PHASE 1 ARCHAEOLOGICAL AND HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROPOSED MAHIKENG MAIN TRANSMISSION SUBSTATION AND A PROPOSED 400KV PLUTO-MAHIKENG POWERLINE WITHIN THE MERAFONG CITY LOCAL MUNICIPALITY OF THE GAUTENG PROVINCE AND THE DITSOBOTLA, JB MARKS AND MAFIKENG LOCAL MUNICIPALITIES OF THE NORTH WEST PROVINCE

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Document Information

Item	Description
Proposed development and location	Proposed Mahikeng Main Transmission Substation and a 400kv Pluto Makikeng powerline within Merafong City Local Municipality of Gauteng Province, and Ditsobotla, JB Marks and Mafikeng Local Municipalities of the North West Province
Purpose of the study	To carry out a Heritage Impact Assessment to determine the presence/absence of cultural heritage sites and the impact of the proposed project on heritage resources within the area demarcated for the proposed Pluto Mahikeng 400KV powerline and Transmission Substation.
1:50 000 Topographic Map	2724 DA and 2724 DB, 2525 DC, 2626 AA, 2625 BA
Coordinates	From S 27° 37' 19.16"; E 24° 38 23 '.69" to S 27° 37 ' 22.20"; E24° 38 ' 15.37"
Municipalities	Merafong City Local Municipality of Gauteng Province, and Ditsobotla, JB Marks and Mafikeng Local Municipalities of the North West Province
Predominant land use of surrounding area	Industrial, commercial, mining, residential and agriculture
Developer	Eskom SOC
EAP	Baagi Environmental Consultancy cc PostNet Suite x412 Private Bag x4, Menlo Park, 0102 Tel: 012 993-0756 Fax: 012 993-0743 Email: tinashe@baagi.co.za
Heritage Consultant	Integrated Specialist Services (Pty) Ltd 135 Pitzer Road, Glen Austin Midrand 1685 Tel: 011 037 1565/ 071 685 9247 Email: trust@issolutions.co.za
Contact Person	Trust Mlilo
Date of Report	Revised report 14/ 09/ 2018

NATIONAL LEGISLATION AND REGULATIONS GOVERNING THIS REPORT

This is a specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014.

DECLARATION OF INDEPENDENCE

In terms of Chapter 5 of the National Environmental Management Act of 1998 specialists involved in Impact Assessment processes must declare their independence.

I, **Trust Mlilo**, do hereby declare that I am financially and otherwise independent of the client and their consultants, and that all opinions expressed in this document are substantially my own, notwithstanding the fact that I have received fair remuneration from the client for preparation of this report.

Expertise:

Trust Mlilo, MA. (Archaeology), BA Hons, PDGE and BA & (Univ. of Pretoria) ASAPA (affiliation member) and more than 15 years of experience in archaeological and heritage impact assessment and management. Mlilo is an accredited member of the Association for Southern African Professional Archaeologists (ASAPA), Amafa akwaZulu Natali and Eastern Cape Heritage Resources Agency (ECPHRA). He has conducted more than hundred AIA/HIA Studies, heritage mitigation work and heritage development projects over the past 15 years of service. The completed projects vary from Phase 1 and Phase 2 as well as heritage nomination work for government, parastatals (Eskom) and several private companies such as BHP Billiton, Rhino Minerals.

Independence

The views expressed in this document are the objective, independent views of Mr Trust Mlilo and the survey was carried out under Baagi Environmental consultancy cc. Integrated Specialist Services has no any business, personal, financial or other interest in the proposed development apart from fair remuneration for the work performed.

Conditions relating to this report

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Integrated Specialist Services (Pty) Ltd reserves the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the author and Baagi. This also refers to electronic copies of the report which are supplied for the purposes of inclusion as part of other reports,

including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

Copyright

Authorship: This AIA/HIA Report has been prepared by Mr Trust Mlilo (Professional Archaeologist). The report is for the review of the Heritage Resources Agency (PHRA).

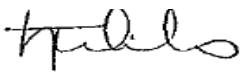
Geographic Co-ordinate Information: Geographic co-ordinates in this report were obtained using a hand-held Garmin Global Positioning System device. The manufacturer states that these devices are accurate to within +/- 5 m.

Maps: Maps included in this report use data extracted from the NTS Map and Google Earth Pro.

Disclaimer: The Authors are not responsible for omissions and inconsistencies that may result from information not available at the time this report was prepared.

The Archaeological and Heritage Impact Assessment Study was carried out within the context of tangible and intangible cultural heritage resources as defined by the SAHRA Regulations and Guidelines as to the authorisation of proposed powerline development being proposed by Eskom SOC.

Signed by



25/ 05/ 2018

Acknowledgement

The author acknowledges Baagi Environmental Consultancy cc and Eskom SOC for their assistance with project information, and the associated project BID as well as responding to technical queries related to the project. The author also acknowledges the Public Participation Practitioner (Nicoline) for arranging access to various farms along the proposed powerline route. In addition, we would like to thank all the farmers who provided access to their farms and also provided information regarding existence of any heritage resources within their respective farms.

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EXECUTIVE SUMMARY

ESKOM proposes to construct a substation in Mahikeng (in the North West province) and to connect this station with a 400kv powerline from Pluto substation (in south-western Gauteng Province). The proposed alternative routes from Pluto to Mahikeng, each traverse an area of over 200km that is generally rich in archaeological and paleontological resources, and any significant development in this area must take full cognizance of this heritage. Various national legislative arms mandate pre-development assessment to ensure the protection of these resources. The rich geological and agricultural resources of the project area have also led to numerous faming and mining activities that had robed parts of the area's pristine environments. The implications of this observation are that whatever heritage resources that still exist in the area must be protected from uncontrolled and unmitigated developments.

Archaeological resources in the general area proposed for the present development stretches in to deep time. The World Heritage Taung Fossil Site with australopithecines (eg Australopithecus Africanus dating to about 2.4 million years occur a little further to the south of development footprint. These australopithecines were gradually displaced by early hominid (Homo Habilis) that was later replaced by the early crude stone tool using hominid (Homo erectus around 1.8 million years ago). This marked the beginning of the Stone Age (ESA), which is not very wide spread in the study area. Nonetheless the area has isolated occurrences of the Middle Stone Age (MSA) industries associated with anatomically modern humans, Homo sapiens that replaced the ESA around 250000 years ago. The subsequent replacement of the MSA by Later Stone Age (LSA) occurred from about 20000 years ago and the new technology is also represented in isolated occurrences. The LSA is triggered a series of technological innovations and social transformations within these early hunter-gatherer societies that included the advent of rock art (paining and engravings), associated with the Khoisan communities. The study area generally is not known for rock paintings but the largest collections of rock engravings in the country is located to the south of the development footprint in Provincial Heritage site of Bosworth and Thaba Sione. From this period onwards, there has not been significant reports of Early Iron Age (AD200 to 1000) sites in the study area until the post 15th century Ntsuanatsatsi-Uitkomsts (Nguni-speakers) and Olifantsfontein and Buispoort (Sotho-Tswana speakers) period of Late Iron Age that is characterized by stone walling. Key historical events relate to the 19th century encroachment of Boer Trekkers and Mfecane fleeing Mzilikazi's Ndebele people, as well as the aftermaths of Boer-Anglo and European-African military encounters that resulted in the establishment of several towns such as Mahikeng, and the national boundaries of South Africa and Botswana. These armed encounters left trails of historical battle grounds, cemeteries and unmarked graves that are protected by the South African heritage legislation and must not be disturbed without consultation and approval from national and provincial heritage agencies. Graves in general, and historical (over 6o years) graves in particular, are of high social significance and any development should preferably avoid them. Other historical mining activities relates to the diamond rush triggered by the discovery during the digging for a

cattle dip at Bakerville in 1924. This place is now a Provincial heritage site and there are also other provincial sites and structures in the study area, especially near Mahikeng. Small-scale diamond and manganese mining activities still continue to date and the associated pre-development studies have indicated low heritage sensitivity on some parts of the study area. All the same, archaeological resources are known to occur in buried contexts that may only be identifiable during construction, such that failure to detect them during field surveys is not absolute evidence of their absence and a clear procedure for reporting chance finds must be followed during construction.

This Archaeological and Heritage Impact Assessment (AIA/HIA) Report has been prepared to address requirements of the National Heritage Resources Act, Act 25 of 1999, Section 38. Integrated Specialist Services (Pty) Ltd (ISS) was commissioned by Baagi Environmental Consultancy cc to conduct this Archaeological and Heritage Impact Assessment (AIA/HIA) Study for the proposed Proposed Mahikeng main Transmission Substation and 1x400kv Pluto Mahikeng powerline within Merafong City Local Municipality of Gauteng Province, and Ditsobotla, JB Marks and Mafikeng Local Municipalities of the North West Province. This report includes an impact study on potential archaeological and cultural heritage resources that may be associated with the proposed 400kv powerline and substation development. This study was conducted as part of the specialist input for the Environmental Impact Assessment exercise. The project information has been passed to ISS research team by the project EAP. Analysis of the archaeological, cultural heritage, environmental and historic contexts of the study area predicted that archaeological sites, cultural heritage sites, burial grounds or isolated artefacts were likely to be present on the affected landscape. The field survey was conducted to test this proposition and verify this prediction within the proposed powerline routes and substation sites. The general project area is predominantly residential, commercial, agriculture and mining.

The report makes the following observations:

- The findings of this report have been informed by desktop data review, field survey and impact assessment reporting which include recommendations to guide heritage authorities in making decisions with regards to the proposed project.
- Sections of the project area are very accessible and the field survey was effective enough to cover most sections of the project receiving environs. However, some portions of the proposed powerline routes had limited access because of thick vegetation cover and crops (maize, soya beans and sunflower).
- The immediate project area is predominantly agricultural, mining, commercial and residential.
- The study did not record any archaeological site at the proposed substation sites.

The report sets out the potential impacts of the proposed powerline and substation development on heritage matters and recommends appropriate safeguard and mitigation measures that are designed to reduce the impacts where appropriate. The Report makes the following recommendations:

- ❖ The construction teams must be inducted on the possibility of encountering archaeological resources that may be accidentally exposed during clearance and excavation for tower positions prior to commencement of work on the site in order to ensure appropriate mitigation measures and that course of action is afforded to any chance finds.
- ❖ If archaeological materials are uncovered, work must cease immediately and the SAHRA be notified and activity should not resume until appropriate management provisions are in place.
- ❖ The findings of this report, with approval of the SAHRA, may be classified as accessible to any interested and affected parties within the limits of the legislations.

This report concludes that the impacts of the proposed powerline and substation development on the cultural environmental values are not likely to be significant on the entire development site if the EMP includes recommended safeguard and mitigation measures identified in this report.

The assessment reached the following conclusions:

1. The proposed powerline originates from an existing Pluto Substation Station and no new infrastructure will be built at this Substation, besides connecting the new line.
2. The proposed Alternative 2a powerline route will run parallel to the existing powerline from Pluto Substation to Watershed Substation near Lichtenburg.
3. There are three visible but isolated potsherds in the proximity of Alternative Corridor 2a powerline route but because of lack of context, the significance is considered to be very low.
4. The proposed new overhead powerline and substation do have a visual impact some sections of the general project area.

Recommendations

1. The proposed linear developments should be allowed to proceed with modifications listed below:
2. Given the sensitivity of sub-surface materials (both archaeological and paleontological), a walk down survey must be conducted once the final route selection is concluded
3. The digging of pylons in the sensitive area should be monitored by qualified Environmental Control officer and if any archaeological or palaentological remains are uncovered work must cease immediately and the project archaeologist and SAHRA must be duly informed.
4. It is also advised that the Archaeology, Palaeontology and Eskom Meteorites Unit is alerted when site work begins.
5. Strict and clear reporting procedures for chance findings must be followed by Eskom and its contractors throughout the whole period of construction.

ABBREVIATIONS

AIA	Archaeological Impact Assessment
ECO	Environmental Control Officer
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EM	Environmental Manager
EMP	Environmental Management Plan
HIA	Heritage Impact Assessment
ISS	Integrated Specialist Services (Pty) Ltd
LIA	Late Iron Age
NHRA	Nation Heritage Resources Act, Act 25 of 1999
PM	Project Manager
PHRA	Provincial Heritage Agency
SM	Site Manager
SAHRA	South African Heritage Resources Agency

KEY CONCEPTS AND TERMS

Periodization Archaeologists divide the different cultural epochs according to the dominant material finds for the different time periods. This periodization is usually region-specific, such that the same label can have different dates for different areas. This makes it important to clarify and declare the periodization of the area one is studying. These periods are nothing a little more than convenient time brackets because their terminal and commencement are not absolute and there are several instances of overlap. In the present study, relevant archaeological periods are given below;

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

Early Iron Age (~ AD 200 to 1000)

Late Iron Age (~ AD1100-1840)

Historic (~ AD 1840 to 1950, but a Historic building is classified as over 60 years old)

Definitions Just like periodization, it is also critical to define key terms employed in this study. Most of these terms derive from South African heritage legislation and its ancillary laws, as well as international regulations and norms of best-practice. The following aspects have a direct bearing on the investigation and the resulting report:

Cultural (heritage) resources are all non-physical and physical human-made occurrences, and natural features that are associated with human activity. These can be singular or in groups and include significant sites, structures, features, ecofacts and artefacts of importance associated with the history, architecture, or archaeology of human development.

Cultural significance is determined by means of aesthetic, historic, scientific, social, or spiritual values for past, present, or future generations.

Value is related to concepts such as worth, merit, attraction or appeal, concepts that are associated with the (current) usefulness and condition of a place or an object. Although significance and value are not mutually exclusive, in some cases the place may have a high level of significance but a lower level of value. Often, the evaluation of any feature is based on a combination or balance between the two.

Isolated finds are occurrences of artefacts or other remains that are not in-situ or are located apart from archaeological sites. Although these are noted and recorded, but do not usually constitute the core of an impact assessment, unless if they have intrinsic cultural significance and value.

In-situ refers to material culture and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

Archaeological site/materials are remains or traces of human activity that are in a state of disuse and are in, or on, land and which are older than 100 years, including artefacts, human and hominid remains, and artificial features and structures. According to the National Heritage Resources Act (NHRA) (Act No. 25 of 1999), no archaeological artefact, assemblage, or settlement (site) and no historical building or structure older than 60 years may be altered, moved or destroyed without the necessary authorisation from the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority.

Historic material are remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

Chance finds means archaeological artefacts, features, structures or historical remains accidentally found during development.

A grave is a place of interment (variably referred to as burial) and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery (contemporary) or burial ground (historic).

A site is a distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

***Heritage Impact* Assessment (HIA)** refers to the process of identifying, predicting, and assessing the potential positive and negative cultural, social, economic, and biophysical impacts of any proposed project, which requires authorisation of permission by law and which may significantly affect the cultural and natural heritage resources. Accordingly, an HIA must include recommendations for appropriate mitigation measures for minimising or circumventing negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

Impact is the positive or negative effects on human well-being and / or on the environment.

Mitigation is the implementation of practical measures to reduce and circumvent adverse impacts or enhance beneficial impacts of an action.

Mining heritage sites refer to old, abandoned mining activities, underground or on the surface, which may date from the prehistorical, historical or the relatively recent past.

Study area or 'project area' refers to the area where the developer wants to focus its development activities (refer to plan).

Phase I studies refer to surveys using various sources of data and limited field walking in order to establish the presence of all possible types of heritage resources in any given area

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1 INTRODUCTION

Background

Most heritage sites occur within communities, whose development should not be neglected in the name of heritage preservation but should be encouraged and embraced within legal and adaptive management frameworks (Carter and Grimwade 1997; Salafsky *et al* 2001). This case is true for the entire project area, which hosts palaeontological, archaeological, historical, natural and contemporary heritage resources. Eskom Transmission (Eskom) is proposing to establish a new 400kv Transmission substation on a site within the Mahikeng area, North-West Province. In addition, Eskom is proposing to construct a new 400kV transmission powerline from their existing Pluto Transmission substation (located near Carletonville, Gauteng Province) to the newly proposed Mahikeng Transmission substation (to be located near Mahikeng). It is important to note that the proposed project forms part of Eskom's larger regional Botswana-South Africa (BOSA) Transmission Interconnecting Project. The Southern African Power Pool (SAPP) coordinates planning, generation and transmission of electricity for national electricity suppliers in the Southern African Development Community (SADC) region. SAPP identified the Botswana-South Africa (BOSA) Transmission Interconnection Project as one of the initiatives to reduce electricity supply constraints and assist in improving distribution of electricity in the region. Eskom of South Africa (Eskom) and the Botswana Power Corporation (BPC) will be the beneficiaries of the project. The project is for a proposed 210 km transmission line that will stretch from the proposed Mahikeng Main Transmission Substation to Isang in Botswana.

The purpose of this HIA is to assess presence/absence of heritage resources on the development footprint of the proposed powerline and substation development. The study was designed to ensure that any significant archaeological or cultural physical property or sites are located and recorded, and site significance is evaluated to assess the nature and extent of expected impacts from the proposed development. The assessment includes recommendations to manage the expected impact of the proposed development activities. The report includes recommendations to guide heritage authorities in making appropriate decision with regards to the environmental approval process for the proposed powerline and substation development. The report concludes with detailed recommendations on heritage management associated with the development work. ISS, an independent consulting firm, conducted the assessment; research and consultations required for the preparation of the archaeological and heritage impact report in accordance with its obligations set in the NHRA as well as the environmental management legislations.

In line with SAHRA guidelines, this report, not necessarily in that order, provides:

1) Management summary
2) Methodology
3) Information with reference to the desktop study
4) Map and relevant geodetic images and data
5) GPS co-ordinates

6) Directions to the site

7) Site description and interpretation of the cultural area where the project will take place

8) Management details, description of affected cultural environment, photographic records of the project area

9) Recommendations regarding the significance of the site and recommendations regarding further monitoring of the site.

10) Conclusion

Description of the proposed project

The Proposed Mahikeng Main Transmission Substation (MTS) and 1x400kV Pluto-Mahikeng Powerline Project entails the following:

- Establish Mafikeng MTS and design for an end state of 3x 500MVA 400/132kV transformers and equip with 2x500MVA transformers on commissioning, and
- Design for an end state of 8x 132kV and equip 3x 132kV feeder bays, by year 2024;
- Communication tower at the Main Transmission Substation; and
- Construction of substation access road
- Establishment of an approximately 250km 400kV transmission powerline from Pluto Main Transmission Substation to the proposed Mahikeng Main Transmission Substation;

Technical Specification for the project

The Servitude

The proposed transmission powerline will require a servitude of 55m in width, i.e. 27.5m both sides of the centre line and cover a distance of approximately 250km in length. The servitude is required for the safe operation of the powerline and reliability of electricity supply to consumers. The preliminary/scoping level studies have assessed a 2km wide corridor per alignment/corridor alternative. This 2km corridor provides sufficient coverage for the assessment of the powerline, servitude and associated infrastructure such as access roads.

Alternatives Considered in this Report

Three (3) technically feasible alternative substation sites and three (3) transmission powerline corridors (2km in width) have been identified for investigation within the EIA process. However, Alternative 3 powerline route was discarded during the scoping phase of the project and this study covers the 2 remaining alternatives. Through the EIA process, a preferred alternative transmission powerline corridor and a substation site will be recommended to

the DEA. Should the project be authorised by the DEA, Eskom will then enter into a servitude negotiation process with each affected landowner. The process of negotiating a servitude is independent of the EIA process, and will be undertaken by Eskom. The following section provides a detailed description of the proposed powerline routes and substation sites.

Pluto - Mahikeng Alternative Corridor 1 (Green Corridor)

Alternative Corridor 1 is approximately 258.5 km and it is located on the southern part of the study area where it runs from Carletonville south-westwards towards Coligny, Dudfield, Shiela, Tshoneng, Rooigrond and finally reaching Mahikeng (refer to figure 3). Alternative Corridor 1 passes near the Abe Bailey Nature Reserve and passes near maize farms in the Carletonville area. There is a presence of dolomitic lime and mottles in the soil and area is dominated by the Carletonville Dolomitic grassland and camel thorns. As the line travels in a north westerly direction the vegetation observed within the area is the Marikana Thornveld, drought resistant *Rhus Lancea, Acacia tortilis, Ziziphus* species and the tuica grass are observed.

Pluto- Mahikeng Alternative Corridor 2 (Purple Corridor)

Alternative Corridor 2a is approximately 236.5 km and runs westwards from Carletonville towards Lichtenburg, where it changes direction northwards immediately north of Lichtenburg towards the proposed Mahikeng substation (refer to figure 3). The proposed Alternative 2a powerline route runs parallel to an existing 275kv powerline from Pluto Substation to Watershed Substation near Lichtenburg.

Substation Site Alternatives

A new 400kV Transmission substation in the Mahikeng area is proposed by Eskom. This substation's footprint will be approximately 1km x 1 km in extent. The substation site alternatives are located 20.5 km from Mahikeng's CBD and 4.2km from the Botswana border. The study area falls under the Mahikeng Bushveld and is situated on a private property. The substation site alternative coordinates are as follows (refer to figure 3):

Site A

25°40'55.15"S & 25°33'29.027"E;

25°40'55.15"S & 25°34'05.62"E;

25°41'30.09"S & 25°34'05.62"E;

25°41'30.09"S & 25°33'29.027"E

Site B

25°41'47.57"S & 25°31'23.83"E;

25°41'47.57"S & 25°32'00.22"E;

25°42'22.32"S & 25°32'00.22"E;

25°42'22.32"S & 25°31'23.83"E;

Site C

25°42'14.09"S & 25°32'55.52"E;

25°42'14.09"S & 25°33'32.11"E;

25°42'49.04"S & 25°33'32.11"E;

25°42'49.04"S & 25°32'55.52"E;

Location of the proposed development

The proposed 400kv transmission powerline will be located within the Gauteng and North West Provinces, starting at Pluto MTS near Carletonville, towards North West running in a predominantly north-westerly direction towards Miga, near Mahikeng, where the site of the proposed Mahikeng MTS will be. The footprint for the Mahikeng MTS will be 1km² in extent. The proposed transmission line will be approximately 250km in length. The proposed project affects several farms. The study area affects the following Municipalities' jurisdictions (refer to Locality Map Figure 3):

- West Rand District Municipality:
- Merafong Local Municipality
- Dr. Kenneth Kaunda District Municipality.
- JB Marks Local Municipality
- Ngaka Modiri Molema District Municipality:
- Ditsobotla Local Municipality
- Mahikeng Local Municipality

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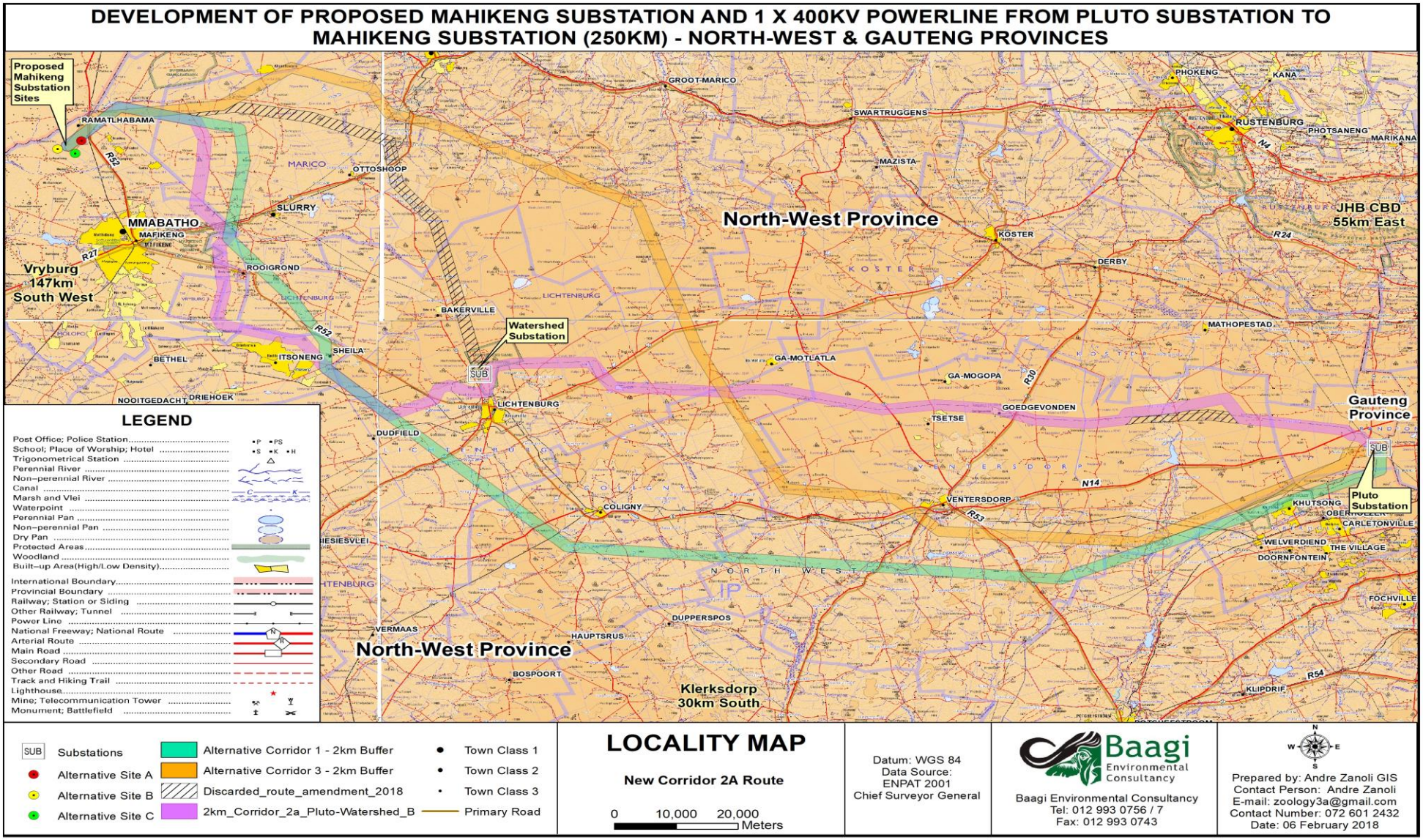
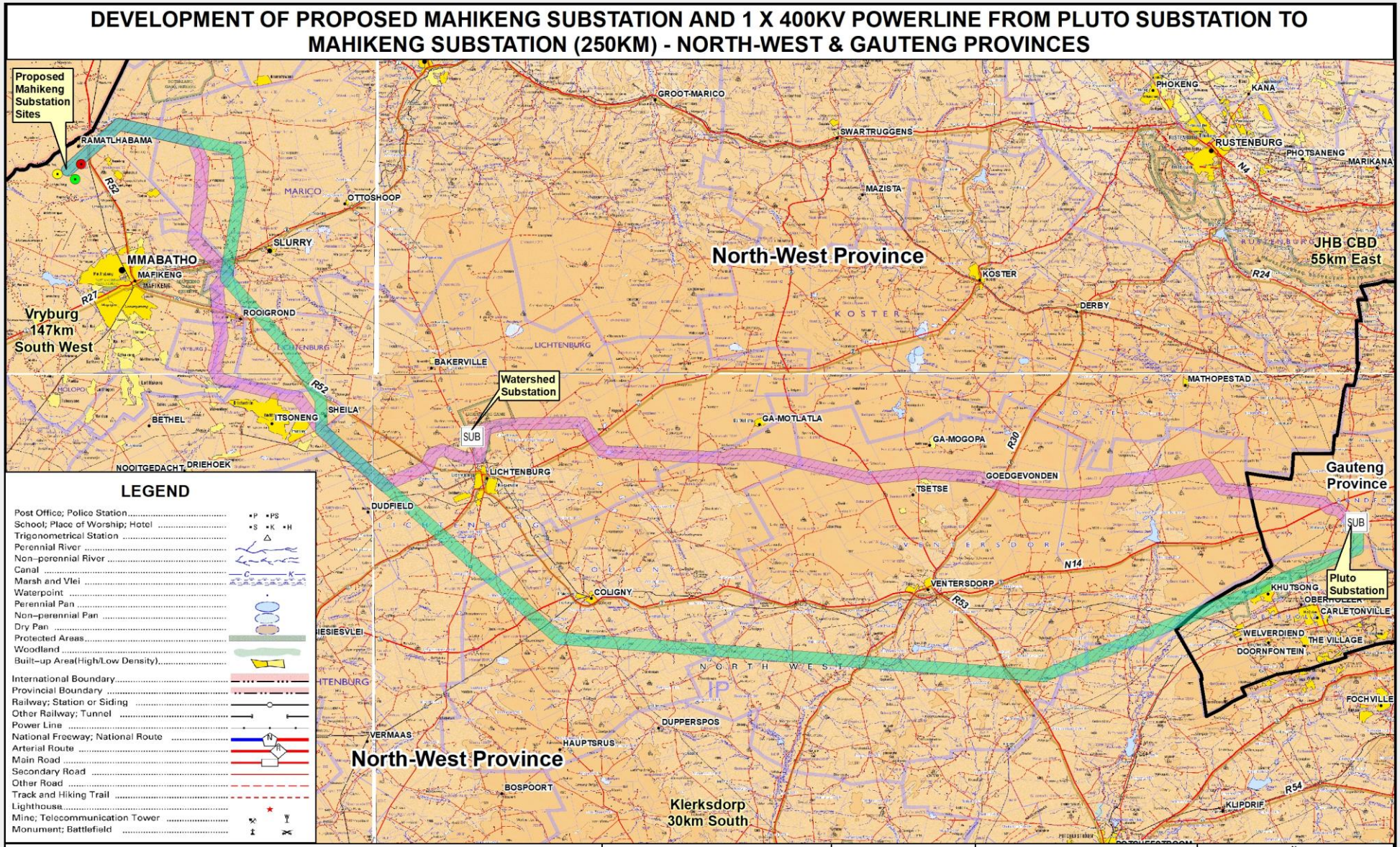


Figure 1: Proposed Pluto Mahikeng powerline routes and substation sites (Baagi 2018)


DEVELOPMENT OF PROPOSED MAHIKENG SUBSTATION AND 1 X 400KV POWERLINE FROM PLUTO SUBSTATION TO MAHIKENG SUBSTATION (250KM) - NORTH-WEST & GAUTENG PROVINCES
Proposed Mahikeng Substation Sites
RAMATLHABAMA
MARICO
OTTOSHOOP
SLURRY
MMABATHO
MAFIKENG
ROOIGROND
Vryburg 147km South West
GROOT-MARICO
SWARTRUGGENS
MAZISTA
North-West Province
PHOKENG
KANA
RUSTENBURG
PHOTSANENG
MARIKANA
JHB CBD 55km East
KOSTER
DERBY
LICHTENBURG
BAKERVILLE
Watershed Substation
SUB
BETHEL
ITSONENG
SHEILA
NOOITGEDACHT
DRIEHOEK
GA-MOTLATLA
GA-MOGOPA
MATHOPESTAD
GOEDGEVONDEN
TSETSE
Gauteng Province
DUDFIELD
COLIGNY
VENTERSDORP
KHUTSONG
CARLETONVILLE
WELVERDIEND
THE VILLAGE
DOORNFONTEIN
Pluto Substation
FOCHVILLE
VERMAAS
DUPPERSPOS
HAUPTSRUS
BOSPOORT
Klerksdorp 30km South
KLIPDRIF
R52
R27
R30
R24
R53
R54
N4
N14
LEGEND
Post Office; Police Station
School; Place of Worship; Hotel
Trigonometrical Station
Perennial River
Non-perennial River
Canal
Marsh and Vlei
Waterpoint
Perennial Pan
Non-perennial Pan
Dry Pan
Protected Areas
Woodland
Built-up Area(High/Low Density)
International Boundary
Provincial Boundary
Railway; Station or Siding
Other Railway; Tunnel
Power Line
National Freeway; National Route
Arterial Route
Main Road
Secondary Road
Other Road
Track and Hiking Trail
Lighthouse
Mine; Telecommunication Tower
Monument; Battlefield
Substations
Alternative Site A
Alternative Site B
Alternative Site C
Alternative Corridor 1 - 2km Buffer
Alternative Corridor 2a - 2km Buffer
Provincial Boundaries
Town Class 1
Town Class 2
Town Class 3
Primary Road
LOCALITY MAP
0 10,000 20,000 Meters
Datum: WGS 84
Data Source: ENPAT 2001
Chief Surveyor General
Baagi Environmental Consultancy
Tel: 012 993 0756 / 7
Prepared by: Andre Zanoli GIS
Contact Person: Andre Zanoli
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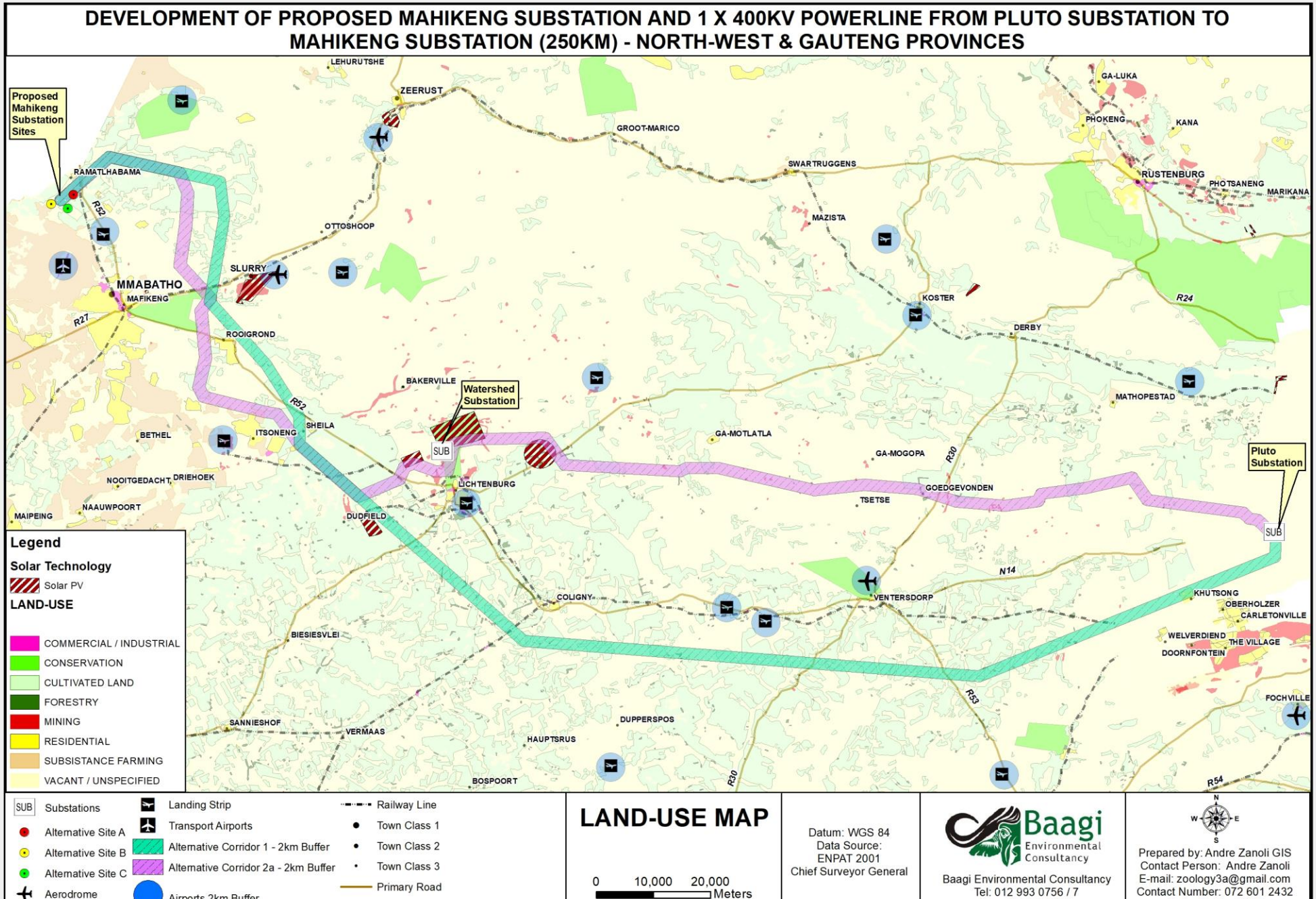
Contact Number: 072 601 2432


DEVELOPMENT OF PROPOSED MAHIKENG SUBSTATION AND 1 X 400KV POWERLINE FROM PLUTO SUBSTATION TO MAHIKENG SUBSTATION (250KM) - NORTH-WEST & GAUTENG PROVINCES
Proposed Mahikeng Substation Sites
Watershed Substation
Pluto Substation
LEHURUTSHE
ZEERUST
GROOT-MARICO
SWARTRUGGENS
GA-LUKA
PHOKENG
KANA
RUSTENBURG
PHOTSANENG
MARIKANA
RAMATLHABAMA
OTTOSHOOP
MAZISTA
SLURRY
MMABATHO
MAFIKENG
KOSTER
DERBY
ROOIGROND
BAKERVILLE
MATHOPESTAD
BETHEL
ITSONENG
SHEILA
GA-MOTLATLA
GA-MOGOPA
NOOITGEDACHT
DRIEHOEK
LICHTENBURG
GOEDGEVONDEN
TSETSE
MAIPEING
NAAUWPOORT
DUDFIELD
VENTERSDORP
COLIGNY
KHUTSONG
OBERHOLZER
CARLETONVILLE
WELVERDIEND
THE VILLAGE
DOORNFONTEIN
BIESIESVLEI
FOCHVILLE
SANNIESHOF
VERMAAS
DUPPERSPOS
HAUPTSRUS
BOSPOORT
R52
R27
R24
R30
R53
R54
N14
SUB
Legend
Solar Technology
Solar PV
LAND-USE
COMMERCIAL / INDUSTRIAL
CONSERVATION
CULTIVATED LAND
FORESTRY
MINING
RESIDENTIAL
SUBSISTANCE FARMING
VACANT / UNSPECIFIED
Substations
Alternative Site A
Alternative Site B
Alternative Site C
Aerodrome
Landing Strip
Transport Airports
Alternative Corridor 1 - 2km Buffer
Alternative Corridor 2a - 2km Buffer
Airports 2km Buffer
Railway Line
Town Class 1
Town Class 2
Town Class 3
Primary Road
LAND-USE MAP
0 10,000 20,000
Meters
Datum: WGS 84
Data Source:
ENPAT 2001
Chief Surveyor General
Baagi Environmental Consultancy
Tel: 012 993 0756 / 7
Prepared by: Andre Zanoli GIS
Contact Person: Andre Zanoli
E-mail: zoology3a@gmail.com
Contact Number: 072 601 2432

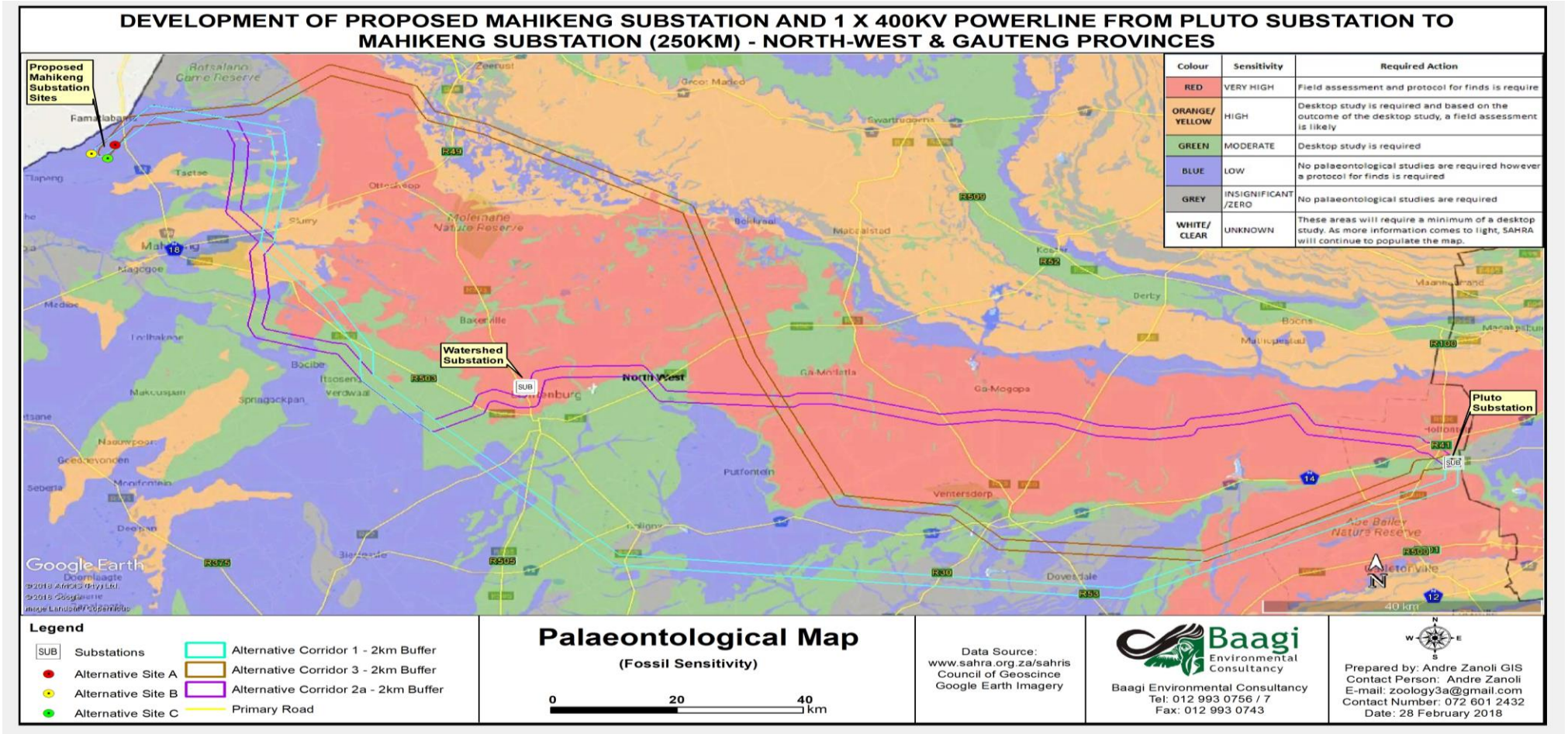


Figure 2: Palaeontology sensitivity map (Baagi 2018).

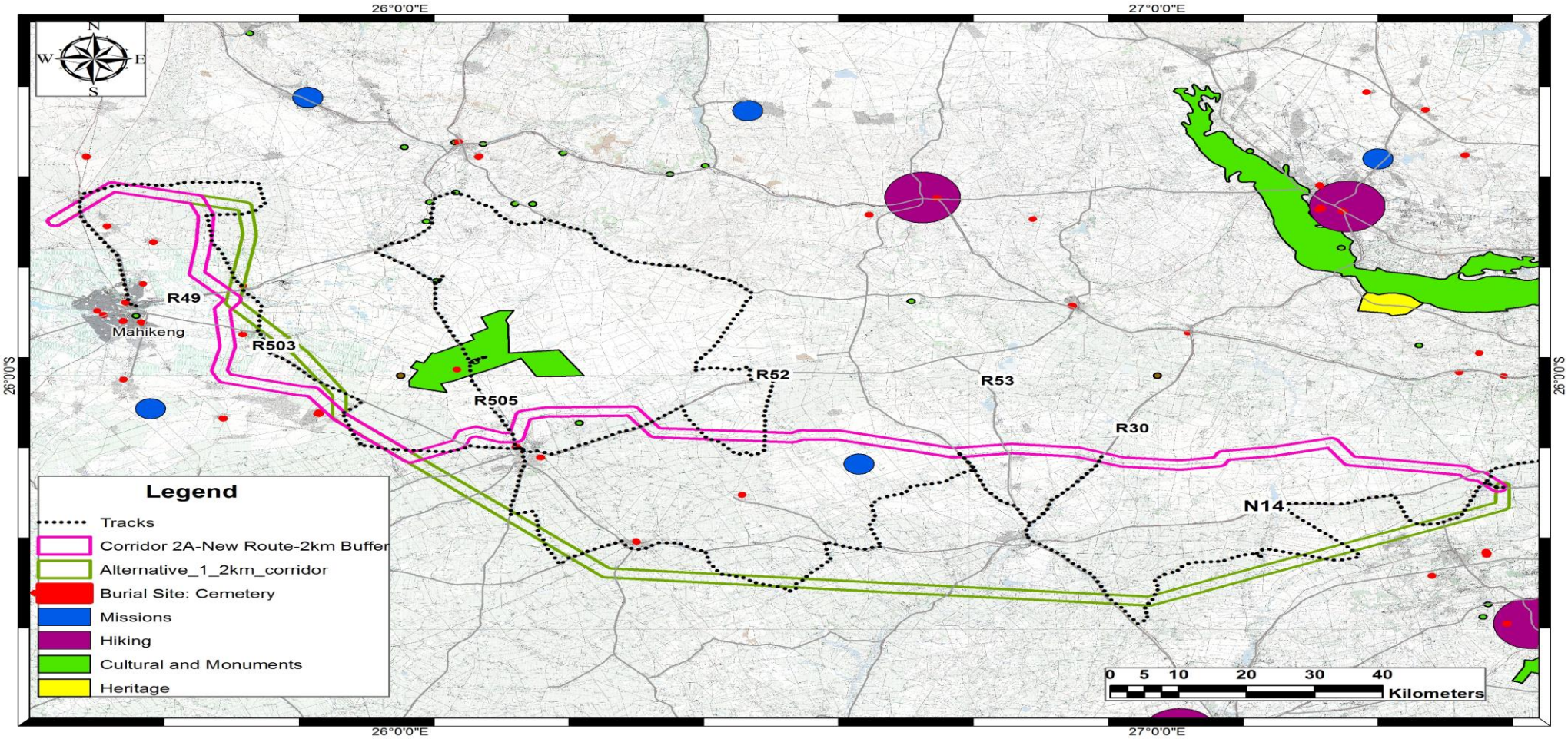


Figure 3: Orthographic map showing known heritage sites along the proposed powerline routes during preliminary survey (ISS 2018).

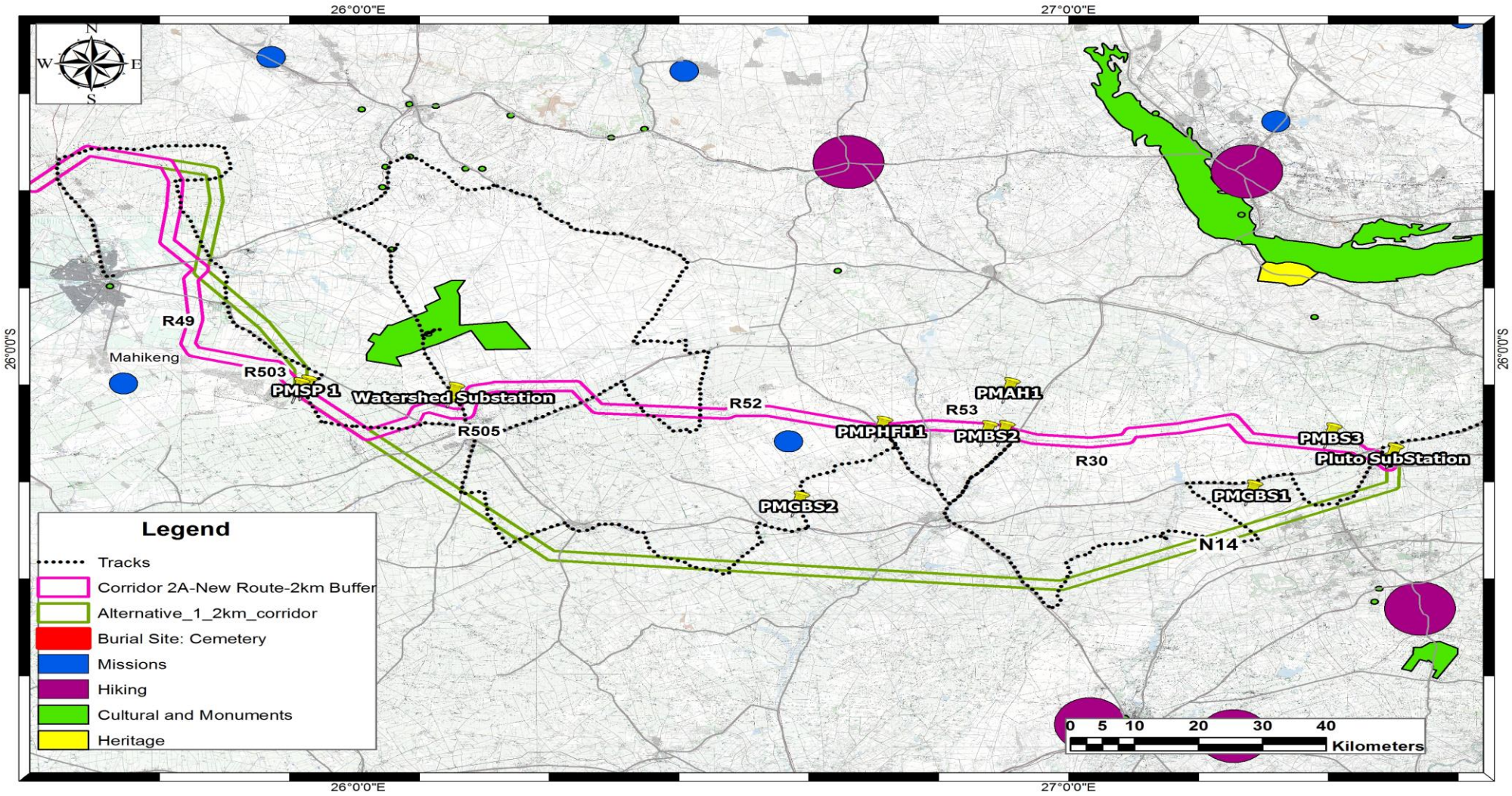


Figure 4: Orthographic map showing known heritage sites along the proposed powerline routes during preliminary survey (ISS 2018).

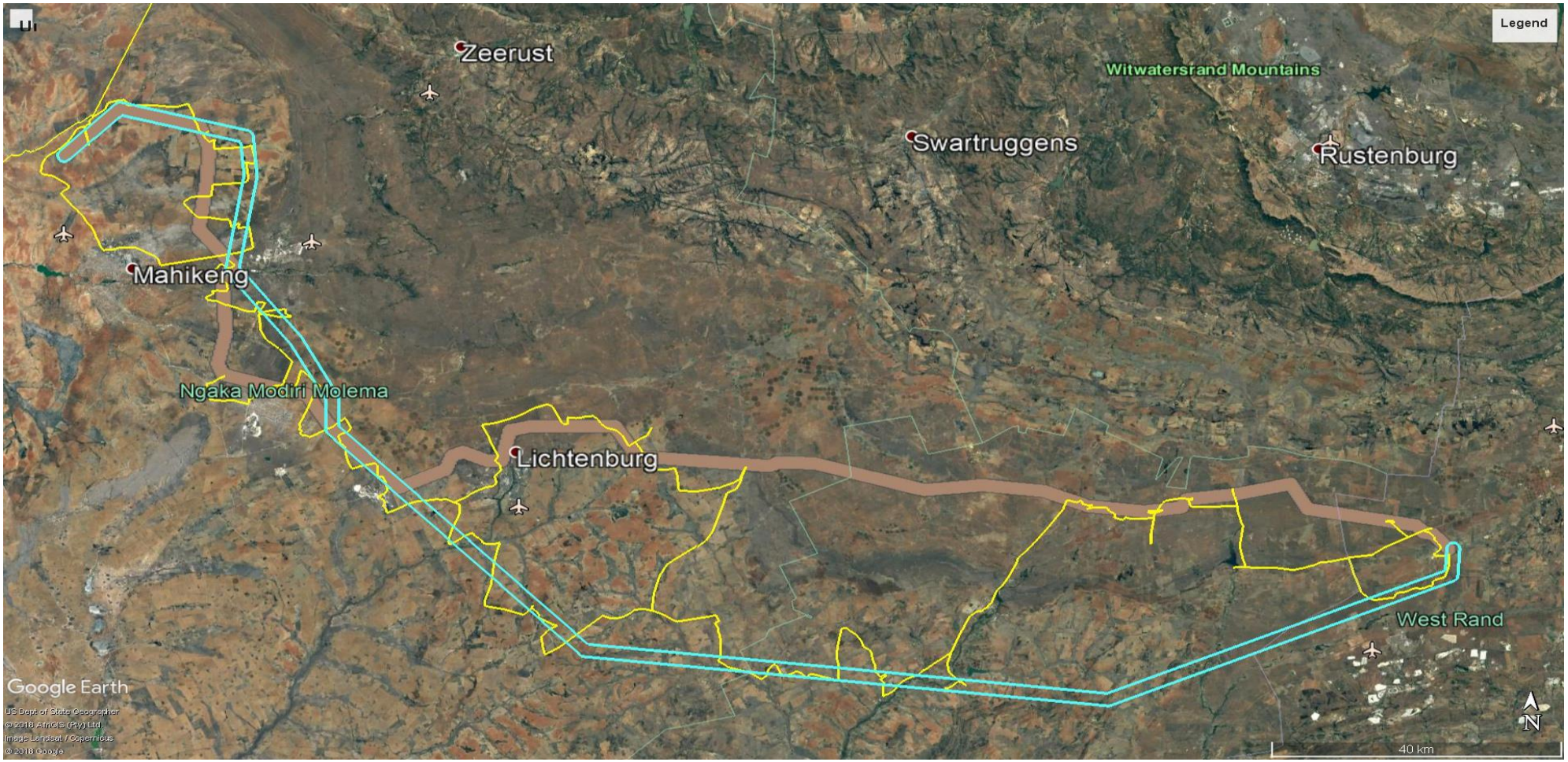


Figure 5: Map showing track logs for the final survey of Alternative 1 and 2a powerline routes (ISS 2018).

2 LEGAL REQUIREMENTS

Relevant pieces of legislations are to the present study are presented here. Under the National Heritage Resources Act (Act 25 of 1999) (NHRA), Mineral and Petroleum Resources Development Act 28 of 2002, and the National Environmental Management Act 107 of 1998 (NEMA) and 2014 Regulations, an AIA or HIA is required as a specialist sub-section of the EIA.

Heritage management and conservation in South Africa is governed by the NHRA and falls under the overall jurisdiction of the SAHRA and its PHRAs. There are different sections of the NHRA that are relevant to this study. The proposed development is a listed activity in terms of Section 38 of the NHRA which stipulates that the following development categories require a HIA to be conducted by an independent heritage management consultant:

- Construction of a road, wall, **powerline**, pipeline, canal or other linear form of development or barrier exceeding 300m in length
- Construction of bridge or similar structure exceeding 50m in length
- Development or other activity that will change the character of a site -
  - Exceeding 5000 sq. m
  - Involving three or more existing erven or subdivisions
  - Involving three or more erven or divisions that have been consolidated within past five years
  - Rezoning of site exceeding 10 000 sq. m
  - The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- Any other development category, public open space, squares, parks, recreation grounds

Thus, any person undertaking any development in the above categories, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. Section 38 (2) (a) of the NHRA also requires the submission of a heritage impact assessment report for authorization purposes to the responsible heritage resources agencies (SAHRA/PHRAs).

Related to Section 38 of the NHRA are Sections 34, 35, 36 and 37. Section 34 stipulates that no person may alter, damage, destroy, relocate etc any building or structure older than 60 years, without a permit issued by SAHRA or a provincial heritage resources authority. Section 35 (4) of the NHRA stipulates that no person may, without a permit issued by SAHRA, destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object. This section may apply to any significant archaeological sites that may be discovered before or during construction. This means that any chance find must be reported to SAHRA or PHRA

(the relevant PHRA), who will assist in investigating the extent and significance of the finds and inform about further actions. Such actions may entail the removal of material after documenting the find site or mapping of larger sections before destruction. Section 36 (3) of the NHRA also stipulates that no person may, without a permit issued by the SAHRA, destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority. This section may apply in case of the discovery of chance burials, which is unlikely. The procedure for reporting chance finds also applies to the likely discovery of burials or graves by the developer or his contractors. Section 37 of the NHRA deals with public monuments and memorials which exist in the proposed project area.

In addition, the new EIA Regulations (4 December 2014) promulgated in terms of NEMA (Act 107 of 1998) determine that any environmental reports will include cultural (heritage) issues. The new regulations in terms of Chapter 5 of the NEMA provide for an assessment of development impacts on the cultural (heritage) and social environment and for Specialist Studies in this regard. The end purpose of such a report is to alert the developer (Eskom in this case), the environmental consultant, SAHRA or PHRA and interested and affected parties about existing heritage resources that may be affected by the proposed powerline development, and to recommend mitigatory measures aimed at reducing the risks of any adverse impacts on these heritage resources.

Assessing the Significance of Heritage Resources

The appropriate management of cultural heritage resources is usually determined on the basis of their assessed significance as well as the likely impacts of any proposed developments. Cultural significance is defined in the Burra Charter as meaning aesthetic, historic, scientific, or social value for past, present, or future generations (Article 1.2). Social, religious, cultural, and public significance are currently identified as baseline elements of this assessment, and it is through the combination of these elements that the overall cultural heritage values of the site of interest, associated place or area are resolved.

Not all sites are equally significant and not all are worthy of equal consideration and management. The significance of a place is not fixed for all time, and what is considered of significance at the time of assessment may change as similar items are located, more research is undertaken and community values change. This does not lessen the value of the heritage approach, but enriches both the process and the long-term outcomes for future generations as the nature of what is conserved and why, also changes over time (Pearson and Sullivan 1995:7). This assessment of the Indigenous cultural heritage significance of the Site of Interest as its environments of the study area will be based on the views expressed by the traditional authority and community representatives, consulted documentary review and physical integrity.

African indigenous cultural heritage significance is not limited to items, places or landscapes associated with pre-European contact. Indigenous cultural heritage significance is understood to encompass more than ancient archaeological sites and deposits, broad landscapes, and environments. It also refers to sacred places and story sites, as well as historic sites, including mission sites, memorials, and contact sites. This can also refer to modern sites with particular resonance to the indigenous community. The site of interest considered in this project falls within this realm of broad significance.

Archaeological sites, as defined by the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people once lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and non-renewable. Many such sites are unfortunately lost on a daily basis through infrastructure developments such as powerlines, roads and other destructive economic activities such as mining and agriculture. This true for the North West Province (proposed project area) whose main economic activities are mining and agriculture. It should be noted that once archaeological sites are destroyed, they cannot be replaced as site integrity and authenticity is permanently lost. Archaeological heritage contributes to our understanding of the history of the region and of our country and continent at large. By preserving links with our past, we may be able to appreciate the role past generations have played in the history of our country and the continent at large.

Categories of Significance

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites. In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

Aesthetic Value:

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

Historical Value:

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually a place has historical value because of some kind of influence by an event, person, phase or activity.

Scientific Value:

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

Social Value:

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group. It is important for heritage specialist input in the EIA process to take into account the heritage management structure set up by the NHR Act. It makes provision for a 3-tier system of management including the South Africa Heritage Resources Agency (SAHRA) at a national level, Provincial Heritage Resources Authorities (PHRAs) at a provincial and the local authority. The Act makes provision for two types or forms of protection of heritage resources; i.e. formally protected and generally protected sites:

Formally Protected Sites

- Grade 1 or national heritage sites, which are managed by SAHRA
- Grade 2 or provincial heritage sites, which are managed by the PHRA.
- Grade 3 or local heritage sites.

General Protection

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 70 years.
- Structures older than 60 years.

The certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low. The significance of archaeological sites is generally ranked into the following categories:

Significance Rating Action

No significance: sites that do not require mitigation.

Low significance: sites, which may require mitigation.

2a. Recording and documentation (Phase 1) of site; no further action required

2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction

Medium significance: sites, which require mitigation.

3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]

High significance: sites, where disturbance should be avoided.

4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism

High significance: Graves and burial places

4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinternment [including 2a, 2b & 3]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

An important aspect in assessing the significance and protection status of a heritage resource is often whether or not the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and mitigated in order to gain data /information, which would otherwise be lost.

Table 1: Evaluation of the proposed development as guided by the criteria in NHRA, MPRDA and NEMA

ACT	Stipulation for developments	Requirement details
NHRA Section 38	Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	Yes
	Construction of bridge or similar structure exceeding 50m in length	No
	Development exceeding 5000 sq. m	No
	Development involving three or more existing erven or subdivisions	No
	Development involving three or more erven or divisions that have been consolidated within past five years	No
	Rezoning of site exceeding 10 000 sq. m	No
	Any other development category, public open space, squares, parks, recreation grounds	No
NHRA Section 34	Impacts on buildings and structures older than 60 years	No
NHRA Section 35	Impacts on archaeological and paleontological heritage resources	Subject to identification during Phase 1 walk down survey
NHRA Section 36	Impacts on graves	Subject to identification during Phase 1
NHRA Section 37	Impacts on public monuments	No
Chapter 5 (21/04/2006) NEMA	HIA is required as part of an EIA	Yes
Section 39(3)(b) (iii) of the MPRDA	AIA/HIA is required as part of an EIA	Not a mining development

Other relevant legislations

The Human Tissue Act

Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925 Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and the Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial Member of the Executive Committee as well as the relevant Local Authorities.

Terms of Reference

The author was instructed to conduct an AIA/HIA study addressing the following issues:

- Archaeological and heritage potential of the proposed powerline routes and substation development sites including any known data on affected areas;
- Provide details on methods of study; potential and recommendations to guide the PHRA/ SAHRA to make an informed decision in respect of authorisation of the proposed development.
- Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located in and around the proposed development site;
- Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value;
- Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions;
- Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources;
- Review applicable legislative requirements;

PHOTOGRAPHIC PRESENTATION OF THE PROJECT AREA

Plate 1: Photo 1: View of Pluto Substation in Gauteng where the proposed powerline will start (Photograph © by Author 2018).

Plate 2: Photo 2: View of Watershed substation where the proposed powerline will turn to south westerly direction (Photograph © by Author 2018).

Plate 3: Photo 3: View of cultivated agriculture fields which characterise the entire project area (Photograph © by Author 2018).

Plate 4: Photo 4: View of sunflower which is one of the main crops in the North West (Photograph © by Author 2018)

Plate 5: Photo 5: View of maize crop which is the main crop in the project area (Photograph © by Author 2018)

Plate 6: Photo 6: View of cultivated fields which are typical of the project area (Photograph © by Author 2018)

Plate 7: Photo 7: View of vast agriculture fields which are lying fallow (Photograph © by Author 2018). Note that the entire project area from Carltonville to Mahikeng is characterised by agriculture fields.

Plate 8: Photo 8: View of existing powerline from Pluto substation to Watershed substation (Photograph © by Author 2018). Note that the proposed Alternative 2a route will run parallel to the existing 275kv line

Plate 9: Photo 9: View of isolated farm structure within the proposed project area (Photograph © by Author 2018)

Plate 10: Photo 10: View of patches of blue gums which are scattered throughout the project area (Photograph © by Author 2018).Note that patches of blue gums indicate the footprint of early European settlements in the project area

Plate 11: Photo 11: View of an abandoned farm house along the proposed Alterative 2 powerline route (Photograph © by Author 2018)

Plate 12: Photo 12: View of some of isolated abandoned buildings along Alternative 1 powerline route (Photograph © by Author 2018)

Plate 13: Photo 13: View of abandoned settlement along both Alternative 1 and Alternative 2a powerline route (Photograph © by Author 2018)

Plate 14: Photo 14: View of abandoned farm house along Alternative 2a powerline route (Photograph © by Author 2018)

Plate 15: Photo 15: View of abandoned homestead along Alternative 2a route (Photograph © by Author 2018)

Plate 16: Photo 16: View of farm house between Alternative 1 and Alternative 2a powerline routes (Photograph © by Author 2018)

Plate 17: Photo 17: View of farm house along Alternative 1 powerline route (Photograph © by Author 2018)

Plate 18: Photo 18: View of farm house along Alternative 1 powerline route (Photograph © by Author 2018)

Plate 19: Photo 19: View of farm house still in use along Alternative 1 powerline route (Photograph © by Author 2018)

Plate 20: Photo 20: View of a patch of blue gums marking a historical settlement (Photograph © by Author 2018)

Plate 21: Photo 21: View of new settlements emerging along the proposed Alternative 1 powerline route (Photograph © by Author 2018)

Plate 22: Photo 22: View of cement plant near Lichtenburg (Photograph © by Author 2018) Note that the proposed Altrnative 2 powerline pass near this plant

Plate 23: Photo 23: View of previous small scale mining sites (manganese and diamond) (Photograph © by Author 2018)

Plate 24: Photo 24: View of previous mining diggings along the proposed Alternative 2a powerline route (Photograph © by Author 2018)

Plate 25: Photo 25: View of abandoned farm buildings and mine diggings on the Farm Wildfontein along Alternative 2a powerline route (Photograph © by Author 2018)

Plate 26: Photo 26: View of previous prospecting within the Farm Wildfontein (Photograph © by Author 2018)

Plate 27: Photo 27: View of grazing land along Alternative 1 powerline route (Photograph © by Author 2018)

Plate 28: Photo 28: View of farm burial site along Alternative 1 powerline route (Photograph © by Author 2018)

Plate 29: Photo 29: View of a burial site on the farm Widfonten along Alternative 2a route (Photograph © by Author 2018)

Plate 30: Photo 30: View of farm burial site along Alternative 1 powerline route (Photograph © by Author 2018)

Plate 31: Photo 31: View of farm burial site along Alternative 2a powerline route (Photograph © by Author 2018)

Plate 32: Photo 32: View of road works along proposed Alternative 2a powerline route near Tshoneng (Photograph © by Author 2018)

Plate 33: Photo 33: View of potsherds retrieved from a road construction site near Alternative 2a powerline route at Tshoneng (Photograph © by Author 2018)

Plate 34: Photo 34: View of previously cleared agriculture fields along Alternative 1 powerline route (Photograph © by Author 2018).

Plate 35: Photo 35: View of residential development marking the boundary of the development site (Photograph © by Author 2018)

Plate 36: Photo 36: View of previously cleared agriculture fields along the powerline route (Photograph © by Author 2018)

Plate 37: Photo 37: View of cornfields and existing powerline route along Alternative 2a powerline route(Photograph © by Author 2018)

Plate 38: Photo 38: View of residential development marking the boundary of the development site (Photograph © by Author 2018)

Plate 39: Photo 39: View of proposed substation site within grazing area (Photograph © by Author 2018)

Plate 40: Photo 40: View of proposed substation within grazing area (Photograph © by Author 2018)

Plate 41: Photo 41: View of proposed substation site within grazing area (Photograph © by Author 2018)

Plate 42: Photo 42: View of proposed substation site (Photograph © by Author 2018)

Plate 43: Photo 43: View of proposed substation site (Photograph © by Author 2018)

3 METHODOLOGY

Relevant published and unpublished sources were consulted in generating desktop information for this report. This included online databases such as the UNESCO website, Google Earth, Google Scholar and SAHRIS. Previous HIA in the project area were also consulted. A number of published works on the archaeology, history and palaeontology were also consulted. This included dedicated archaeological, paleontological and geological works by (Breutz 1956; 1968; 1987; Button 1971; Clarck 1971; Eriksson *et al*. 1975; Bertrand and Eriksson 1977; Humphreys 1978; Humphreys and Thackeray 1983; Beaumont and Vogel 1984; Beaumont and Morris 1990; Beaumont 1999; Holmgren *et al*. 1999; Johnson *et al*. 1997; Peabody 1954; Shillington 1985; Wills 1992; Young 1934; 1940). Thus, the proposed development by Eskom was considered in relation to the broader landscape, with a key requirement of the ICOMOS Guidelines.

The proposed powerline and substation development requires clearance and authorisation from government compliance agencies including the heritage authority of SAHRA. The objectives of this report are to:

- Fulfil the legislative requirements of the National Heritage Resources Act, Act 25 of 1999.
- Identify and describe, (in terms of their conservation and / or preservation importance) sites of cultural and archaeological importance that may be affected by the proposed powerline and substation development. This study searched for sites and features of traditional historical, social, scientific, cultural, and aesthetic significance within the affected study area; the identification of gravesites.
- Assess the significance of the resources where they are identified.
- Evaluate the impact thereon with respect to the socio-economic opportunities and benefits that would be derived from the proposed development.
- Provide guidelines for protection and management of identified heritage sites and places (including associated intangible heritage resources management that may apply).
- Consult with the affected and other interested parties, where applicable, in regard to the impact on the heritage resources in the project's receiving environment.
- Make recommendations on mitigation measures with the view to reduce specific adverse impacts and enhance specific positive impacts on the heritage resources.
- Take responsibility for communicating with the SAHRA and other authorities in order to obtain the relevant permits and authorization with reference to heritage aspects.

In order to meet the objectives of the AIA/HIA Phase 1 study, the following tasks were conducted: 1) site file search, 2) literature review, 3) consultations with the affected communities, 4) completion of a field survey and assessment and 5) analysis of the acquired data and report production. The following tasks were undertaken:

- Preparation of a predictive model for archaeological heritage resources in the study area.

- A review and gap analysis of archaeological, historical, and cultural background information, including possible previous heritage consultant reports specific to the affected project area, the context of the study area and previous land use history as well as a site search;
- Field survey of the proposed powerline routes and substation sites in order to test the predictive model regarding that heritage sites in the area;
- Physical cultural property recording of any identified sites or cultural heritage places;
- Identification of heritage significance; and
- Preparation of AIA/HIA report with recommendation, planning constraints and opportunities associated with the proposed development.

Walking surveys were conducted in order to identify and document archaeological and cultural sites within the proposed powerline and substation development area. Formal settlements, grazing lands; village roads and main road infrastructures, cultivated cornfields, distribution & transmissions lines and other auxiliary infrastructures dominate the affected project area. The entire project area was accessible through a network of main roads, district roads and farm tracks used to access the settlements. Although some sections of ground surface were covered with grass, thick bushes and crops such as maize, sunflower and soya beans, this did not hinder identification of possible archaeological sites in surveyed areas. Geographic coordinates were obtained with a handheld Garmin GPS global positioning unit. Photographs were taken as part of the documentation process during field study.

3.1 Assumptions and Limitations

The investigation has been influenced by the unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence) and the difficulty in establishing intangible heritage values. It should be noted that archaeological deposits (including graves and traces of archaeological heritage) usually occur below the ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted immediately, and a competent heritage practitioner, SAHRA or PHRA must be notified in order for an investigation and evaluation of the find(s) to take place (see NHRA (Act No. 25 of 1999), Section 36 (6). Recommendations contained in this document do not exempt the developer from complying with any national, provincial and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA. The author assumes no responsibility for compliance with conditions that may be required by SAHRA in terms of this report

The field survey did not include any form of subsurface inspection beyond the inspection of burrows, road cut sections, and the sections exposed by erosion or field ploughing. Some assumptions were made as part of the study and therefore some limitations, uncertainties and gaps in information would apply. It should however, be noted that these do not invalidate the findings of this study in any significant way:

- The proposed powerline and substation development will be limited to specific right of site as detailed in the development layout (Figure 2 & 3).
- The construction team to provide link and access to the proposed site will use the existing access roads and there will be no construction beyond the demarcated site.
- No excavations or sampling were undertaken, since a permit from heritage authorities is required to disturb a heritage resource. As such the results herein discussed are based on surficially observed indicators. However, these surface observations concentrated on exposed sections such as road cuts and clear farmland.
- This study did not include any ethnographic and oral historical studies nor did it investigate the settlement history of the area.

3.2 Consultation

Public consultations are being conducted by an independent practitioner and issues raised by Interested and Affected parties will be presented during Specialist integration meetings. Issues relating to heritage will be forwarded to the heritage specialist. Integrated Specialist Services team consulted farm owners in respect of heritage resources such as graves, historical buildings and structures located in their farms. A questionnaire was sent to each landowner to confirm if there are any heritage resources in his or her farm (see list of farmers consulted in Appendix 1)

4 CULTURE HISTORY BACKGROUND OF THE PROJECT AREA

Stone Age Archaeology

The project area is located in the North West Province of South Africa that boosts a rich traditional homeland of the contemporary Western Sotho-Tswana including Hurutshe, Kwena, and Kgatla (Huffman 2007, Coetzee 2010). Archaeological and heritages studies in the region indicate that the area is of high pre-historic and heritage significance. It is in fact a cultural landscape where palaeontological, Stone Age, Iron Age and Historical period sites contribute the bulk of the cultural heritage of the region (also Calebrese 1996; Huffman, 2007; Murimbika, 2006; Schoeman, 2006; Meyer, 2000; van Doornum, 2008).

Stone Age sites are general identifiable by stone artefacts found scattered on the ground surface, as deposits in caves and rock shelters as well as in eroded gully or river sections. Archaeological sites recorded in the project region confirms the existence of Stone Age sites that conform to the generic SA periodization split into the Early Stone Age (ESA) (2.5 million years ago to 250 000 years ago), the Middle Stone Age (MSA) (250 000 years ago to 22 000 years ago) and the Late Stone Age (LSA) (22 000 years ago to 300 years ago). Stone Age sites in the region are also associated with rock painting sites. Cave sites also exist on the landscape south west of the project area. Concentrations of **Early Stone Age (ESA)** sites are usually present on the flood-plains of perennial rivers and may

date to over 2 million years ago. These ESA open sites may contain scatters of stone tools and manufacturing debris and secondly, large concentrated deposits ranging from pebble tool choppers to core tools such as hand axes and cleavers. The earliest hominids who made these stone tools, probably not always actively hunted, instead relying on the opportunistic scavenging of meat from carnivore fill sites.

Very little is known about the pre-historical context of the Project Area. However, at a limestone working site in Taung paleo-anthropological evidence of the emergence of humans' earliest ancestors were found when the fossilised skull of an Australopithecus (man-ape) child were brought to the surface decades ago. So far remains of Australopithecine and Homo habilis have also been found in the Blaauwbank region near Krugersdorp in the Gauteng Province. Homo habilis.

The Acheulian industrial complex replaced the Oldowan industrial complex during the Early Stone Age. This phase of human existence was widely distributed across the world and is associated with Homo Erectus, who manufactured hand-axes and cleavers from as early as one and a half million years ago. Acheulian sites will most probably be found in the larger Project Area.

Middle Stone Age (MSA) sites also occur on flood plains, but are also associated with caves and rock shelters (overhangs). Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris. Tools may have been hafted but organic materials, such as those used in hafting, seldom preserve. Limited drive-hunting activities are also associated with this period.

Sites dating to the **Later Stone Age (LSA**) are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material. By using San (Bushman) ethnographic data a better understanding of this period is possible. South African rock art is also associated with the LSA.

In the northern regions of South Africa at least three settlement phases have been distinguished for early prehistoric agropastoralist settlements during the **Early Iron Age** (EIA). Diagnostic pottery assemblages can be used to infer group identities and to trace movements across the landscape. The first phase of the Early Iron Age, known as **Happy Rest** (named after the site where the ceramics were first identified), is representative of the Western Stream of migrations, and dates to AD 400 - AD 600. The second phase of **Diamant** is dated to AD 600 - AD 900 and was first recognized at the eponymous site of Diamant in the western Waterberg. The third phase, characterised by herringbone-decorated pottery of the **Eiland** tradition, is regarded as the final expression of the Early Iron Age (EIA) and occurs over large parts of the North West Province, Limpopo Province, Gauteng and Mpumalanga (Huffman

2007, Coetzee 2010). The Eiland tradition occurs over large areas in North West Province. The Eiland tradition has been regarded as the last expression of Early Iron Age that has been date to AD 900 – 1200. This phase has been dated to about AD 900 - AD 1200. These sites are usually located on low-lying spurs close to water.

The Late Iron Age is well represented in the central parts of North-West although stone walled sites have also been reported near Lichtenburg and Mahikeng. In fact, Mahikeng may have been established on Late Iron Age stone walled sites considering the fact that this name refers to 'the place of stone walls'. The Late Iron Age in the wider study area is associated with Tswana clans such as the Rolong, Tloung, Kwena and other smaller less well known groups.

The North West Province region hosts some of southern Africa's most important Late Iron Age archaeological remains. The Iron Age in southern Africa is associated with the recent peopling of South Africa since the arrival of Bantu-speaking mixed farmers who practised food and metal production and sedentarism that stretch as far back at the 5th Century AD (Berg 1999). Stonewalled enclosures situated on hilltops are characteristic of the Late Iron Age (LIA) settlements that are dated between AD 1640-1830 widely found across the affected landscape. These include sites dating to AD 1500 - AD 1700 represented by the Olifantspoort and Madikwe facies of the Urewe tradition (Huffman, 2007). Other LIA sites in the area date to AD 1650 - AD 1840 and include the Uitkomst, Rooiberg, and Buispoort facies of the Urewe tradition (Huffman, 2007). Between AD 1700 and AD 1750 the Kgafela settled in Pilanesberg area named after Chief Pilane ruler of the Kgafela people who reigned between AD 1825 and AD 1859. From AD 1600 to AD 1800 various Sotho-Tswana speaking communities settled in and around the Brits area (Berg, 1999; Pistorius, 2009). These communities included the Kwena, Kgatla, Fokeng and Po and had small farm style settlements throughout the area (Berg, 1999). The Fokeng were very active in this area during the early 19th century and also built their capital at Phokeng. Various Sotho-Tswana sites in the district of Brits have been excavated and yielded faunal remains. These sites include Boitsemagano, Molokwane and Mabjanamatshwana (Plug and Baderhorst, 2006). Some of the sites that are linked to this are found in the neighbouring Waterberg regions.

The province is also endowed with ancient copper mines that date back to pre-colonial times in the Dwarsberg. Grant and Huffman (2007) found 20 homesteads with pottery assemblages belonging to Moloko cluster. According to Grant *et al,* (2007) Moloko is the archaeological name for the styles of pottery produced by Sotho-Tswana speakers. The facies called Madikwe belongs to the middle phase of the sequence dating between AD 1500 and 1700. Prehistoric copper production was also practiced in the province as is evidenced by copper ore, slag and tuyeres. The North West Province also is host to the Cradle of Human kind area which also a World Heritage Site. From the late 1700s, trade in supply of meat to passing ships on the east coast had increased substantially to an extent that by 1800 meat trade is estimated to have surpassed ivory trade. At the same time population was booming following the increased food production that came with the introduction of maize that became the staple food. These

changes promoted further westwards movement by the Nguni farming communities. Naturally, there were signs that population groups had to compete for resources and at time move out of region, which may have been under stress. KwaZulu Natal, east of the North West Province has a special place in the history of the region and country at large. This relates to the most referenced Mfecane (wandering hordes) period of tremendous insecurity and military stress. Around the 1805, the region was witnessing the massive movements, which later came to be associated with the Mfecane. The causes and consequences of the Mfecane are well documented elsewhere (e.g. Hamilton 1995; Cobbing 1988).

Historical Period

Early European explorers and missionaries visited and settled in the project area. Their written accounts about precolonial African Societies are important to our understanding and interpretation of archaeological remains. For example, John Campbell visited BaHurutshe of Kaditshwene in the 1920s and David Livingstone established a mission station to the north of Lichtenburg in 1843 (Mbenga and Mason Date unknown). Their activities paved the way for later occupation by European settlers and establishment of towns in the late 1800.

Ventersdorp, Lichtenburg and Mahikeng are the three most important towns within the general project area. Lichtenburg was established on the farms Middelbosch and Doornfontein in 1873. The farms were donated by Hendrik Greef, father-in-law of Gen. J.H. de la Rey to the Zuid Afrikaansche Republiek (ZAR) to develop a town. It should be noted that the Lichtenburg area was inhabited by the BaRolong under Montsiwa. The BaRolong protested against occupation of their land by the Voortrekkerss and many skirmishes occurred in and around Lichtenburg. The initial development of the town was slow and it only received municipal status in 1904.

Important historical events that are associated with Lichtenburg include:

- General J.H. de la Rey, the infamous Boer General which was nicknamed 'Lion of the Western Transvaal' and who lead several successful campaigns against the British during the Anglo Boer War, was buried in the town in 1914. His house which was torched during the Anglo Boer War was rebuilt after the war.
- The residential house of Hendrik Greeff, founder of Lichtenburg, was built on the farm Manana in 1875. It is still standing today.
- The 'Nederduitsch Gereformeerde' Church which was built in 1890 is a national monument.
- The Molopo Oog ('eye') which is a natural wonder and which consists of a sustainable fountain is situated to the north-west of Lichtenburg on route to Zeerust.
- The Gruisfontein battlefield where several Boers perished during the Anglo Boer War is located to the east of Lichtenburg.

- The farmer's statue in Lichtenburg symbolises the history of agriculture which played a pivotal role in the development of this part of the North-West Province.

Lichtenburg is also known for the most 'famous diamond rush in the history of South Africa'. While erecting a fence on the farm Elandsputten, Johan Voorendijk discovered a diamond on 13 March 1929. This led to the biggest diamond rush in South Africa's history. This event took place at Bakerville, 25km north-west of Lichtenburg on route to Zeerust. Just like at Pilgrims rest in Mpumalanga, thousands of fortune seekers from all over descended on Elandsputten with approximately 150 000 people digging, washing and panning for diamonds on any given day during the first three years of mining. (At one occasion 30 000 potential diggers participated in a rush to state their claims). Ten years after the diamond rush regressed, approximately seven million carats of diamonds were mined. The mining ceased in 1935 leaving traces of diggings, the remains of mining settlements in the vicinity of Lichtenburg are best preserved at Bakkersville. Some of the old dimond diggings around Lichtenburg are still visible and clearly indicated on the topographic map 2626AA 1:50 000 Topo map. Today the Bekkersville site is a provincial heritage site and the proposed Alternative 2a powerline route was shifted partly to avoid the provincial heritage site. The cattle dip at Elandsputte located approximately 3 km to the north east of Bekkerville is also registered as a provincial heritage site (SAHRA 20017).

The most important crops in the area include maize, sunflowers and peanuts and cattle rearing. Cement manufacturing further contributes towards the local economy. Limestone (calcrete) that is needed in the cement manufacturing process is mined in the district. Another important feature is the Lichtenburg Game breeding centre established in 1974.

The events which lead to the establishment of Mahikeng and Vryburg during the late 19th century were extraordinarily similar. During a dispute between two Barolong chiefs in 1881, Boers and other independent adventurers were recruited by the two chiefs. For services rendered the men each received a farm as payment. The new settlers with their 140 farms established the independent Republic of Goosen with Rooigrond as capital 15km to the south-east of Mahikeng. (The capital was first called Vrywilligersrust and later Heliopolis). Both the Republics of Stellaland (near Vryburg) and Goosen were destroyed by a British expeditionary force in 1885 and incorporated in British Bechuanaland. The British commander, Sir Charles Warren laid out a new town on a place which the Tswana's called 'Mahikeng (the place of stones).

Members of the Bechuanaland border police were stationed at this place to maintain order amongst the various ethnic groups who gradually developed into a stable community. The town's name was gradually corrupted to an English version of Mahikeng, namely 'Mafiking'. Mahikeng later became the administrative capital of the Bechuanaland Protectorate Mahikeng was besieged for 217 days (October 1899-May 1901) during the Anglo-Boer War (1899-1902). The British garrisoned the town and with the help of the Barolong and Fingoes fought against the

Boers. The British also took up various positions around the town, and like the Boers, erected forts, layers and stone bulkwarks. Sol Plaatjes participated in the siege of Mahikeng. Because of his linguistic talent he became the intermediary between the British forces under Colonel RSS Baden-Powell and the Barolong population of some 5 000 who lived near the town. Mahikeng is particularly well remembered for the following events:

- The disastrous Jameson invasion which commenced at Pitswe, a few kilometres to the north-west of Mahikeng on 29 December 1895, The Jameson column was stopped and captured near Krugersdorp on 2 January1896.
- ZAR forces besieged Mahikeng during the Anglo Boer War from 14 October 1899 to 17 May 1900. General Baden Powell's defensive garrison resisted the Boer onslaught for 271 days when the siege was lifted with the arrival of military support from the south.
- The Boy Scout movement was born during the siege of Mahikeng. Young men were organised in non-combatant groups who were responsible for various administrative and emergency services.
- After the Anglo Boer War, the town's economy was based on cattle farming, dairy products, maize agriculture, cement manufacturing and employment in the large railway shunting yards. Mahikeng remained the seat of the British administration of the Bechuanaland Protectorate until 1965 when the 'independent' Republic of Bophuthatswana came into being. Gabarone became the capital of the new state. The administrative quarters and buildings were located in the Imperial Reserve for more than seventy years and were only used by the British. Mahikeng's original name was restored in 1980 when the town was incorporated inthe newly founded Bophuthatswana homeland. After independence Mmabatho ('mother of the nation'), a new capital, was developed in the veldt next to Mahikeng.

Heritage resources associated with Mahikeng include:

- Kanonkoppie, south east of Mahikeng was one of the important British forts during the siege of Mahikeng.
- Wondergat, which is a natural sinkhole filled with groundwater. The theory is that it is the collapsed dome of a dolomitic compartment. It is a public site where recreational diving takes place. It is 70 metres in diameter and between 38 and 55 meters deep. It is located 30km to the south-east of the town. The hole was reportedly used many years ago as a drinking place for cattle when the hole was filled to ground level.
- The Anglican Church of St John was designed by Herbert Baker and was built with stone from Zimbabwe. It serves as a commemorative beacon for those who have died during the siege.

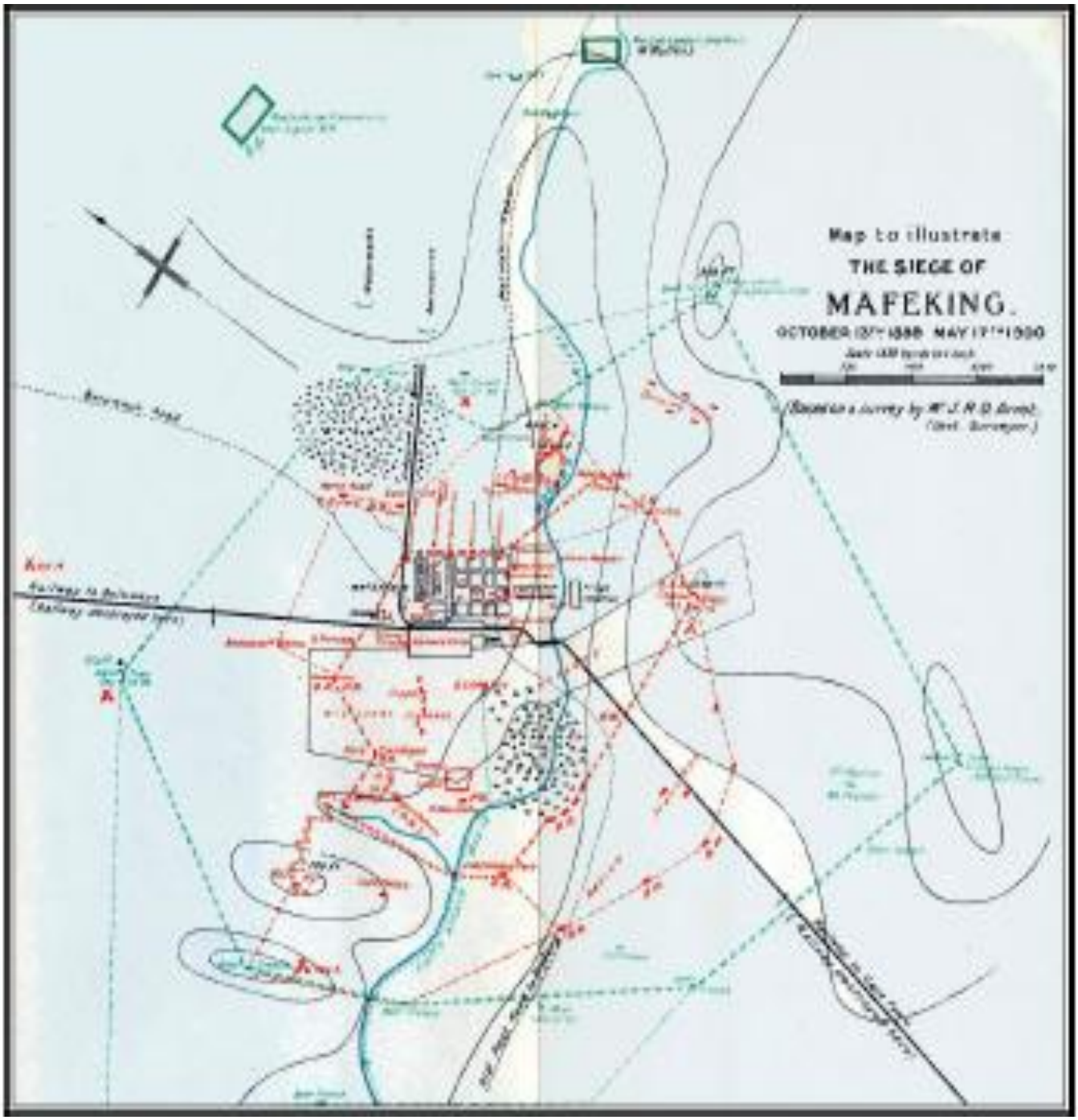


Figure 6: Map of the siege of Mafikeng (Amery 1906)

Intangible Heritage

As defined in terms of the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003) intangible heritage includes oral traditions, knowledge and practices concerning nature, traditional craftsmanship and rituals and festive events, as well as the instruments, objects, artefacts and cultural spaces associated with group(s) of people. Thus, intangible heritage is better defined and understood by the particular group of people that uphold it. In the present study area, very little intangible heritage is anticipated on the development footprint because

most historical knowledge does not suggest a relationship with the study area per se, even though several other places in the general area do have intangible heritage.

SAHRIS Database and Impact assessment reports in the proposed project area

Several AIA/HIA studies were conducted in the general vicinity of the study area. Hutten (2011, 2012), conducted studies for solar parks in Lichtenburg and Mahikeng. Kusel (2008) also conducted studies for housing development at Lichtenburg, the study noted colonial heritage and mining heritage in and around Lichtenburg. Pistorius (2011) conducted studies for a photovoltaic solar park in Mahikeng. Pistorius (2011) confirmed that the Lichtenburg-Mahikeng area has not yet been subjected to a detailed archaeological survey. However, ethnographic surveys have pointed out the presence of stone walled sites dating from the Late Iron Age. The Late Iron Age is well represented in the central parts of North-West than it is on the western parts of North West region. However stone walled sites have also been reported near Lichtenburg and Mahikeng but no detailed studies of the sites were conducted. The studies also confirm the occurrence of stone walled Late Iron Age sites in the North West Region in Ventersdorp area (Kusel 2011). All the studies mention the existence of structures older than 60 years and burial sites in the project area (Kusel 2007, 2008, 2009, Van Shchalkwyk 2011, Hutten 2011, 2012, Pretorius 2011, 2011b). Pistorius (2011) detailed historical heritage associated with Lichtenburg and Mahikeng. Van Schalkwyk (2008) also conducted studies for a powerline development from Watershed Substation to Mmabatho Substation in Mahikeng. This study to a large extent is very relevant to the current study as it stretches a longer distance from Lichtenburg to Mahikeng. The report notes potential of encountering ESA, MSA and LSA artefacts but none were recorded along the powerline route probably because the entire project area has been subjected to extensive agriculture and mining activities. The western side of the North west Province has limited stone walled sites compared to the central and northern sections such as the Madibeng, Groot Marico, Zeerust and Pilanesburg areas where massive LIA sites occur. Van Schalkwyk and De Jong 1995 conducted extensive studies at the Bakersville Provincial heritage site. Kruger (2016) presents a detailed account of heritage resources particularly the Zeerust and Groot Marico area in the northern and eastern part of the North West Province. He provides details about the siege of Mafikeng, the battle of Mosega (Ndebele Boer war), Kaditshwene National Heritage site and a host of other heritage sites in the Ngaka Modiri Molema District Municipality. These studies combined, provide an insight in the heritage character of the current project area.

5 RESULTS OF THE ARCHAEOLOGICAL/HERITAGE ASSESSMENT STUDY

The proposed powerline routes cut through mixed land use areas of the North West Province. The proposed powerline routes and substation sites have been established through consideration of biophysical, social, technical, and cultural aspects. The Environmental Impact Assessment process will aim to provide a final site assessment of the proposed development site based on biophysical, social, cultural, and technical considerations. The following section presents results of the archaeological and Heritage survey conducted along the proposed project area.

Table 2: Summary of Findings

Heritage resource	Status/Findings
Buildings, structures, places and equipment of cultural significance	There sparsely located farmstead and farm structures of varying significance throughout the project area. Significant historical buildings occur in urban locations such as Ventersdrop, Lichtenburg and Mahikeng
Areas to which oral traditions are attached or which are associated with intangible heritage	None exists on the study area
Historical settlements and townscapes	The proposed powerline bypasses major towns in the project area
Landscapes and natural features of cultural significance	None
Archaeological and palaeontological sites	The project area is archaeologically and palaeontological sensitive however no significant archaeological remains were recorded during the survey
Graves and burial grounds	There are farms and villages where graves occur at varying distances from the proposed routes. Farm owners have been requested to declare burial sites within their farms
Movable objects	None
Overall comment	The surveyed area has heritage resources of varying significance most of which may be located within privately owned farms where access is very restricted. The substation sites are located within grazing area with limited chances of encountering heritage resources.

Table 3: Summary of findings and coordinates

Site/Point	Coordinates	Description
Pluto Substation	S 26° 16' 19.2"; E 27° 24 '. 11 0".	Substation within disturbed area with multiple powerlines and agriculture fields
PMGBS1	S 26° 16' 19.24"; E 27° 15 '. 47".	Burial site on Green Corridor
PMPHFH1	S 26° 9' 5.5"; E 26° 44 '11. 1".	Historical farm house and structures
PMGBS2	S 26° 17' 33.23"; E 26° 37 '10. 6".	Historical Burial site on Green Corridor
Watershed Substation	S 26° 5' 13.9"; E 26° 8 '2.5".	Abandoned and dilapidated farm house
PMRS1	S 26° 4' 35.076"; E 25° 55 '. 24.4".	Ruined structures along Shiella road near Tsoneng
PMSP 1	S 26° 4' 25. 7"; E 25° 55' 33.4".	Scatter of potsherds exposed during road construction
PMAH1	S 26° 4' 43.6"; E 26° 54 '. 57 7".	Abandoned homestead
PMAFH 2	S 26° 4' 43.6"; E 25° 54 '57.7".	Abandoned farm house with potential for graves
PMHFH3	S 26° 1' 17.4"; E 27° 26 '. 47. 6".	Occupied historical farm house at VK8
PMHFH4	S 26° 9' 48.5"; E 27° 55 '13 9".	Farm house
PMHFH5	S 26° 9' 36.0"; E 26° 54 '. 30 2".	Farm house
PMBS2	S 26° 9' 35.2"; E 26° 53 '5. 2".	Village Cemetery
PMBS3	S 26° 9' 50.4"; E 27° 22 '9. 4".	Traditional burial site in the vicinity of Alternative 2a

5.1 ALTERNATIVE 1 POWERLINE ROUTE (GREEN)

Archaeological and Heritage Site

The proposed Alternative 1 powerline route did not yield any confirmable archaeological sites or material. The affected landscape is heavily degraded from current agriculture activities, small scale mining, infrastructure developments and human settlements (See Plates 1-12). There are corn fields, residential, small scale mining, grazing land, powerlines, roads, and other associated infrastructures along the entire project area. As such the proposed powerline, will be an additional development on the project area (Figure 1, 2 and 3) also see Plates 1 to 16). It is assumed that the chances of recovering significant archaeological materials were seriously compromised and limited due to destructive land use patterns such as clearance and residential developments.

Buildings and Structures older than 60 years

The field study identified several buildings and structures of varying significance along the proposed Alternative 1 powerline route. Most of these building are farmsteads and farm structures which are still in use (see Plate 19, 20& 21). The study did not assess their significance and could not establish their ages because the farm owners restricted access to their premises and farms (Nicoline peers.com). There are also ruined farm buildings and structures some of which may have been for farm workers or for evicted African populations to pave way for European settlements and farms (see Plate 16 &17). Although most of the ruined buildings are not of any architectural value they are very significant in respected of ongoing land restitution and must not be destroyed. The survey recorded several ruined homesteads along the proposed powerline route. The ruined buildings and structures are protected by Section 34 of the NHRA. The ages and significance of potentially affected buildings and structures will be assessed in detail once the final route selection is concluded. In addition, the 2km wide surveyed corridor provides adequate space for avoiding any significant buildings and structures on the direct footprint of the proposed powerline route.

Burial grounds and graves

Human remains and burials are commonly found close to archaeological sites; they may be found in abandoned and neglected burial sites, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Archaeological and historical burials are usually identified when they are exposed through erosion and earth moving activities for infrastructure developments such as powerlines and roads. In some instances, packed stones or stones may indicate the presence of informal pre-colonial burials.

The field survey confirmed that there are several burial sites located within settlements and farmsteads. In this regard farm owners were consulted to find out if any burial sites are located within their farms. Some farmers

confirmed that that they are graves located in their farms. They indicated that some belong to farm labourers and previous farm owners. However, access to the affected farms is highly restricted and the matter is being dealt with by the Public Participation Practitioner for the project. Given the length of the line and restricted access to some farms and mining operations, a walk down survey is necessary once the final route is selected. Formal cemeteries do not create problems for any infrastructure developments because they are known and developments can be planned to avoid them. The possibility of encountering previously unidentified burial sites is high along the proposed Alternative 1 powerline route, should such sites be identified during construction, they are still protected by applicable legislations and they should be protected (also see Appendixes for more details). Burial sites older than 60 years are protected by the NHRA and those younger than 60 years are protected by the Human Tissue Act. Exhumation of graves must confirm to the standards set out in the ordinance on excavation (Ordinance no.12 of 1980 which replaced the old Transvaal Ordinance no.7 of 1925.

Significance valuation for Burial Ground, Historic Cemeteries, and Individual Graves

The significance of burial grounds and gravesites is closely tied to their age and historical, cultural, and social context. Nonetheless, every burial should be considered as of high socio-cultural significance protected by practices, a series of legislations, and municipal ordinances.

Historical Monuments and Memorials

The survey did not identify any historical monument and public memorials along the proposed Alternative 1 Powerline route. There are no sites within the proposed development site that are on the National Heritage or provincial List. However, it should be noted that there are Historical Monuments listed on SAHRIS Data base in the Ventersdorp, Lichtenburg, Coligny and Mahikeng areas of North West Province. The proposed development will not impact on any listed monuments and memorials in the project area because it was designed to avoid known heritage sites

Battle fields

The survey did not identify any battle fields along the proposed Alternative 1 powerline route. Most battlefields are located in the Mahikeng area but none of them is located along the proposed powerline route (Figure 3).

Palaeontology

The Palaentological sensitivity map shows that the proposed Alternative 1 powerline route cuts through a sensitive area (see Figure 2). Limestone deposits which may contain fossilised remains of animals, plants or early hominids occur in the project area. For example, the skeleton of the Taung child, which is related to Australopithecine family, was found in limestone deposits at Taung in the North-West Province whilst limestone deposits near Makapans Cave in Mokopane revealed remains of Homo Erectus and other extinct animal species. As such a Palaeontological

study was commissioned to assess the route, the results of study will be presented to the author of this report during specialist integration meeting.

Archaeo-Metallurgy, Prehistoric Mining and Mining Heritage

There are historical and current mining activities in the entire North West Province, however the proposed Alternative 1 powerline route will not affect any of the listed heritage sites such as Bekkerville Provincial Heritage site. Evidence of previous diggings were recorded during the survey but most of them are fairly recent and not protected by the NHRA (see Plate 23, 24, 25, 26).

Natural Heritage

The survey recorded several patches of blue gums scattered throughout the project area. Patches of blue gums mark the footprint of early European settlements in the project area, they are associated with farmsteads and historical graves (see Plate 22,23, 40, 41). As such where ever they occur they provide insights about colonial history of the area and must be avoided where possible.

Visual impacts

The proposed powerline will certainly spoil the visual quality of the landscape. A full visual study was commissioned as part of the specialist studies. Results of the survey will be share during Specialist Integration meetings for the project.

Mitigation

Walk down survey required once the final route is selected.

5.2 ALTERNATIVE POWERLINE ROUTE 2 (PURPLE)

Archaeological and Heritage Site

The proposed Alternative 2a powerline route did not yield any confirmable archaeological sites or material within the 2km corridor. Three isolated potsherds were retrieved along the road construction site at Tshoneng (see Plate 32 and 33). The affected landscape is heavily degraded from previous and current mining, infrastructure developments and agriculture activities along the entire route. There are residential, grazing land, powerlines, roads, and other associated infrastructures around the entire project area. As such the proposed powerline development, will be an additional development on the project area (Figure 1, 2 and 3) also see Plates 1 to 6). It is assumed that the chances of recovering significant archaeological materials were seriously compromised and limited due to destructive land use patterns such as clearance and residential developments.

Buildings and Structures older than 60 years

The survey identified several ruined buildings and farm structures along the proposed Alternative 1 powerline route (see Plate 12,15, 20 27). Most of the recorded buildings and structures are located within privately owned farms where access is restricted due to security reasons. As such the study could not establish the exact ages of the structures to determine their significance and subsequent protection. The study team sent questionnaires to farmers along the powerline route to declare heritage resources in their farms and responses are trickling in slowly.

Burial grounds and graves

The field survey confirmed one burial site located on the farm Farm Wildfontein in Merafong Local Municipality. They are located at GPS coordinates S26° 9' 50.4" E 027° 22' 9.4" (see Plate 29 and 30. The burial site is located approximately 400m from the proposed Alternative 1 powerline route. The site has more than 200 graves probably of farm workers. The graves are arranged in rows and are marked by oval shaped stone piles, a significant number is marked by cement plaster and inscribed tombstones. The oldest grave is for 1937, which may mean that the graves belongs to former labour tenants. Although the possibility of encountering previously unidentified burial sites is low on the proposed development sites, should such sites be identified during construction, they are still protected by applicable legislations and they should be protected (also see Appendixes for more details). Burial sites older than 60 years are protected by the NHRA and those younger than 60 years are protected by the Human Tissue Act. Exhumation of graves must confirm to the standards set out in the ordinance on excavation (Ordinance no.12 of 1980 which replaced the old Transvaal Ordinance no.7 of 1925.

Historical Monuments and Memorials

The survey did not identify any historical monument and public memorials along the proposed powerline route. There are no sites within the proposed development site that are on the National Heritage or provincial List. However, it should be noted that there are Historical Monuments listed on SAHRIS Data base in the Ventersdorp, Lichtenburg and Mahikeng areas. The proposed construction of powerlline will not impact on any listed heritage sites in the project area.

Palaeontology

The SAHRIS Palaeontological sensitive map indicates that the greater part of the proposed Alternative 2a powerline route cuts through palaeontologically sensitive areas (see Figure 2). Limestone deposits which may contain fossilised remains of animals, plants or early hominids occur in the project area. For example, the skeleton of the Taung child, which is related to Australopithecine family, was found in limestone deposits at Taung in the North-West Province whilst limestone deposits near Makapans Cave in Mokopane revealed remains of Homo Erectus

and other extinct animal species. As such a palaeontological study was commissioned and finding will be shared during the integration meetings for finalisation of this report.

Mining Heritage

The survey observed that there are several historical diggings and prospecting activities in the entire project area. The proposed Alternative 2a powerline route was shifted to the south at Watershed Substation to avoid impacting on the Bekkerville Grade 2 Diamond Rush site (see Figure 3). Diggings recorded within privately owned farms were not assessed because entry to the farms is restricted.

Natural Heritage

The survey recorded patches of blue gums along the proposed powerline route. Most of them occur in private farms where access is highly restricted. Patches of blue gums are significant because they are often associated with farmsteads/homesteads and burials and they mark and define footprints of early European settlements such as farms, stores and homesteads in the project area.

Visual impacts

The proposed powerline will certainly affect the visual quality of the project area. A full visual impact study was commissioned and the findings will be shared during specialist integration meetings.

Mitigation

A walk down survey is required once the final route is selected.

5.3 ALTERNATIVE 1 SUBSTATION SITE (GREEN)

Archaeological and Heritage Site

The proposed substation site was assessed alongside the proposed powerline routes. The proposed substation site did not yield any confirmable archaeological sites or material. The affected landscape is heavily degraded from previous agriculture activities. The site is located within a communal residential and grazing area. As such the proposed substation, will be an additional development on the project area (Figure 1, 2 and 3) also see Plates 39 to 42). It is assumed that the chances of recovering significant archaeological materials were seriously compromised and limited due to destructive land use patterns such as clearance and residential developments.

Buildings and Structures older than 60 years

The proposed substation site is located in a grazing area approximately 3km from the nearest village. There are no buildings or structures within the proposed substation site. Therefore, the proposed substation does not trigger Section 34 of the NHRA.

Burial grounds and graves

The field survey did not record any burial site within the proposed substation site. Although the possibility of encountering previously unidentified burial sites is low on the proposed substation sites, should such sites be identified during construction, they are still protected by applicable legislations and they should be protected (also see Appendixes for more details). Burial sites older than 60 years are protected by the NHRA and those younger than 60 years are protected by the Human Tissue Act. Exhumation of graves must confirm to the standards set out in the ordinance on excavation (Ordinance no.12 of 1980 which replaced the old Transvaal Ordinance no.7 of 1925.

Historical Monuments and Memorials

The survey did not identify and historical monument and public memorials within the proposed substation site. There are no sites within the proposed development site that are on the National Heritage or Provincial List. However, it should be noted that there are Historical Monuments listed on SAHRIS Data base in the Mahikeng area. The proposed substation will not impact on any listed heritage sites in the project area.

Mitigation

Mitigation is not required since nothing was found. Only the chance find procedure apply.

5.4 ALTERNATIVE 2A SUBSTATION SITE (PURPLE)

Archaeological and Heritage Site

The proposed substation site did not yield any confirmable archaeological sites or remains. The site is located adjacent to Alternative 1 substation site. Similarly, the site did not yield any confirmable archaeological remains.

Buildings and Structures older than 60 years

The proposed substation site is located within a communal grazing area where there are no settlements. The survey did not record any buildings or structures within the proposed substation site. Similarly, the site does not trigger Section 4 of the NHRA (see Plate 11).

Burial grounds and graves

The field survey did not record any burial site within the proposed substation site. The site is located within a communal grazing area located approximately 3km from the nearest village. It is understood that the nearest village has formal cemetery and the chances of encountering contemporary graves within the site are limited. Although the possibility of encountering previously unidentified burial sites is low on the proposed development site, should such sites be identified during construction, they are still protected by applicable legislations and they should be protected (also see Appendixes for more details). Burial sites older than 60 years are protected by the NHRA and those younger than 60 years are protected by the Human Tissue Act. Exhumation of graves must confirm to the standards set out in the ordinance on excavation (Ordinance no.12 of 1980 which replaced the old Transvaal Ordinance no.7 of 1925.

Historical Monuments and Memorials

The survey did not identify and historical monument and public memorials within the proposed substation site. There are no sites within the proposed development site that are on the National Heritage or provincial List. However, it should be noted that there are Historical Monuments listed on SAHRIS Data base in the Mahikeng area. The proposed powerline and sudation development will not impact on any listed heritage sites in the project area.

Mitigation

Mitigation is not required at this site because no heritage resources were recorded on the proposed site, however, the chance find procedure apply.

ALTERNATIVE 3 SUBSTATION SITE

Archaeological and Heritage Site

The proposed substation site was accessed alongside Alternative 1 and 2. The proposed substation site is located within the same landscape adjacent to the other alternatives. Similarly, the site did not yield any confirmable archaeological remains.

Buildings and Structures older than 60 years

The proposed substation site is also located within a communal grazing area where there are no settlements. The survey did not record any buildings or structures within the proposed substation site. Similarly, the site does not trigger Section 4 of the NHRA.

Burial grounds and graves

The field survey did not record any burial site within the proposed substation site. Similarly, the site is located within a communal grazing area located approximately 3km from the nearest village. The study confirmed that people burry their deceased relatives within the village cemetery located approximately 3km from the proposed development site. The chances of encountering contemporary graves within the site are limited, however, the possibility of encountering unmarked historical graves cannot be ruled out. Although the possibility of encountering previously unidentified burial sites is low on the proposed development site, should such sites be identified during construction, they are still protected by applicable legislations and they should be protected (also see Appendixes for more details). Burial sites older than 60 years are protected by the NHRA and those younger than 60 years are protected by the Human Tissue Act. Exhumation of graves must confirm to the standards set out in the ordinance on excavation (Ordinance no.12 of 1980 which replaced the old Transvaal Ordinance no.7 of 1925.

Historical Monuments and Memorials

The survey did not identify and historical monument and public memorials within the proposed substation site. The proposed substation development will not impact on any listed heritage sites in the project area.

Mitigation

Mitigation is not required for the proposed substation site because no heritage resources were recorded on the proposed site, however, the chance find procedure apply.

6 CUMMULATIVE IMPACTS

The European Union Guidelines define cumulative impacts as: "Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. Therefore, the assessment of cumulative impacts for the proposed powerline and substation project considered the total impact associated with the proposed projects when combined with other past, present, and reasonably foreseeable future developments projects. An examination of the potential for other projects to contribute cumulatively to the impacts on heritage resources from this proposed project was undertaken during the preparation of this report. The total impact arising from the proposed project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated. The project's impact is therefore one part of the total cumulative impact on the environment. The analysis of a project's incremental impacts combined with the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation. The impacts of the proposed project were assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in this case there are several infrastructure developments including agricultural activities where baselines have already been affected, the proposed project will continue to add to the impacts in the region, it was deemed appropriate to consider the cumulative effects of proposed powerline and substation development.

Cumulative impacts are those impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same heritage resources and/or receptors as the proposed Project. Cumulative impacts are therefore generally impacts that act with others in such a way that the sum is greater than the parts. This is, however, not always the case – sometimes they will simply be the sum of the parts, but that sum becomes significant. This section considers the cumulative impacts that would result from the combination of the proposed powerline and substation project.

There are existing infrastructure developments and massive agriculture activities along the proposed powerline routes. As such increased development in the project area will have a number of cumulative impacts on heritage resource whether known or covered in the ground. For example, during construction phase they will be increase in human activity and movement of heavy construction equipment and vehicles that could change, alter or destroy heritage resources along the selected route given that archaeological remains occur on the surface. Cumulative impacts that could result from a combination of the proposed project and other actual or proposed future developments in the broader study area include site clearance and the removal of topsoil could result in damage to or the destruction of heritage resources that have not previously been recorded for example abandoned and unmarked graves. Heritage resources such as burial grounds and graves and archaeological and historical sites

are common occurrences within the greater study area. These sites are often not visible and as a result, can be easily affected or lost. In addition, increased human activity during construction phase allows increased access to nearby heritage resources. Furthermore, many heritage resource in the greater study area are informal, unmarked and may not be visible, particularly during the wet season when grass cover is dense. As such, construction workers may not see these resources, which results in increased risk of resource damage and/or loss. Vibrations and earth moving activities associated with tower foundation excavation has the potential to crack/damage rock art covered surfaces, which are known to occur in the greater study area. In addition, vibration from traffic has the potential to impact buildings and features of architectural and cultural significance. A potential interaction between archaeology, architectural and cultural heritage and landscape and visual during both the construction and operational phase of the proposed project is identified. Construction of the proposed powerline and substation will result in a visual impact and impact on features of architectural and cultural significance. Construction works associated with the provision of material assets such as gravel, in particular underground works have the potential to interact with archaeology, architectural and cultural heritage.

No specific paleontological resources were found in the project area during the time of this study; however, this does not preclude the fact that paleontological resources may exist within the greater study area. As such, the proposed powerline has the potential to impact on possible paleontological resources in the area. sites of archaeological, paleontological, or architectural significance were not specifically identified and cumulative effects are not applicable. the nature and severity of the possible cumulative effects may differ from site to site depending on the characteristics of the sites and variables.

The very purpose of the proposed powerline and substation is to improve the transmission and distribution of electricity, while minimising the impacts of the proposed development. Cumulative impacts refer to additional impacts, which even if acceptable if considered in isolation, would together with the existing impacts, exceed the threshold of acceptability and cause harm to the cultural landscape. Cumulative impacts that need attention are related to the impacts of access roads and impacts to buried heritage resources. Allowing the impact of the proposed powerline to go beyond the surveyed area would result in a significant negative cumulative impact on sites outside the surveyed area. A significant cumulative impact that needs attention is related to stamping by especially construction vehicles during clearance and stringing along the line. Movement of heavy construction vehicles must be monitored to ensure that they do not drive beyond the approved servitude. No significant cumulative impacts, over and above those already considered in the impact assessment, are foreseen at this stage of the assessment process. Cumulative impacts can be significant, if construction vehicles are not monitored to avoid driving through undetected heritage resources.

7 ASSESSMENT OF SIGNIFICANCE

Assessment Criteria

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability: This describes the likelihood of the impact actually occurring

Improbable: The possibility of the impact occurring is very low, due to the circumstances, design or experience.

Probable: There is a probability that the impact will occur to the extent that provision must be made therefore.

Highly Probable: It is most likely that the impact will occur at some stage of the development.

Definite: The impact will take place regardless of any prevention plans and there can only be relied on mitigatory measures or contingency plans to contain the effect.

Duration: The lifetime of the impact

Short Term: The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.

Medium Term: The impact will last up to the end of the phases, where after it will be negated.

Long Term: The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.

Permanent: The impact is non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale: The physical and spatial size of the impact

Local: The impacted area extends only as far as the activity, e.g. footprint

Site: The impact could affect the whole, or a measurable portion of the above mentioned properties.

Regional: The impact could affect the area including the neighboring residential areas.

Magnitude/ Severity: Does the impact destroy the environment, or alter its function

Low: The impact alters the affected environment in such a way that natural processes are not affected.

Medium: The affected environment is altered, but functions and processes continue in a modified way.

High: Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

Negligible: The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.

Low: The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.

Moderate: The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

High: The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

Table 4: The following weights were assigned to each attribute:

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	≤20
	Low	>20 ≤40
	Moderate	>40 ≤60
	High	>60

The significance of each activity should be rated without mitigation measures (WOM) and with mitigation (WM) measures for both construction, operational and closure phases of the proposed development.

Table 3. Impact Assessment Matrix

Alternative 1 powerline route								
Nature of Impact	**Management Measures**	**Duration**	**Scale**	**Magnitude/ Severity**	**Probability**	**Calculations Sum (Duration, Scale, Magnitude) x Probability**	**Proposed Management Measures**	**Significance**
Archaeological Remains	Without management	3	3	6	2	(3+3+6)x2=**24**		Low
	With management	3	2	2	2	(3+2+2)x2=**14**	Induction of construction workers, monitoring by ECO	Negligible
Graves and Burial Grounds	Without management	3	3	1	4	(3+3+1)x4=**28**		Low
	With management	3	3	1	2	(3+3+1)x2=**14**	Mark burial sites, shift route to avoid and induction of construction workers	Negligible
Historical buildings and structures	Without management	3	3	6	3	(3+3+6)x3=36		Low
	With management	3	3	2	2	(3+3+2)x2=16	Mark all historical buildings and structures, shift route to avoid and induction of construction workers.	Negligible
Mining Heritage	Without management	3	3	1	4	(3+3+1)x4=28		Negligible
	With management	3	2	1	2	(3+2+1)x2=12	Induct construction workers, mark all potential mining heritage sites.	Negligible
Monuments and memorials	Without management	3	3	1	1	(3+3+1)x1=7		Low
	With management	1	3	1	1	(1+3+1)x1=5	Induct construction workers and mark any memorials and plaques	Negligible
Natural Heritage	Without management	3	3	6	2	(3+3+6)x2=36		Low
	Without management	3	2	2	2	(3+2+2)x2=14		Negligible

Alternative 2A powerline route								
Nature of Impact	**Management Measures**	**Duration**	**Scale**	**Magnitude/ Severity**	**Probability**	**Significance Calculations: Sum (Duration + Scale +Magnitude) x Probability**	**Proposed Management Measures**	**Significance**
Archaeological Remains	Without management	3	2	1	4	(3+2+1)x4=**24**		Low
	With management	3	2	1	2	(3+2+1)x2=**12**	Induction of construction workers, monitoring by ECO	Negligible
Graves and Burial Grounds	Without management	3	2	1	4	(3+2+1)x4=**24**		Low
	With management	3	2	1	2	(3+2+1)x2=**12**	Mark burial sites, shift route to avoid and induction of construction workers	Negligible
Historical buildings and structures	Without management	3	2	6	3	(3+2+6)x3=**33**		Low
	With management	3	2	2	2	(3+2+2)x2=**14**	Mark all historical buildings and structures, shift route to avoid and induction of construction workers.	Negligible
Mining Heritage	Without management	1	2	2	1	(1+2+2)x1=**5**		Negligible
	With management	1	2	2	1	(1+2+2)x1=**5**	Induct construction workers, mark all potential mining heritage sites.	Negligible
Monuments and memorials	Without management	3	2	1	4	(3+2+1)x4=**24**		Low
	With management	3	2	1	2	(3+2+1)x2=**12**	Induct construction workers and mark any memorials and plaques	Negligible
Natural Heritage	Without management	3	2	1	4	(3+2+1)x4=**24**		Low
	Without management	3	2	1	2	(3+2+1)x2=**12**	Induct construction workers, shift route to avoid direct impact	Negligible
Alternative A Substation								

Nature of Impact	Management Measures	Duration	Scale	Magnitude/ Severity	Probability	Significance Calculations: Sum (Duration + Scale +Magnitude) x Probability	Proposed Management Measures	Significance
Archaeological Remains	Without management	2	3	1	4	(2+3+1)x4=**24**		Negligible
	With management	2	2	1	2	(2+2+1)x2=**12**	Induction of construction workers, monitoring by ECO	Negligible
Graves and Burial Grounds	Without management	2	3	1	2	(2+3+1)x2=**12**		Negligible
	With management	2	3	1	1	(2+3+1)x1=**6**	Mark burial sites, shift route to avoid and induction of construction workers	Negligible
Historical buildings and structures	Without management	2	3	1	1	(2+3+1)x1=**6**		Negligible
	With management	2	3	1	1	(2+3+1)x1=**6**	Mark all historical buildings and structures, shift route to avoid and induction of construction workers.	Negligible
Monuments and memorials	Without management	2	3	2	1	(2+3+2)x1=**7**		Negligible
	With management	2	3	2	1	(2+3+2)x1=**7**	Induct construction workers and mark any memorials and plaques	Negligible

Alternative B Substation								
Nature of Impact	**Management Measures**	**Duration**	**Scale**	**Magnitude/ Severity**	**Probability**	**Significance Calculations: Sum (Duration + Scale +Magnitude) x Probability**	**Proposed Management Measures**	**Significance**
Archaeological Remains	Without management	3	2	2	4	(3+2+2)x4=**28**		Negligible
	With management	3	2	2	2	(3+2+2)x2=**14**	Induction of construction workers and monitoring by ECO	Negligible
Graves and Burial Grounds	Without management	3	2	2	1	(3+2+2)x1=**7**		Negligible
	With management	3	2	2	1	(3+2+2)x1=**7**	Shift powerline route to avoid graves, mark burial sites and induction.	Negligible
Historical buildings and structures	Without management	3	2	2	1	(3+2+2)x1=**7**		Negligible
	With management	3	2	2	1	(3+2+2)x1=**7**	Shift powerline route, mark historical buildings and structures & induction	Negligible
Monuments and memorials	Without management	3	2	2	1	(3+2+2)x1=**7**		Negligible
	With management	3	2	2	1	(3+2+2)x1=**7**	Induction of construction workers	Negligible

Alternative C Substation								
Nature of Impact	**Management Measures**	**Duration**	**Scale**	**Magnitude/ Severity**	**Probability**	**Significance Calculations: Sum (Duration + Scale +Magnitude) x Probability**	**Proposed Management Measures**	**Significance**
Archaeological Remains	Without management	2	3	1	4	(2+3+1)x4=**24**		Negligible
	With management	2	2	1	2	(2+2+1)x2=**10**	Induction of construction workers and monitoring by ECO	Negligible
Graves and Burial Grounds	Without management	2	3	1	2	(2+3+1)x1=**6**		Negligible
	With management	2	3	1	1	(2+3+1)x1=**6**	Shift powerline route to avoid graves, mark burial sites and induction.	Negligible
Historical buildings and structures	Without management	2	3	1	1	(2+3+1)x1=**6**		Negligible
	With management	2	3	1	1	(2+3+1)x1=**6**	Shift powerline route, mark historical buildings and structures & induction	Negligible
Monuments and memorials	Without management	2	3	2	1	(2+3+2)x1=**7**		Negligible
	With management	2	3	2	1	(2+3+2)x1=**7**	Induction of construction workers	Negligible

Based on the results of the Impact Assessment Matrix the two alternative powerline routes and 3 substation sites are all viable from a heritage perspective.

8 STATEMENT OF SIGNIFICANCE

Aesthetic Value

The aesthetic values of the AIA Study Area and the overall project area are contained in the valley bushveld environment and landscape typical of this part of the North West Province. The visual and physical relationship between AIA study area and the surrounding historical Cultural Landscape demonstrates the connection of place to the local and oral historical stories of the African communities who populated this region going back into prehistory.

The proposed powerline and substation development will be situated within an environment and associated cultural landscape, which, although developed by existing settlements, remains representative of the original historical environment and cultural landscape of this part of North West Province. The local communities consider the project area a cultural landscape linked to their ancestors and history. However, the proposed development will not alter this aesthetic value in any radical way since it will add to the constantly changing and developing settlements.

Historic Value

The Indigenous historic values of the Site of Interest and overall study area are contained in the claim of possible historic homesteads being located on the affected area. The history of generations of the Sotho-Tswana clans is tied to this geographical region. Such history goes back to the pre-colonial period, through the colonial era, the colonial wars and subsequent colonial rule up to modern day North West Province.

Scientific value

Past settlements and associated roads and other auxiliary infrastructure developments and disturbance within the HIA Study Area associated with the proposed powerline and substation development has resulted in limited intact landscape with the potential to retain intact large scale or highly significant open archaeological site deposits.

Social Value

The project sites fall within a larger and an extensive North West cultural landscape that is integrated with the wider inland. The overall area has social value for the local community, as is the case with any populated landscape. Literature review suggests that social value of the overall project area is also demonstrated through local history which associates the area with the coming of European missionaries, explorers and colonialists and the African struggle against settler colonialism in the second half of the 1800s and at the end of the 1800s, the colonial wars of resistance, the century long struggle for democracy that followed colonial subjugation. Several generations of communities originate from the project area and continue to call it home. As such, they have ancestral ties to the

area. The land also provides the canvas upon which daily socio-cultural activities are painted. All these factors put together confirms the social significance of the project area. However, this social significance is unlikely to be negatively impacted by the proposed powerline and substation development especially given the fact that the development will add value to the human settlements and activities already taking place. Sections of the powerline route and substation sites are covered in thick bushes and vegetation retains social value as sources of important herbs and traditional medicines. As such, they must be considered as significant social value sites

9 DISCUSSION

Various specialists conducted several Phase 1 Archaeological/ Heritage studies for various infrastructure developments and mining developments in the project area since 2006. The current study should be read in conjunction with previous Phase 1 Impact Studies conducted in the proposed project area. Although these studies recorded sites of significance for example Kruger, (2016), (Kusel (2008), Van Schalkwyk (2011a, 2011b, 2012) and Pistorius (2011, 2012) the recorded sites are far from the current proposed development site. The lack of confirmable archaeological sites recorded during the current survey is thought to be a result of two primary interrelated factors:

1. That proposed powerline route is located within a degraded area (agriculture), and have reduced sensitivity for the presence of high significance physical cultural site remains, be they archaeological, historical, or burial sites, due to previous disturbances resulting from developments and other land uses in the project area.
2. Limited ground surface visibility on sections of all the proposed powerline and substation project area that were not cleared at the time of the study may have impended the detection of other physical cultural heritage site remains or archaeological signatures immediately associated with the construction activities. This factor is exacerbated by the fact that the study was limited to general survey without necessarily conducting any detailed inspection of specific locations that will be affected by the proposed powerline development.

The absence of confirmable and significant archaeological cultural heritage site is not evidence in itself that such sites did not exist in the proposed powerline development area. In addition, some sections were not accessible due to thick vegetation cover, agriculture activities and restrictions by farmers along the powerline routes (see Appendix 1). It should be noted that significance of the sites of Interest (powerline development site) is not limited to presence or absence of physical archaeological sites.

Chance finds procedures

It has already been highlighted that sub-surface materials may still be lying hidden from surface surveys. Therefore, absence (during surface survey) is not evidence of absence all together. The following monitoring and reporting procedures must be followed in the event of a chance find, in order to ensure compliance with heritage laws and policies for best-practice. This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. Accordingly, all construction teams must be properly inducted to ensure they are fully aware of the procedures regarding chance finds.

- If during the construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- The site manager must then make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area before informing ISS.
- The client will then contact a professional archaeologist for an assessment of the finds who will in turn inform SAHRA/NWPHRA.

10 RECOMMENDATIONS

The study did not find any permanent barriers to the proposed powerline and substation developments although heritage resources of varying significances occur within proposed powerline routes. The proposed powerline routes were designed to avoid known heritage sites (see Figure 3). As such it is the opinion of the author that the proposed Pluto Mahikeng 400kv powerline and substation project may proceed from a heritage resources management perspective, provided that mitigation measures are implemented if and when required. The following recommendations are based on the results of the AIA/HIA research, cultural heritage background review, site inspection and assessment of significance.

1. The potential impacts of the proposed powerline and substation developments on all ranges of heritage resources generally range from low to moderate.
2. From a heritage perspective supported by the findings of this study, the proposed Alternative 1 and Alternative 2a powerline routes are both feasible. However Alternative 2a has a slight advantage because of it is relatively shorter and also runs along existing powerline from Pluto Substation to Watershed Substation.
3. A walk down survey must be conducted once the final route selection is concluded.
4. Alternative 1, Alternative 2a, Alternative 3 substation sites are equally viable.
5. Eskom should bear in mind that limestone deposits may contain fossilised remains of animals, plants or early hominids. The skeleton of the Taung child, which is related to Australopithecine family, was found in limestone deposits at Taung in the North-West Province whilst limestone deposits near Makapans Cave in Mokopane revealed remains of Homo Erectus and other extinct animal species.
6. The foot print impact of the proposed development and associated infrastructure should be kept to minimal to limit the possibility of encountering chance finds.
7. Should any unmarked graves be exposed during construction affected families must be trekked and consulted and relevant rescue/ relocation permits must be obtained from SAHRA before any grave relocation can take place. Furthermore, a professional archaeologist must be retained to oversee the relocation process in accordance with the National Heritage Resources Act 25 of 1999.
8. The Project Public Participation Process should ensure that any cultural heritage related matters for this project are given due attention whenever they arise and are communicated PHRA throughout the proposed powerline and substation development. This form of extended community involvement would pre-empty any potential disruptions that may arise from previously unknown cultural heritage matter that may have escaped the attention of this study.

9. As a result of restricted access to some farms along the proposed powerline routes, the Public consultation practitioner must request farmers to declare all heritage resources within their farms. The practitioner must persuade farmers to respond to the questionnaire in respect of potential heritage resources in their farms.
10. Should chance archaeological materials or human remains be exposed during subsurface construction work on any section of the proposed development laydown sites, work should cease on the affected area and the discovery must be reported to the heritage authorities immediately so that an investigation and evaluation of the finds can be made. The overriding objective, where remedial action is warranted, is to minimize disruption in construction scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the NHRA regulations.
11. Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of the project EMP, there are no significant cultural heritage resources barriers to the proposed development. The Heritage authority may approve the proposed development to proceed as planned with special commendations to implement the recommendations here in made.

11 CONCLUDING REMARKS

The literature review and field research confirmed that the project area is situated within a contemporary cultural landscape dotted with settlements with long local history. Field survey established that the proposed powerline routes and substation sites are degraded by previous agriculture, mining activities, residential developments and other infrastructure developments. In terms of the archaeology and heritage with respect to the proposed Pluto-Mahikeng 400kv powerline and substation development, there are no obvious 'Fatal Flaws' or 'No-Go' areas. However, the potential for chance finds, still remains and the developer and contractors are advised to be diligent and observant, should construction activities commence on the powerline route and substation site. The procedure for reporting chance finds has clearly been laid out. This report concludes that the proposed Pluto-Mahikeng powerline and substation development may be approved by SAHRA to proceed as planned subject to recommendations herein made and heritage monitoring plan being incorporated into the construction EMP (also see Appendices). The mitigation measures are informed by the results of the HIA study and principles of heritage management enshrined in the NHRA, Act 25 of 1999.

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Appendix 1: List of farmers consulted during the survey.

Farmer	Contact details	Farm Name	Route	Heritage
Mnr At van Wyk Mr Corrie Nel	082 856 6911 082 875 6571	Farm Wildfontein (Site 1)		There are graves on the farm – situated in the southern border of the property (Access granted)
Mr Fanie Kruger	082 800 6367	Farm Rietvallei (Site 15)		
Mr John Rankin	0827008106	Farm Kareeboschbult (18B)		
Mnr At van Wyk	082 856 6911	Farm Wildfontein (Fontein1)		
		Farm Buchansvale (2)		Property is owned by a Chinese group Open cast mining is taking place on property
Mnr Nicky Coetzee		**Farm Illmasdale (Site 3)**		**NO SPECIALIST STUDY TO BE CONDUCTED ON THIS PROPERTY**
Goedgevonden Communal Property Associate Mr Solomon Motlhaoleng – Chairperson	072 847 4432	Farm Goedgevonden (4)		Access granted

		Farm Hartebeestlaagte 146 (Site 5)		Awaiting confirmation that property is owned by Tirisano Diamond Mine
Mr Nico &Phillip Tromp Manager: Zack Maree	076 812 6868	Farm Grootbos Grootbos Game Farm (6)		
Hannes Liebenberg	082 347 3822	Farm Houtkop (7)		
Awie Erasmus	0828957365	Farm Klippan (8)		
		Farm Witpan (9)		
Property is leased by Jan Steinman from the Ditsobotla Local Municipality	Tel: (018) 632 2607 / Cell: 082 550 0457	Lichtenburg Game Breeding Farm (does not exist anymore) (10)		
		Farm Sekai (site 12)		
		Farm Adma (14)		
Mr Fanie Kruger	082 800 6367	Farm Rietvallei (15)		Access granted
		Farm Tweelingsfontein (16)		
Mr Tinus Steyn	072 215 2193	Farm Gouwspan (17)		
Mr Wayne Preece	082 576 1425	Farm Slypsteen (18)		

Mr John Rankin	0827008106	Farm Kareeboschbult (18b)		Permission grated
Mr Jan Terblache	072 444 9243 / 073 812 7775	Farm Rietfontein (19)		
Hannes Liebenberg	082 347 3822	Farm Houtkop (7)		

Appendix 2: Heritage Management Plan Input into the powerline and substation development project EMP

Objective	• Protection of archaeological sites and land considered to be of cultural value; • Protection of known physical cultural property sites against vandalism, destruction and theft; and • The preservation and appropriate management of new archaeological finds should these be discovered during construction.							
No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Contacted	Informed
Pre-Construction Phase								
1	Planning	Ensure all known sites of cultural, archaeological, and historical significance are demarcated on the site layout plan, and marked as no-go areas.	Throughout Project	Weekly Inspection	Contractor [C] CECO	SM	ECO	EA EM PM
Construction Phase								
1	Emergency Response	Should any archaeological or physical cultural property heritage resources be exposed during excavation for the purpose of construction, construction in the vicinity of the finding must be stopped until heritage authority has cleared the development to continue.	N/A	Throughout	C CECO	SM	ECO	EA EM PM
		Should any archaeological, cultural property heritage resources be exposed during excavation or be found on development site, a registered heritage specialist or PHRA official must be called to site for inspection.		Throughout	C CECO	SM	ECO	EA EM PM
		Under no circumstances may any archaeological, historical or any physical cultural property heritage material be destroyed or removed form site;		Throughout	C CECO	SM	ECO	EA EM PM
		Should remains and/or artefacts be discovered on the development site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the Construction Manager who in turn will inform PHRA.		When necessary	C CECO	SM	ECO	EA EM PM
		Should any remains be found on site that is potentially human remains, the PHRA and South African Police Service should be contacted.		When necessary	C CECO	SM	ECO	EA EM PM
Rehabilitation Phase								
		Same as construction phase.						
Operational Phase								
		Same as construction phase.						

Appendix 3: Heritage mitigation measures table

SITE REF	HERITAGE ASPECT	POTENTIAL IMPACT	MITIGATION MEASURES	RESPONSIBLE PARTY	PENALTY	METHOD STATEMENT REQUIRED
Chance Archaeological and Burial Sites	General area where the proposed project is situated is a historic landscape, which may yield archaeological, cultural property, remains. There are possibilities of encountering unknown archaeological sites during subsurface construction work which may disturb previously unidentified chance finds.	Possible damage to previously unidentified archaeological and burial sites during construction phase. • Unanticipated impacts on archaeological sites where project actions inadvertently uncovered significant archaeological sites. • Loss of historic cultural landscape; • Destruction of burial sites and associated graves • Loss of aesthetic value due to construction work • Loss of sense of place Loss of intangible heritage value due to change in land use	In situations where unpredicted impacts occur construction activities must be stopped and the heritage authority should be notified immediately. Where remedial action is warranted, minimize disruption in construction scheduling while recovering archaeological data. Where necessary, implement emergency measures to mitigate. • Where burial sites are accidentally disturbed during construction, the affected area should be demarcated as no-go zone by use of fencing during construction, and access thereto by the construction team must be denied. • Accidentally discovered burials in development context should be salvaged and rescued to safe sites as may be directed by relevant heritage authority. The heritage officer responsible should secure relevant heritage and health authorities permits for possible relocation of affected graves accidentally encountered during construction work.	• Contractor / • Project Manager • Archaeologist • Project EO	Fine and or imprisonment under the PHRA-G Act & NHRA	Monitoring measures should be issued as instruction within the project EMP. PM/EO/Archaeologists Monitor construction work on sites where such development projects commences within the farm.

Appendix 4: Legal background in South Africa

Extracts relevant to this report from the National Heritage Resources Act No. 25 of 1999, (Sections 5, 36 and 47):

General principles for heritage resources management

5. (1) All authorities, bodies and persons performing functions and exercising powers in terms of this Act for the management of heritage resources must recognise the following principles:

(a) Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and as they are valuable, finite, non-renewable and irreplaceable they must be carefully managed to ensure their survival;

(b) every generation has a moral responsibility to act as trustee of the national heritage for succeeding generations and the State has an obligation to manage heritage resources in the interests of all South Africans;

(c) heritage resources have the capacity to promote reconciliation, understanding and respect, and contribute to the development of a unifying South African identity; and

(d) heritage resources management must guard against the use of heritage for sectarian purposes or political gain.

(2) To ensure that heritage resources are effectively managed—

(a) the skills and capacities of persons and communities involved in heritage resources management must be developed; and

(b) provision must be made for the ongoing education and training of existing and new heritage resources management workers.

(3) Laws, procedures and administrative practices must—

(a) be clear and generally available to those affected thereby;

(b) in addition to serving as regulatory measures, also provide guidance and information to those affected thereby; and

(c) give further content to the fundamental rights set out in the Constitution.

(4) Heritage resources form an important part of the history and beliefs of communities and must be managed in a way that acknowledges the right of affected communities to be consulted and to participate in their management.

(5) Heritage resources contribute significantly to research, education and tourism and they must be developed and presented for these purposes in a way that ensures dignity and respect for cultural values.

(6) Policy, administrative practice and legislation must promote the integration of heritage resources conservation in urban and rural planning and social and economic development.

(7) The identification, assessment and management of the heritage resources of South Africa must—

(a) take account of all relevant cultural values and indigenous knowledge systems;

(b) take account of material or cultural heritage value and involve the least possible alteration or loss of it;

(c) promote the use and enjoyment of and access to heritage resources, in a way consistent with their cultural significance and conservation needs;

(d) contribute to social and economic development;

(e) safeguard the options of present and future generations; and

(f) be fully researched, documented and recorded.

Burial grounds and graves

36. (1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources

authority.

(5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)(b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

(a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—

(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

(7) (a) SAHRA must, over a period of five years from the commencement of this Act, submit to the Minister for his or her approval lists of graves and burial grounds of persons connected with the liberation struggle and who died in exile or as a result of the action of State security forces or agents provocateur and which, after a process of public consultation, it believes should be included among those protected under this section.

(b) The Minister must publish such lists as he or she approves in the Gazette.

(8) Subject to section 56(2), SAHRA has the power, with respect to the graves of victims of conflict outside the Republic, to perform any function of a provincial heritage resources authority in terms of this section.

(9) SAHRA must assist other State Departments in identifying graves in a foreign country of victims of conflict connected with the liberation struggle and, following negotiations with the next of kin, or relevant authorities, it may re-inter the remains of that person in a prominent place in the capital of the Republic.

General policy

47. (1) SAHRA and a provincial heritage resources authority—

(a) must, within three years after the commencement of this Act, adopt statements of general policy for the management of all heritage

resources owned or controlled by it or vested in it; and

(b) may from time to time amend such statements so that they are adapted to changing circumstances or in accordance with increased knowledge; and

(c) must review any such statement within 10 years after its adoption.

(2) Each heritage resources authority must adopt for any place which is protected in terms of this Act and is owned or controlled by it or vested in it, a plan for the management of such place in accordance with the best environmental, heritage conservation, scientific and educational principles that can reasonably be applied taking into account the location, size and nature of the place and the resources of the authority concerned, and may from time to time review any such plan.

(3) A conservation management plan may at the discretion of the heritage resources authority concerned and for a period not exceeding 10 years, be operated either solely by the heritage resources authority or in conjunction with an environmental or tourism authority or under contractual arrangements, on such terms and conditions as the heritage resources authority may determine.

(4) Regulations by the heritage resources authority concerned must provide for a process whereby, prior to the adoption or amendment of any statement of general policy or any conservation management plan, the public and interested organisations are notified of the availability of a draft statement or plan for inspection, and comment is invited and considered by the heritage resources authority concerned.

(5) A heritage resources authority may not act in any manner inconsistent with any statement of general policy or conservation management plan.

(6) All current statements of general policy and conservation management plans adopted by a heritage resources authority must be available for public inspection on request.