessible.

Due to the rainfall over summer, vegetation and grass cover was thick in most areas making visibility of low lying heritage resources such as archaeological sites and unmarked graves difficult.



As much of the four powerline route options was investigated during the site inspection. The site inspection allowed the specialist to gain a comprehensive understanding of heritage resources in the study area and the potential impact that the powerline could have on these resources.

## **7. DETAILS OF THE HERITAGE SPECIALIST**

Jean Beater has undertaken heritage impact assessments since 2003. She has worked on several powerline projects including:

- The walk down heritage survey of proposed construction of Neptune-Pembroke 400kV powerlines near East London, Eastern Cape Province (2016);
- The HIA for the Makalu B substation and associated transmission and distribution powerline project, Sasolburg, Free State Province (2017); and
- The HIA for the Mulalo 400/132kV MTS and associated 400kV transmission and distribution powerline project in Secunda, Mpumalanga Province (2017).

## **8. HISTORICAL BACKGROUND OF LARGER GEOGRAPHICAL AREA**

From a reading of the archaeological and HIAs undertaken in the larger surrounding area of the project, a pattern emerges showing that archaeological resources are most commonly clustered around rivers and river valleys, existing and ancient drainage lines, pans, and ridges with rocky outcrops, and that heritage resources are generally absent from flatlands that are some distance from water sources (Nilssen 2016:14).

Very little habitation of the central highveld area took place during Stone Age times. Tools dating to the Early Stone Age (ESA) period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River or the Harts River and especially in sheltered areas such as at the Taung fossil site (some 70 km south of Vryburg). During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. The MSA is a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology. Late Stone Age (LSA) people had more advanced technology and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the region. These are mostly open sites located near river and pans. The LSA people also left a rich legacy of rock art. Some of the farms known to have rock engravings are Bernauw Content (which is crossed by Options 2 and 4), Gemsbok Laagte, Klipfontein, Kinderdam, Melalarig, Schatkist, Verdwaal Vlakte (Option 1) and Wonderfontein (van Schalkwyk 2016:9).

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior Highveld area. Due to their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes, but also for firewood and water (van Schalkwyk:10).

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province.

The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. Stone walled sites dating to the Late Iron Age and which can be linked to the Tswana occupation of the area, are found on a number of farms in the region, e.g. Waai Hoek and Brul Pan. However, the most important one, named Dithakong which is located some distance to the west of the project area. White settlers moved into the larger area during the first half of the 19th century basing their survival on cattle/sheep farming and hunting (van Schalkwyk:10).

Vryburg was established as the capital of the independent Boer Republic of Stellaland in 1882, hence the name of the town. Stellaland was incorporated as a British protectorate into British Bechuanaland in 1884, which in turn became part of the Cape Colony in 1895 (Rossouw undated:8). Vryburg became an important base, during the Anglo-Boer War (1899-1902), for the resupply and refitting of British troops operating in the north-west of the then Cape Colony and western areas of the Boer Republic. Six armoured trains were assembled at Vryburg as part of the defence of railway line northwards to Mahikeng (then Mafeking) (Jones and Jones 1999:238).

The town of Mahikeng was given the name Mahikeng by the Barolong boo Ratshidi who settled in the area during the early nineteenth century. The Barolong spelling of using an H was later changed to an F in order to comply with a more standard Setswana spelling. The name in English means “place of rocks”. In Setswana, Lefika means rock and Mafika is the plural. The ‘eng’ at the end of Mafikeng denotes place of (Vhufa Hashu Heritage Consultants 2012:2). Pistorius (2011:23) has conjectured that the town of Mahikeng may have been established on Late Iron Age stone walled sites considering the fact that the name refer to ‘the place of stone / rocks’.

During the nineteenth century the expansion of the Voortrekkers and the establishment of the Zuid Afrikanse Republic in the then Western Transvaal became a threat to Barolong boo Ratshidi autonomy. As a result, Chief Montshiwa requested British protection. On the 22 May 1884 in Mafikeng, Chief Montshiwa signed a treaty ceding his Sovereignty to the British. Soon afterwards the British government established a garrison in town and the following year, a proclamation was approved that divided Mafikeng into two sections, one for the Barolong and the other for European settlement (Vhufa Hashu Heritage Consultants:18).

The settlers with their 140 farms established the independent Republic of Goosen with Rooigrond as capital 15km to the south-east of Mahikeng. The Republic of Goosen was disabled by a British expeditionary force in 1885 and incorporated in British Bechuanaland and a new town was laid out on a place which the Tswana's called 'Mahikeng' – 'the place of stones' (Pistorius 2011:25).

During the Anglo-Boer War, 1899-1902, the town was besieged by Boer forces for 217 days from October 1899 until 17 May 1900 (Jones and Jones 1999:143). One of the people trapped in Mafikeng was Solomon T Plaatjie who was one of the founders of the African National Congress (ANC) in January 1912.

In 1977, the northern section of the project area was incorporated into the so-called independent homeland of Bophuthswana. The homeland policy was put in place by the Nationalist government to give black South African's self-government in restricted areas. The homeland policy was disbanded in 1994 and the homelands incorporated into South Africa.

## 9. SITE INSPECTION RESULTS

It should be noted that the site inspection was undertaken from north to south beginning at Mahikeng and ending at the existing Mookodi substation at Vryburg. The site inspection results will accordingly detail the findings from north to south. The heritage sites identified during the site inspection are depicted on a heritage sensitivity map appended to this report (see **Appendix 1**).

The termination point for the proposed powerline (including the future site for the Mahikeng substation) was inspected on foot. The site of the substation is situated west of Mahikeng. The landscape was largely undisturbed and the area was covered with a thick layer of grass interspersed with pockets of shrubs. Several fence posts were observed indicating that the area is being used for the grazing of animals. A rudimentary gravel road provides access to the future substation site. The inspection revealed no visible heritage resources.



**Figure 6: Future Mahikeng substation site with fence posts in background**



**Figure 7: Future Mahikeng substation site**

South of the future substation site, a foot survey was undertaken of the powerline options through several villages including Moletsamongwe and Phadima. There are a number of settlements in the area as well as undeveloped tracts of land where goat and cattle farming takes place with some subsistence farming occurring near dwellings. Residential structures encountered were recently built. The remains of a several structures were also observed in this area and these appeared to be recent structures. Several water boreholes were found during the inspection and at least one existing powerline crosses the area inspected.



**Figure 8: Vegetation cover, fencing and powerline**



**Figure 9: Recently built dwellings**



**Figure 10: Remains of brick structure**



**Figure 11: Subsistence farming near dwellings**

Throughout the communal land area south of the future Mahikeng substation, many informal cemeteries were found. Some were small in size but several were very large with one cemetery containing around 100 graves. Many of the graves have legible headstones; however, there are many graves or cairns made from mounds of calcite and/or rocks that are unmarked (without headstones). Some of the graves are very recent but several are older than 60 years. Graves older than 60 years are protected by section 36 (3) (b) of the NHRA and graves and cemeteries

situated outside a formal cemetery and where it is not the responsibility of any other authority, the NWPHERA or SAHRA must generally conserve and care for such burial grounds and graves according to section 36 (1) of the NHRA.



**Figure 12: Graves found in project area**



**Figure 13: Cemetery in project area**

The specialist was referred to the farm Taaiboschspruit by the owner, Mr. Bosch, who stated that there were two graves close to several buildings in various states of disrepair. Although a search of the area was undertaken no graves were located. The abandoned buildings could be older than 60 years but are of low heritage significance due to their advanced state of disrepair and because the buildings are typical outbuildings found on many farms found in the province and in South Africa. The site falls within the buffer area of route Option 1.

A recent grave was located within a farm yard which falls within route Option 3. The grave is situated approximately 200 m west of the N18. The farm complex also falls with Option 3.

Several buildings that are older than 60 years were found along the route options. These buildings are protected by section 34 (1) of the NHRA and should therefore not be impacted by the proposed powerline. Several of the buildings are in good condition (see **Figures 14** and **15**). The specialist could not establish if there were any graves related to the stone dwelling pictured in **Figure 15** as the specialist did not have permission to access the property.





**Figure 14: Old dwelling located alongside R377 – Option 1**



**Figure 15: Stone structure – Option 3**



**Figure 16: Silo and other structures – Option 3**

The EAP informed the specialist that a landowner had made mention of a Bushman grave on the farm Naudespan. The specialist went to see the owner in order to inspect and record the site. The owner, Mr Scholtz, unfortunately, was not in a position to take the specialist to the site but he did correct the information provided. The site is not a grave but rock face/s that have been ‘knapped’ / ‘chipped’ / marked by Bushmen who lived in the area.

According to Mitchell (2002:193), both engravings and paintings were producing well into the 19<sup>th</sup> century by Bushmen. A Bushman from the Northern Cape stated that in the 1870s his father(s) had executed ‘chippings’ of gemsbok, ostrich and zebra. Mitchell (2002:193) states that engravings occur principally in the Karoo, western Free State and North-West Province. The engraving/s are protected by section 35 (4) of the NHRA which states that no person may, without a permit issued by the responsible heritage resources authority—

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite. This site must not be impacted by the proposed powerline if the option where this site is located is chosen as the route for the proposed powerline.

Several pans and borrow pits (quarries) were observed along and in the vicinity of the powerline route options. These sites can contain LSA and MSA material. However, those that were inspected were full of water (due to the recent rains) and thickly vegetated making visibility of archaeological material difficult.



**Figure 17: Pan with water**

The powerline options that pass on the eastern side of Vryburg (route Options 2 and 4) will cross an undisturbed rocky outcrop at the Vryburg Truck Inn situated just off the R34 road. Rocky outcrops are often archaeological sensitive and should, accordingly, be treated with care and avoided if possible by the powerline. The development of the Truck Inn has partially damaged the outcrop but the remainder is currently undisturbed.



**Figure 18: Rocky outcrop: Options 2 and 4**

The heritage resources identified during the site inspection are included in the table below. The powerline option/s in which the heritage resource is located is indicated in the first column:

**Table 1: Heritage resources identified during site inspection**

<b>POWERLINE OPTION</b>	<b>COORDINATES</b>	<b>HERITAGE RESOURCE</b>	<b>MITIGATION</b>
All options	25°50'23.9"S 25°27'43.7"E	Cemetery with ± 50 graves	20 m buffer
All options	25°43'34.2"S 25°30'54.4"E	Small cemetery	20 m buffer
All options	25°44'49.0"S 25°31'43.4"E	Small cemetery	20 m buffer
All options	25°44'49.04"S 25°31'41.4"E	Large cemetery with ± 100 graves	20 m buffer
All options	25°51'23.2"S 25°25'24.6"E	Cemetery with ± 10 graves	20 m buffer
All options	25°51'28.6"S 25°25'26.0"E	Cemetery with between 30 – 50 graves	20 m buffer
All options	25°52'18.2"S 25°25'31.0"E	Cemetery with ± 20 graves	20 m buffer
All options	25°52'09.7"S 25°25'26.1"E	Cemetery with ±10 visible graves	20 m buffer
All options	25°51'54.7"S 25°24'20.9"E	Cemetery with ±20 graves	20 m buffer
All options	25°54'25.6"S 25°23'46.3"E	Cemetery within homestead with 3 graves	20 m buffer
Option 1	26°23'02.4"S 24°56'36.2"E	Possible graves amongst dilapidated buildings	20 m buffer
Option 3	26°27'15.4"S 24°57'37.1"E	Single grave amongst farm buildings	20 buffer around farm complex
Outside project area	26°28'30.0"S 24°42'22.1"E	Protected structure	Not applicable
Outside project area	26°28'28.1"S 24°42'22.5"E	Graves >60 years	Not applicable
Option 4	26°29'35.8"S 24°45'14.7"E	Protected structure	20 m buffer

POWERLINE OPTION	COORDINATES	HERITAGE RESOURCE	MITIGATION
Option 1	26°31'21.95"S 24°50'19.84"E	Protected structure	20 m buffer
Option 3	26°50'47.16"S 24°41'29.59"E	Protected structure	20 m buffer
Option 3	26°50'49.18"S 24°41'30.95"E	Protected structure	20 m buffer
Option 1	26°54'49.85"S 24°39'21.14"E	Remains of structures and stone wall	Avoid placing pylons on walling
Options 2 and 4	26°58'8.06"S 24°46'7.68"E	Rocky outcrop	20 m buffer

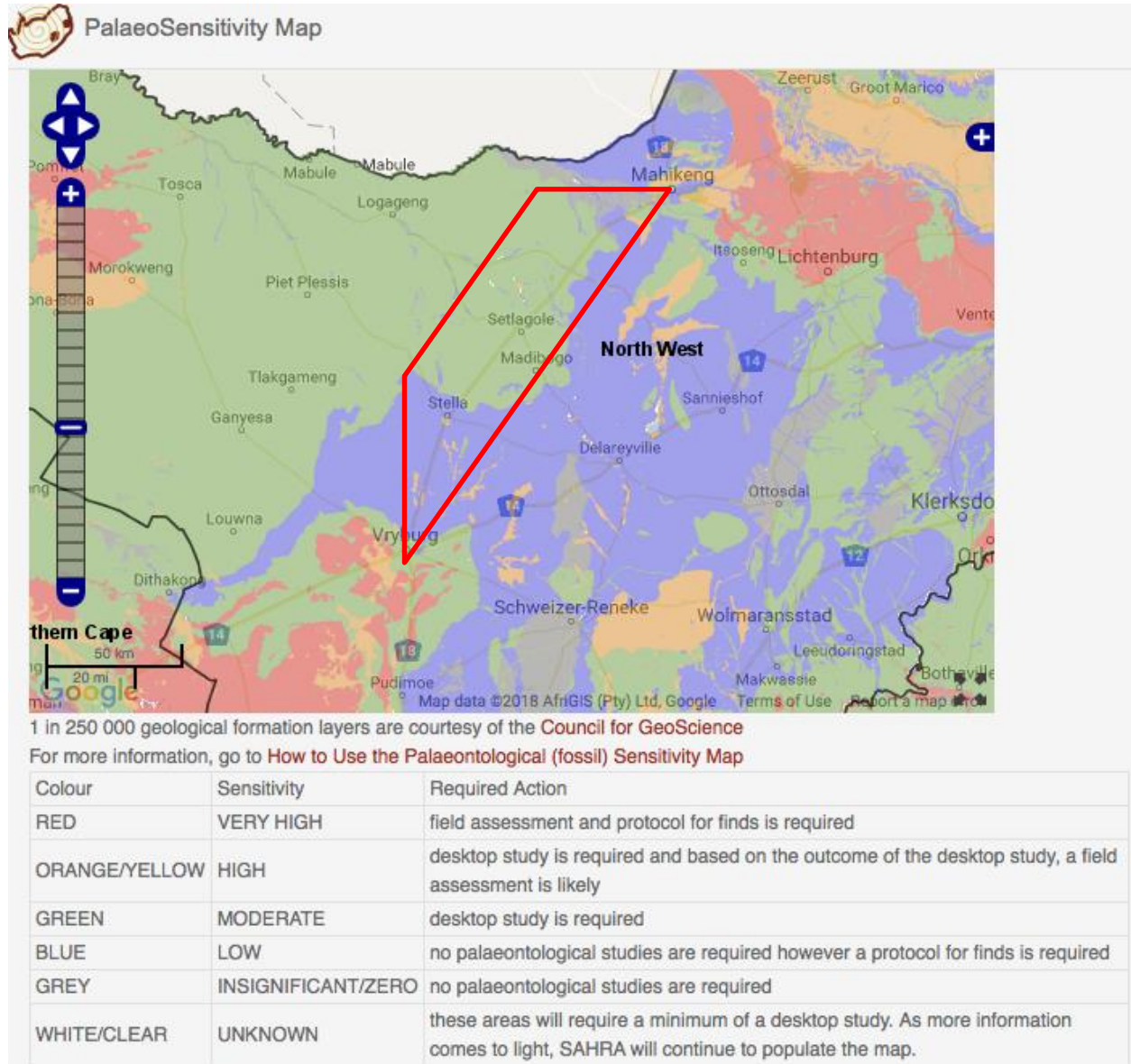
Previous HIAs undertaken in the area indicate the proposed establishment of a number of photovoltaic (solar energy) facilities close to the Mookodi substation. These proposed developments are to take place on the farms Klondike 670, Rosendal 673 and Waterloo 992.

Route options 1 and 3 when exiting from Mookodi substation cross the farms Rosendal 673 and Klondike 670IN. The AMDA Delta solar energy facility is proposed to be situated mainly on the farm Klondike together with the overhead powerline also crossing the farm Rosendal. The proposed facility is situated north-west of the Mookodi substation. The HIA of this development indicated several heritage features that need to be taken into cognisance if either of these options are selected for the proposed Mookodi-Mahikeng powerline. The heritage features that are recommended to be protected include unmarked graves and pans with MSA and LSA material. The details of the sites are included in the table below.

**Table 2: Heritage features to be conserved: AMDA Delta solar energy facility**

DEVELOPMENT ZONE	COORDINATES	DESCRIPTION OF HERITAGE SITE
AMDA Delta solar energy facility	S26.99337° E24.67861°	Unmarked burial ground with unmarked graves
Grid Connection	Centre point: S26.99171° E24.70376°	Pan site with LSA & MSA material
Grid Connection	Centre point: S27.00739° E24.73964°	Quarry and pan site with LSA & MSA material
Grid Connection	Centre point: S27.01074° E24.73853°	Quarry and pan site with LSA & MSA material

The South African Fossil Sensitivity Map indicates that the project area falls within an area of low (blue colour) to moderate (green colour) fossil sensitivity (see **Figure 19** below). It is therefore recommended that a desktop palaeontological assessment is undertaken of the entire project area in order to establish whether significant fossil finds will be impacted by the proposed powerline. The recommendations and mitigation measures provided by the desktop assessment must be implemented and adhered to where necessary.



**Figure 19: Fossil sensitivity of project area indicated with red polygon**

## 10. ASSESSMENT OF IMPACTS

The potential impacts on the heritage resources that were identified were assessed in terms of probability (likelihood of occurring), scale (spatial scale), magnitude (severity) and duration (temporal scale). To enable a scientific approach to the determination of the environmental significance (importance), a numerical value is linked to each rating scale.

The following criteria were applied:

### Occurrence

- Probability of occurrence (how likely is it that the impact may occur?); and
- Duration of occurrence (how long the impact may last).

### Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?); and
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?). The following ranking scales was used:

**Table 3: Ranking scales**

<p><b>Probability:=P</b></p> <p>5 – Definite/don't know</p> <p>4 – Highly probable</p> <p>3 – Medium probability</p> <p>2 – Low probability</p> <p>1 – Improbable</p> <p>0 – None</p>	<p><b>Scale:=S</b></p> <p>5 – International</p> <p>4 – National</p> <p>3 – Regional</p> <p>2 – Local</p> <p>1 – Site only</p> <p>0 – None</p>
<p><b>Duration:=D</b></p> <p>5 – Permanent</p> <p>4 - Long-term (ceases with the operational life)</p> <p>3 - Medium-term (5-15 years)</p> <p>2 - Short-term (0-5 years)</p> <p>1 – Immediate</p>	<p><b>Magnitude:=M</b></p> <p>10 - Very high/don't know</p> <p>8 – High</p> <p>6 – Moderate</p> <p>4 – Low</p> <p>2 – Minor</p>

## Status of Impact

+: Positive

-: Negative N:

Neutral

The following formula was applied to calculate the impact significance after the factors were ranked for each impact:  $SP = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$

**Table 4: Significance of impacts**

SIGNIFICANCE	ENVIRONMENTAL SIGNIFICANCE	COLOUR CODE
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60 (max = 100)	H

The heritage resources of significance that could be impacted by the proposed powerline are:

- Damage and/or destruction of graves and cemeteries
- Damage and/or destruction of structures older than 60 years
- Damage and/or destruction of archaeological material including rock art and rocky outcrops, and fossils.

**Table 5: Graves and cemeteries**

<b>All powerline route options – pre-construction, construction and operation</b>		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Scale</b>	Local (2)	Local (2)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (8)	Low (4)
<b>Probability</b>	Medium (3)	Low (2)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No	No
<b>Level of Significance</b>	45 (medium negative)	22 (low negative)
<b>Can impacts be mitigated</b>	Yes	n/a
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• Prior to construction, a walk-down of the chosen powerline route option must be undertaken by a heritage specialist to identify any grave sites and cemeteries</li> <li>• If any pylons are positioned on graves or cemeteries, then the position of the pylon must be adjusted to avoid impacting on the graves or cemeteries</li> <li>• A buffer of 20 m must be placed around all graves and cemeteries to ensure that during the construction of the powerline, these sites are not damaged.</li> </ul>		



- The material demarcating the 20 m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the powerlines so that maintenance crews are aware of the sites.
- If, for any reason, graves or cemeteries have to be moved, then a Phase 2 HIA will need to be undertaken during which process, the family and relevant communities will have to be engaged with to obtain their permission and to discuss where the remains are to be moved to. In addition, application will have to be made to the NWHRA or SAHRA for the necessary permits. Sub-sections (4) and (5) of section 36 of the NHRA regarding the removal of graves must be adhered to.
- **The exhumation and removal of graves is strongly discouraged as graves are highly significant to many people and there are many traditional, cultural and personal sensitivities concerning the removal of graves.**

Table 6: Structures older than 60 years

<b>All powerline route options – pre-construction and construction</b>		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Scale</b>	Local (2)	Local (2)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	Medium (3)	Low (2)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No	No
<b>Level of Significance</b>	39 (medium negative)	22 (low negative)
<b>Can impacts be mitigated</b>	Yes	n/a
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• Prior to construction, a walk-down of the selected powerline route option must be undertaken by a heritage specialist to identify any additional protected structures as well as those protected structures that may be directly impacted by the location of pylons.</li> <li>• If any pylons are positioned on protected structures, then the position of the pylon must be adjusted to avoid impacting on the structure/s</li> <li>• A buffer of 20 m must be placed around all structures (whether protected or not) to ensure that during the construction of the powerline, all buildings (including farm houses and associated buildings) are not damaged by the construction process.</li> <li>• The material demarcating the 20 m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the powerlines.</li> <li>• If any building is to be altered, damaged or destroyed then permission from the owner must be obtained. If the building is protected (older than 60 years), then application must be made to the NWHRA or SAHRA for the necessary permits.</li> </ul>		

**Table 7: Archaeological sites**

<b>All powerline route options – pre-construction, construction and operation</b>		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Scale</b>	Regional (3)	Regional (3)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	High (8)	Low (4)
<b>Probability</b>	High (4)	Low (2)
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No	No
<b>Level of Significance</b>	64 (medium negative)	24 (low negative)
<b>Can impacts be mitigated</b>	Yes	n/a
<b>Mitigation</b>		
<ul style="list-style-type: none"> <li>• Prior to construction, a walk-down of the selected powerline route option must be undertaken by an archaeologist to identify archaeological areas (such as pans and quarries) and archaeological sites that may be impacted by the location of pylons.</li> <li>• If any pylons are positioned on or very close (within 10 m) of archaeological sites, then the position of the pylon must be adjusted to avoid impacting on such sites</li> <li>• A buffer of 20 m must be placed around significant archaeological sites to ensure that during the construction of the powerline, such sites are not damaged by the construction process.</li> <li>• The material demarcating the 20 m buffer must be highly visible and made of durable material to ensure that they are still in place during the operation of the powerline so that these sites are not destroyed during the maintenance of the powerline.</li> <li>• If archaeological sites are impacted by a pylon or by the construction process, then the necessary permits must be obtained from the NWPHERA or SAHRA either for the rescue or destruction of archaeological material dependent on the significance of the material/site.</li> </ul>		

## 11. STATEMENT OF IMPACT SIGNIFICANCE

The project area that will be impacted by the proposed powerline is currently disturbed by farming activities and the expansion of settlements. The impact significance of the powerline on graves and cemeteries is low (post-mitigation) as most graves and cemeteries are visible and the recommended walk-down of the selected route option will locate all graves and cemeteries prior to construction. Impacts on graves and cemeteries can be successfully mitigated. From the survey of the project area, it should be noted that it is quite likely that graves may be found in fairly close proximity to farmsteads and, in the traditional authority areas, graves are most likely to be found in centralised cemeteries but occasionally, individual graves will be found close to homesteads.

The impact significance of the proposed powerline on protected structures is low as the structures are generally easily visible and therefore can be avoided. The proposed walk-down of the selected route option will identify all structures to be avoided. Impacts on protected structures can be easily mitigated. From the survey, it is moderately likely that some of the farm houses and associated buildings will be over 60 years of age and therefore protected by the NHRA.

The impact significance of the proposed powerline on archaeological material/sites is rated as a high impact that is reduced to a low significance with the implementation of the proposed mitigation measures. The high impact rating is largely due to the nature of archaeological remains where they can occur below the ground making such sites difficult to detect. Impacts are more likely to occur in such cases. However, the threshold of significance will not be exceeded as the project area is not in pristine condition meaning that activity in the project area will have disturbed or destroyed many sites; secondly, if the mitigation measures, including the walk-down of the selected route option by an archaeologist is applied then significant archaeological sites can be identified prior to the construction process.

## **12. SELECTION OF POWERLINE ROUTE OPTION**

Four powerline route options have been provided as alternatives for the proposed 400kV powerline. The environment that the four powerline options cross is largely the same for all the options and during the site inspection for the Phase 1 assessment, heritage sites were found along or close to all the options. Hence, the length of the route options is important as the longer a powerline is, the higher the risk or possibility that the powerline could impact on heritage resources. Route Option 2 is approximately 8 km shorter than the other route options and is therefore the preferred route from a heritage perspective.

The Best Practicable Environmental Option (BPEO) is defined in National Environmental Management Act as the option that provides the most benefit or causes the least damage to the environment as a whole at a cost acceptable to society in the long term as well as the short term. Route Option 2 is the BPEO for this project in the opinion of the heritage specialist.

The 'no-go' option refers to the project not going ahead and therefore there would be no impact on the environment including heritage resources. In contrast, the current Watershed MTS is un-firm and does not have the capacity to meet the forecasted load. This would mean that future electricity demand would not be met and this could potentially restrict economic growth in the affected areas. From a heritage perspective the project area is already disturbed through farming and the expansion of villages and settlements. The 'no-go' option will maintain this status quo. The construction of the powerline will have a low impact on heritage resources if the pre-construction, construction and operational phases of the project are managed in line with the recommendations and mitigation measures provided in this report. Therefore, the 'no-go' option is not regarded as a reasonable option in light of the future electricity demands of the area.

### **13. MITIGATION MEASURES**

- For any chance finds of heritage resources, all work must cease in the area affected and the Contractor must immediately inform the Project Manager. A heritage specialist must be called to site to inspect the finds. The NWPHERA / SAHRA must also be informed about any chance finds.
- The heritage specialist will assess the significance of the heritage resource/s found and provide guidance on the way forward.
- Permits must be obtained from the NWPHERA or SAHRA if heritage resources are to be removed, destroyed or altered.
- Any heritage resources found close to the construction site must be protected by a 20m buffer in which no construction can take place. The buffer material (danger tape, fencing, etc.) must be highly visible to construction crews.
- Under no circumstances may any heritage material be destroyed or removed from site unless under direction of a heritage specialist.
- Any mitigation measures recommended by the desktop palaeontological assessment must be adhered to and implemented where necessary.

### **14. RECOMMENDATIONS AND CONCLUSION**

The proposed Mookodi-Mahikeng 400kV powerline could impact on heritage resources along all four route options. Heritage resources that occur in the study area include graves, cemeteries containing numerous graves, archaeological sites and protected structures. The recommendations below are provided to mitigate the potential impact of the powerline on heritage resources:

- Route option 2 is the preferred option from a heritage perspective as it is shortest in length;
- A walk-down of the selected route option by a heritage specialist, preferably an archaeologist, must be undertaken prior to construction in order that all heritage sites are identified and recorded prior to construction;
- All heritage sites identified along the route option and in close proximity must be protected with a 20 m buffer so that the construction process does not impact these sites; and
- A desktop palaeontological assessment must be undertaken as the project area falls into an area of both medium and low fossil sensitivity. The desktop assessment would indicate if significant/sensitive fossils will be impacted by the proposed project and provide mitigation measures and the way forward in this regard. The project may only proceed once the desktop palaeontological assessment has been undertaken.

No fatal flaws were identified during this study hence the construction of the proposed powerline can proceed from a heritage perspective as long as the recommendations and mitigation measures contained in this report and in the desktop palaeontological assessment are implemented where necessary.

## 15. REFERENCES

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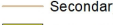
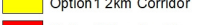
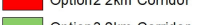
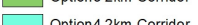

## **APPENDIX 1**

### **HERITAGE SENSITIVITY MAP**



**MOOKODI-MAHIKENG 400KV POWER LINE**

**Legend**

-  Provinces
-  All Towns
-  Heritage Sites 20m Buffer
-  Heritage Sites
-  Freeways
-  Major
-  Main
-  Secondary
-  Option1 2km Corridor
-  Option2 2km Corridor
-  Option3 2km Corridor
-  Option4 2km Corridor

