Archaeological and Heritage EMP Walk down Report for proposed Emkhiweni Substation and 400 kv line from Emkhiweni substation to Silimela in Limpopo and Mpumalanga Province.

August 2019

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Archaeological and Heritage EMP Walk down for proposed Emkhiweni substation and 400 kv Powerline from Emkhiweni substation to Silimela in Limpopo and Mpumalanga Province

August 2019

For and on behalf of

Eskom Transmission (Megawatt Park)

Approved by: Dr. McEdward Murimbika

Signed:

Position: Principal Investigator

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Document information

TITLE:	**ARCHAEOLOGICAL AND HERITAGE EMP WALK DOWN REPORT FOR: Emkhiweni substation and 400 Kv line from Emkhiweni substation to Silimela**
PURPOSE OF SCOPE: **The purpose of this document is to describe the cultural values and heritage factors that may be impacted on by the proposed construction of the proposed development. The proposed electrification is located in Limpopo and Mpumalanga Province.**	
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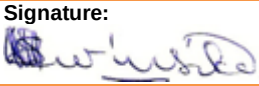
Signature: 	Position: Principle Investigator
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Issue	Date	Reason For Issue	Responsible	Accountable
1		Archaeological and Heritage EMP Walk down Report	M.Murimbika	Dr. M. Murimbika

Citation:	Emkhiweni substation and 400 kv Powerline from Emkhiweni substation to Silimela.
Recipients:	Eskom Transmission Megawatt Park Sunninghill
Eskom Soc Reference	Emkhiweni substation and 400 kv powerline from Emkhiweni Substation to Silimela

Caveat

This HIA Report has been prepared for Eskom Transmission by Nzumbululo Heritage Solutions for the expressed purpose of fulfilling the requirements of the National Heritage Resources Act, Act 25 of 1999 and SAHRA regulations in terms of Sec. 38 of the Act.

Authorship: This Report has been prepared by Dr. M. Murimbika (Principal Investigator & Professional Archaeologist). The report is for the review of the Heritage Resources Agency (PHRA).

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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 Author is 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 for Powerline Project being proposed by Eskom Transmission Megawatt Park

Signed by Principal Investigator:

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McEdward Murimbika (Ph.D.), August 2019.

CONTENT

1. EXECUTIVE SUMMARY

1.1 BACKGROUND

In March 2010 SAHRA issued a Record of Decision on the Heritage Impact Assessment Report (dated February 2009) submitted by Jan van Schalkwyk regarding the proposed development of the Marble Hall-Rockdale B powerline establishment. In line with the National Heritage Act No. 25 of 1999 Section 38 (1), SAHRA upheld the findings of the HIA Report and, among other conditions, instructed that a professional Archaeologist should conduct a final walk down survey on the tower placements along the entire 105 km (301 towers) route and the construction campsites, roads/access routes and equipment storage sites (see Appendix 1). In partial fulfilment of SAHRA conditions, Eskom Transmission appointed the Nzumbululo Heritage Solutions to conduct an Archaeological and Heritage Walk Down Survey as part of the overall Construction Environmental Management Plan development. 2019 Nemai appointed Nzumbululo to update the report with the new tower position. This report covers the Archaeological Walk Down of the alignment of the overall 108km 400kv Emkhiweni to Silimela substation

1.2 SUMMARY FINDINGS

The HIA Phase 1 survey recorded a number of sites within the project area. As such, this walk-down survey was conducted after Eskom has finalised the individual location of each tower within the approved servitude. The survey checked the previously recorded sites in the project in relation to final proposed tower positions and the study did not identify any significant archaeological or physical cultural property that is likely to be destroyed by the placement of the power line towers or associated development. The towers will be erected on land portions that are currently degraded or were previously disturbed, previous and current agricultural land, existing developed settlements, industrial developments area, previous road works, etc. However, although no archaeological sites classified from local, provincial or national levels of significance were recorded on the direct part of the tower position, the different archaeological materials recorded in the general project area are an indication of the potential to yield chance finds once construction begins.

The archaeology of the project area within the Limpopo and Mpumalanga Provinces is very rich and an important area of study and the potential value for addressing landscape and environmental questions in archaeology of the project region must be taken cognisance of.

1.3 RECOMMENDATIONS

The overall management objective of archaeological and heritage resources is the conservation of the resource *in situ* and demarcation of such sites as “no-go” areas during construction. However, where

the cost implication and socio-economic implications outweigh such an option, the next option would be mitigating the impact on the resource by means of the documentation of the site by means of sampling / surface collections and in some cases-controlled excavations to collect a representative sample for further study of the site. In the present project, although no significant archaeological or heritage sites were recorded on direct path of the tower locations, but several archaeological materials were recorded in the project area during HIA Phase 1 study. No immediate intervention is recommended prior to the proposed development.

Furthermore, should any chance archaeological or physical cultural remains, such as previously unknown human remains, be exhumed or discovered subsurface during the construction work, activities on the affected tower positions, chance finds procedures should be activated. This will include caseation of any construction work on affected work site and the heritage authority (SAHRA) be notified immediately. As a cautionary measure, when construction begins, heritage rescue or salvage procedures are applicable as part of the project's Construction Environmental Management Plan.

Certain sections of the project area have yielded considerable density of archaeological sites although not associated directly with any specific planned tower position, it is likely that such section will yield chance finds during subsurface construction. As such, towers positions located in such servitude sections should be monitored by an archaeologist during construction phase.

It is the final observation of this study that the approved, substation, powerline servitude and identified powerline tower positions may proceed as planned within the approved servitude. As such the powerline may be developed subject to construction monitoring in some sections of the project area and inclusion of general heritage management plan into the project CEMP.

ABBREVIATIONS

AIA	Archaeological Impact Assessment
C	Contractor
CECO	Construction Environmental Conservation Officer
EAP	Environmental Assessment Practitioner
ECO	Environmental Conservation Officer
EIA	Environmental Impact Assessment
EM	Environmental Manager
EMP	Environmental Management Plan
HIA	Heritage Impact Assessment
LIA	Late Iron Age
NHRA	Nation Heritage Resources Act, Act 25 of 1999
PM	Project Manager
SM	Site Manager
SAHRA	South African Heritage Resources Agency
ROD	Record of Decision

DEFINITIONS

The following terms used in this Archaeological /Heritage Impact Assessment are defined in the National Heritage Resources Act [NHRA], Act Nr. 25 of 1999, South African Heritage Resources Agency [SAHRA] Policies as well as the Australia ICOMOS Charter (Burra Charter):

Archaeological Material remains resulting from human activities, which are in a state of disuse and are in, or on, land and which are older than 100 years, including artifacts, human and hominid remains, and artificial features and structures.

Chance Finds means Archaeological artefacts, features, structures or historical cultural remains such as human burials that are found accidentally in context previously not identified during cultural heritage scoping, screening and assessment studies. Such finds are usually found during earth moving activities such as water pipeline trench excavations.

Compatible use means a use, which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Cultural Heritage Resources Same as ***Heritage Resources*** as defined and used in the National Heritage Resources Act *(Act No. 25 of 1999*). Refer to physical cultural properties such as archaeological and palaeolontological sites; historic and prehistoric places, buildings, structures and material remains; cultural sites such as places of ritual or religious importance and their associated materials; burial sites or graves and their associated materials; geological or natural features of cultural importance or scientific significance. ***Cultural Heritage Resources*** also include ***intangible resources*** such as religion practices, ritual ceremonies, oral histories, memories and indigenous knowledge.

Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.

Cultural Significance also encompasses the complexities of what makes a place, materials or intangible resources of value to society or part of, customarily assessed in terms of aesthetic, historical, scientific/research and social values.

Environment The surroundings within which humans exist and that are made up of: i. the land, water and atmosphere of the earth;

ii. micro-organisms, plant and animal life;

iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and,

iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being. This includes the economic, social, cultural, historical and political circumstances, conditions and objects that affect the existence and development of an individual, organism or group.

Environmental impact assessment An Environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law and which may significantly affect the environment. The EIA includes an evaluation of alternatives. As well as recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and environmental management and monitoring measures.

Expansion means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased;

Fabric means all the physical material of the place including components, fixtures, contents and objects.

Grave A place of interment *(variably referred to as burial)*, including 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).*

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, plan,

programme or policy which requires authorisation of permission by law and which may significantly affect the cultural and natural heritage resources. The HIA includes recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

Historic Material 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.

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

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

Interested and affected parties Individuals, communities or groups, other than the proponent or the authorities, whose interests may be positively or negatively affected by the proposal or activity and/ or who are concerned with a proposal or activity and its consequences.

Interpretation means all the ways of presenting the cultural significance of a place.

Late Iron Age this period is associated with the development of complex societies and state systems in southern Africa.

Material culture means buildings, structure, features, tools and other artefacts that constitute the remains from past societies.

Mitigate The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

Place means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.

Protected area means those protected areas contemplated in section 9 of the NEMPAA and the core area of a biosphere reserve and shall include their buffers;

Public participation process A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of ***NEMA*** refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters

Setting means the area around a place, which may include the visual catchment.

Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgments and science-based criteria (i.e. biophysical, physical cultural, social and economic).

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

Use means the functions of a place, as well as the activities and practices that may occur at the place.

2 INTRODUCTION

2.1 BACKGROUND

This report emanates from the results of a detailed Walk-down HIA survey of 302 powerline tower positions for the proposed construction of a 108km long 400kV powerline in Limpopo and Mpumalanga Provinces. The proposed route fall within three local municipalities of: Elias Motsoaledi, and Ephraim Mogale Local Municipality in Limpopo Province and Steve Tshwete Local Municipality in Mpumalanga. The urban areas consist of the town of Marble Hall, Groblersdal, and Middleburg. Major farming areas include De Loskop North and South, Selons River Valley. The farming areas contain a number of farm settlements and agribusiness infrastructure and factories. The walk-down survey focused on all tower positions within the final approved powerline servitude following the pre-issued GPS coordinates for each tower.

The aim of the study is to identify all archaeological sites, document, and assess their importance within the Local, Provincial and National context in order assist the developer in managing any heritage resources that may be associated with the development area in a responsible manner in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

The report outlines the approach and methodology utilised before and during the survey, which includes in Phase 1: Information collection from desktop sources; Phase 2: Physical surveying of the area on foot and by vehicle; and Phase 3: Reporting the outcome of the study.

The study was designed to ensure that any significant archaeological or cultural physical property or sites that fall on the direct path of the substation and powerline towers were located and recorded, and site significance is evaluated to assess the nature and extent of expected impacts from the development. Based on this assessment, recommendations to either relocate the affected pylon of to rescue or salvage the affected site were to be made.

3 BRIEF LEGISLATION BACKGROUND

Phase 1 AIA and HIA studies were conducted to fulfil the requirements of Section 38 (1) of the National Heritage Resources Act (No 25 of 1999). This particular development also triggered the regulations applicable under the National Environmental Management Act and Environmental Conservation Act,

1989 (No 73 of 1989). As such the EIA study included a HIA specialist study and the EIAR was produced and the relevant authorities, including SAHRA's comments were invited. Following the granting of the Record of Decision for the development by the environmental authority, a detailed Walk-down archaeological and heritage survey was required. This report is an outcome of the walk-down survey of the 302-tower locations along the approved servitude.

4 PROJECT DESCRIPTION

4.1 Approved Development

Eskom SOC Limited proposes to construct 302 400kv Powerline towers over a 108km long servitude that is from Emkhiweni to Silimela (Fig. 1) traversing from Limpopo to Mpumalanga provinces. The proposed development is meant to cater for electricity requirements of the Marble Hall, Groblersdal and Middleburg areas and proposed new developments within the farming communities along the servitude, (Please refer to Fig. 1 and 2).

4.2 Project Location

The approved route fall within three local municipalities: Elias Motsoaledi, and Ephraim Mogale in Limpopo Province and Steve Tshwete Local Municipality in Mpumalanga Province. The urban areas consist of the town of Marble Hall, Groblersdal, and Middleburg. Farming areas include farms (De Loskop north and south and Selons River Valley). The farming areas are characterised by extensive cultivated lands, irrigation schemes infrastructure, commercial animal husbandry grazing areas, game farms, farm factories and farm settlements.

The project area is accessed from the R101 and R519 Road to N11 South East Highway to Marble Hall onward to Middleburg. (Refer to Fig. 1 and 2 – Google Route Map).

Figure 1: Locality Map of the project route (Source: Nemai Consulting BID, 2018).

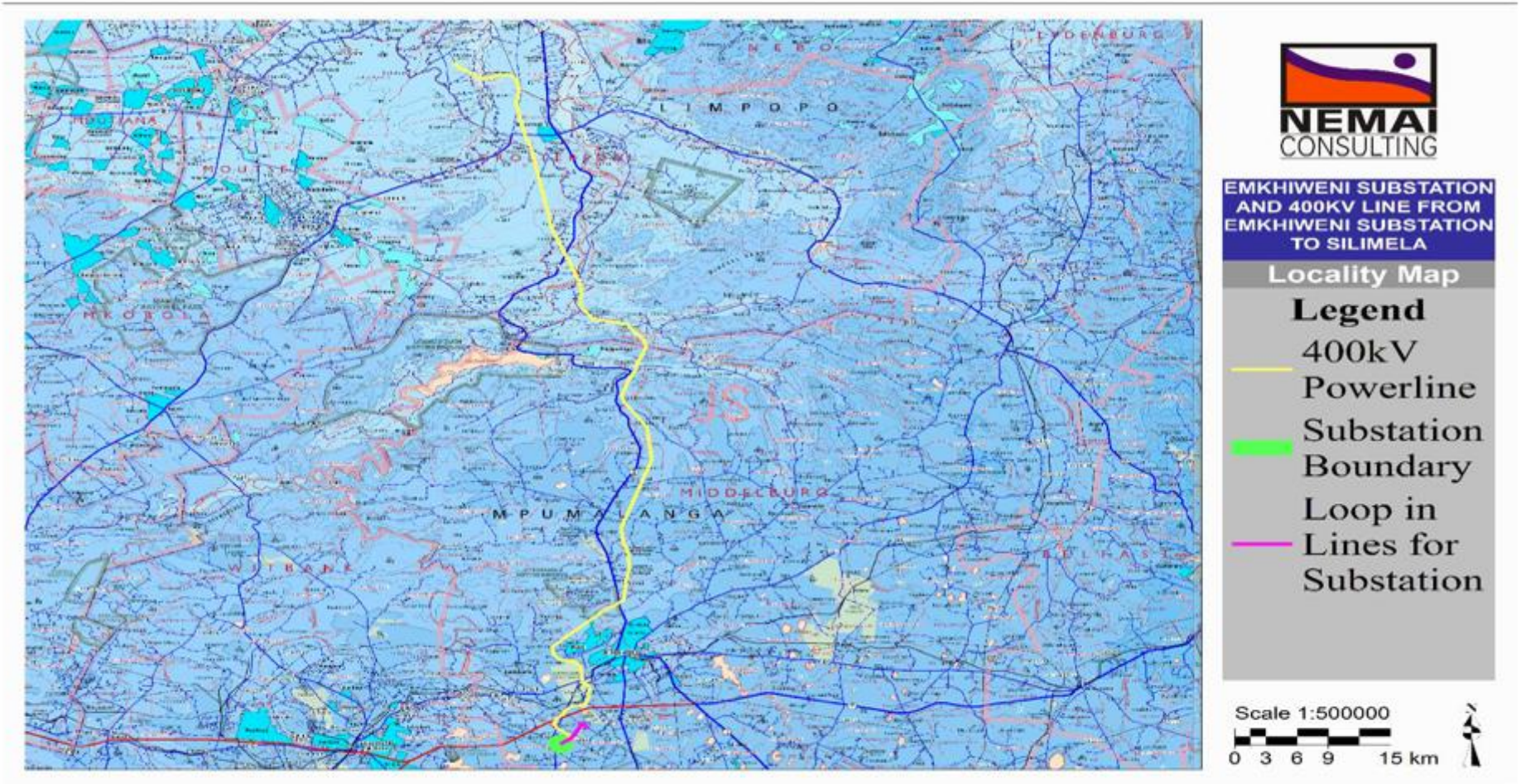


Figure 2: Topographic map showing the proposed powerline servitude (Source: Nemai Consulting BID, 2018).

4.3 The Construction Process

The following is a process that will be adopted for the entire route, beginning at the starting point of the new line. Each activity will follow the previous one, such that at any one point an observer will see a chain of events, with different teams involved over time. At any one time some or all of the different teams may be working at different points along the line. There may be days of no activity in the process. Table 1 provides generic description of activities associated with the powerline development.

Table 1: Activity scheduled associated with the power line development.

Activity	**Approx. team size**	**Approx. duration at a point**
1. Centre line pegging and identification of *access*	N/A	N/A
2. Access Negotiations • an access plan is developed and agreed to by the landowners, Eskom and the contractor • rehabilitation measures are agreed to • photographs are taken before hand • access road will be established through recurring use (i.e. there will be no blading or scraping of a new road) *(light vehicle access)*	N/A	N/A
3. Tower Pegging • a surveyor has undertaken this work • the footing of the pylons will be set out • the contractor will report back if anything odd is found and the tower will be moved accordingly	N/A	N/A
4. New Access where required	N/A	N/A
5. Foundation nominations (for main structure and anchors) • soil types are checked to determine foundation requirements • trial pits are dug at the main foundation points – usually using mechanical back-actor/auger methods, though in a few circumstances manual labour may be used. *(heavy vehicle access)*	N/A	N/A
6. Excavation of foundation • foundation squares are excavated and depth depend on soil conditions • foundation pits then need to be covered or fenced off until foundation is poured *(heavy vehicle access)*	N/A	N/A
7. Foundation steelwork (reinforcing) • the steelwork is usually made up at the base camp and brought on to site by truck • all fitting, wiring is done on site (limited welding on site) *(heavy vehicle access)*	N/A	N/A
8. Foundation (concrete) pouring • shuttering • standard concrete truck used • if there are access problems, concrete will be mixed on site *(heavy usage of the servitude roads during this phase)*	N/A	N/A

Activity	Approx. team size	Approx. duration at a point
9. Delivery of tower steelwork • steelwork is delivered in sections and assembled on site • one truck can transport one tower • transported from the factory to site (the towers are individually designed for each location) • access roads are clearly marked to ensure the correct tower is delivered *(heavy vehicle access)* *(extra long trucks will be used)*	N/A	N/A
10. Assembly team / Punching and painting • the steelwork is fitted together and assembled on the ground • nuts are punched and non-corrosive paint is placed on the nuts *(light vehicle access)*	N/A	N/A
11. Erection • Cranes pick up the towers for final assembly. *(abnormal load vehicle access)*	N/A	N/A
12. Stringing • cable drums are placed next to each other within the servitude • stringing takes place in both directions from the drum stations • the working area at each drum station will be as long as 130m, but will be confined to the servitude width. Intensive vehicle movement may take place within this working area • a pilot tractor will place the pilot cable on the ground • this cable is then pulled up through the use of a pulley • conductors are never to touch the ground • in mountainous areas, a helicopter can be used or the pilot rope can be shot across valleys *(abnormal load vehicle access)* *(intensive vehicle activity likely within the working area)*	N/A	N/A
13. Sag and tension The line is tensioned from each cable station to ensure minimum ground clearance heights are achieved *(heavy vehicle access)*	N/A	N/A
14. Rehabilitation • rehabilitation is a continuous process during the construction phase • rehabilitation will typically only commence after the towers have been strung *(heavy and light vehicle access)*	N/A	N/A

4.4 CONSTRUCTION CAMPS

The entire construction workforce is usually stationed at ‘construction camps’ that will be situated at various points along the route. The location is selected by the contractor who will take into account such aspects as access to the construction site, access to services, access to materials, etc. The contractor will enter into an agreement with a landowner for the establishment of the construction camp.

The various teams will travel from the camp to the construction site each day. The site moves continuously with the progression of the line, so the teams will perhaps travel a different distance to the site each time.

All materials are stored at the construction camp with the exception of those materials which may come direct from the factory and concrete unless the site is very remote, when concrete may be mixed on site.

5 METHODOLOGY

This Heritage and Archaeological Walk Down (AWD) report was compiled in line with the stipulated guidelines in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998) and as was requested by SAHRA. The AWD process consisted of three steps:

- Step I – Literature Review: The background information to the field survey leans greatly on the HIA Phase 1 and archaeological desktop survey completed for the EIA report.

- Step II – Physical Survey: A physical survey was conducted on foot through the proposed project area by the author aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

- Step III – The final step involved the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the archaeological impact assessment criteria and report writing, as well as mapping and constructive recommendations

5.1 Physical Surveying

The study area for the proposed projects covers approximately 108 kilometres. Due to the nature of cultural remains, with the majority of artefacts occurring below surface, an intensive foot-survey that covered the study area was conducted.

The survey focussed on the centre line of the servitude of 55 metres that will in most cases also be utilised for the tower positioning as well as other services such as service roads and construction related activities associated with the proposed new powerline line. Each accessible pylon footprint (As provided by Eskom and Nemai) was then surveyed and documented.

Table 2: SHOWING TOWER LATITUDE LONGITUDE- EAST DEGREES, MINUTES AND SECONDS SOUTH DEGREES, MINUTES AND SECONDS

	Tower			Latitude	Longitude
No.	Easting	Northing			
1	29,29873	-25,0864		29°17'55.44"E	25°5'10.98"S
2	29,29923	-25,0862		29°17'57.23412"E	25°5'10.1853600000055"S
3	29,30144	-25,0852		29°18'5.19587999999629"E	25°5'6.62747999999453"S
4	29,30421	-25,0871		29°18'15.1653599999986"E	25°5'13.3857599999956"S
5	29,30492	-25,0903		29°18'17.7263999999991"E	25°5'25.2106800000021"S
6	29,30822	-25,092		29°18'29.5959600000029"E	25°5'31.0858800000048"S
7	29,31163	-25,0937		29°18'41.8762799999979"E	25°5'37.1641200000013"S
8	29,31576	-25,0957		29°18'56.7262800000049"E	25°5'44.5131599999996"S
9	29,31905	-25,0973		29°19'8.57711999999452"E	25°5'50.377560000004"S
10	29,32068	-25,0997		29°19'14.4523199999972"E	25°5'58.7850000000032"S
11	29,32229	-25,102		29°19'20.2418399999962"E	25°6'7.06968000000018"S
12	29,32499	-25,1019		29°19'29.9769599999968"E	25°6'6.68735999999598"S
13	29,32922	-25,1017		29°19'45.1981200000054"E	25°6'6.08903999999995"S
14	29,33348	-25,1015		29°20'0.529439999996839"E	25°6'5.48567999999619"S
15	29,336	-25,1014		29°20'9.59640000000377"E	25°6'5.12891999999653"S
16	29,33809	-25,0984		29°20'17.1358800000021"E	25°5'54.1586400000014"S
17	29,34307	-25,0983		29°20'35.0671200000008"E	25°5'53.7467999999976"S
18	29,34774	-25,0982		29°20'51.8553599999947"E	25°5'53.3608800000025"S
19	29,35272	-25,098		29°21'9.78155999999842"E	25°5'52.9479599999988"S
20	29,35564	-25,1006		29°21'20.2892399999976"E	25°6'2.16503999999503"S
21	29,35844	-25,1031		29°21'30.3987599999994"E	25°6'11.0321999999948"S
22	29,35965	-25,1066		29°21'34.7364000000036"E	25°6'23.8928400000057"S
23	29,36087	-25,1102		29°21'39.1197600000049"E	25°6'36.8873999999957"S
24	29,36205	-25,1138		29°21'43.3767600000004"E	25°6'49.5064799999975"S
25	29,36126	-25,1177		29°21'40.5529199999984"E	25°7'3.73547999999914"S
26	29,36053	-25,1214		29°21'37.8972000000041"E	25°7'17.115959999997"S
27	29,3599	-25,1246		29°21'35.646840000002"E	25°7'28.4538000000029"S
28	29,35927	-25,1278		29°21'33.3543599999936"E	25°7'40.0029599999971"S
29	29,35857	-25,1313		29°21'30.8660399999988"E	25°7'52.538879999999"S
30	29,35941	-25,1349		29°21'33.867360000003"E	25°8'5.77247999999429"S
31	29,3602	-25,1384		29°21'36.715679999997"E	25°8'18.3310800000055"S
32	29,36097	-25,1418		29°21'39.4952400000059"E	25°8'30.5854800000046"S
33	29,36158	-25,1445		29°21'41.6966399999987"E	25°8'40.2900000000056"S
34	29,3624	-25,1481		29°21'44.6241599999973"E	25°8'53.1956400000053"S
35	29,36312	-25,1513		29°21'47.246760000001"E	25°9'4.75632000000616"S
36	29,3639	-25,1547		29°21'50.0410800000034"E	25°9'17.0737199999996"S
37	29,36469	-25,1582		29°21'52.8757200000038"E	25°9'29.5667999999998"S
38	29,36549	-25,1618		29°21'55.7784000000063"E	25°9'42.3608399999998"S
39	29,3664	-25,1657		29°21'59.0291999999971"E	25°9'56.6866799999949"S
40	29,36756	-25,1687		29°22'3.23183999999685"E	25°10'7.49856000000619"S
41	29,36889	-25,1722		29°22'8.00508000000121"E	25°10'19.7778000000014"S

42	29,37014	-25,1754		29°22'12.5029199999975"E	25°10'31.3478399999966"S
43	29,37149	-25,1788		29°22'17.3470799999993"E	25°10'43.8081599999975"S
44	29,37281	-25,1822		29°22'22.1124000000006"E	25°10'56.0643600000049"S
45	29,37344	-25,1853		29°22'24.3944400000021"E	25°11'6.91260000000625"S
46	29,37413	-25,1885		29°22'26.8690800000033"E	25°11'18.6766800000052"S
47	29,37486	-25,192		29°22'29.4812400000001"E	25°11'31.0930800000045"S
48	29,37556	-25,1953		29°22'31.9994399999987"E	25°11'43.0620000000056"S
49	29,37614	-25,1981		29°22'34.1014799999942"E	25°11'53.0523599999961"S
50	29,37679	-25,2012		29°22'36.456959999997"E	25°12'4.24692000000306"S
51	29,37746	-25,2043		29°22'38.8567200000057"E	25°12'15.6502799999944"S
52	29,37817	-25,2077		29°22'41.4166800000064"E	25°12'27.8161199999946"S
53	29,37882	-25,2108		29°22'43.7530800000036"E	25°12'38.9188800000031"S
54	29,37953	-25,2142		29°22'46.2939599999987"E	25°12'50.9911199999965"S
55	29,38018	-25,2173		29°22'48.6375600000034"E	25°13'2.12556000000433"S
56	29,38083	-25,2203		29°22'50.9754000000046"E	25°13'13.2330000000036"S
57	29,38157	-25,2239		29°22'53.6422800000014"E	25°13'25.902480000006"S
58	29,38226	-25,2271		29°22'56.1280800000051"E	25°13'37.7104799999938"S
59	29,383	-25,2307		29°22'58.8158400000029"E	25°13'50.477519999998"S
60	29,38372	-25,2341		29°23'1.40964000000253"E	25°14'2.79743999999539"S
61	29,38442	-25,2374		29°23'3.90300000000508"E	25°14'14.6403599999948"S
62	29,38517	-25,241		29°23'6.60443999999643"E	25°14'27.4696799999978"S
63	29,38586	-25,2443		29°23'9.10464000000218"E	25°14'39.3428400000053"S
64	29,3865	-25,2473		29°23'11.4097200000043"E	25°14'50.290440000004"S
65	29,3871	-25,2501		29°23'13.5607199999964"E	25°15'0.503999999993709"S
66	29,38785	-25,2537		29°23'16.2466799999987"E	25°15'13.2577199999957"S
67	29,38856	-25,2571		29°23'18.8307599999999"E	25°15'25.526880000001"S
68	29,3893	-25,2606		29°23'21.4688400000054"E	25°15'38.0505600000006"S
69	29,39005	-25,2642		29°23'24.1918800000062"E	25°15'50.9788799999967"S
70	29,39074	-25,2674		29°23'26.6499600000057"E	25°16'2.64612000000227"S
71	29,39146	-25,2708		29°23'29.2520399999998"E	25°16'14.9980800000031"S
72	29,3922	-25,2744		29°23'31.9282800000036"E	25°16'27.7006799999961"S
73	29,39285	-25,2774		29°23'34.2653999999965"E	25°16'38.7929999999977"S
74	29,394	-25,2801		29°23'38.4097200000053"E	25°16'48.4852799999965"S
75	29,39594	-25,2847		29°23'45.4009200000041"E	25°17'4.83503999999499"S
76	29,39669	-25,2864		29°23'48.1001999999958"E	25°17'11.1469199999976"S
77	29,39943	-25,2928		29°23'57.9433200000051"E	25°17'34.1627999999946"S
78	29,40081	-25,2961		29°24'2.92103999999455"E	25°17'45.7998000000049"S
79	29,40241	-25,2998		29°24'8.67779999999442"E	25°17'59.2591200000032"S
80	29,40401	-25,3035		29°24'14.4277200000039"E	25°18'12.7004399999959"S
81	29,40553	-25,3071		29°24'19.9177199999943"E	25°18'25.533719999994"S
82	29,40687	-25,3091		29°24'24.7474799999941"E	25°18'32.6070000000055"S
83	29,40798	-25,312		29°24'28.7315999999981"E	25°18'43.0488000000022"S
84	29,40906	-25,3148		29°24'32.6325600000024"E	25°18'53.2727999999989"S
85	29,4102	-25,3178		29°24'36.7066799999967"E	25°19'3.95003999999716"S
86	29,4113	-25,3207		29°24'40.6929600000004"E	25°19'14.396160000006"S
87	29,41264	-25,3242		29°24'45.5072399999983"E	25°19'27.0112799999998"S

88	29,41426	-25,3284		29°24'51.3291600000051"E	25°19'42.2662799999947"S
89	29,41601	-25,333		29°24'57.6277200000055"E	25°19'58.7690400000034"S
90	29,41748	-25,3368		29°25'2.91036000000275"E	25°20'12.6077999999978"S
91	29,41902	-25,3409		29°25'8.48640000000103"E	25°20'27.2158800000042"S
92	29,42088	-25,3458		29°25'15.1849199999944"E	25°20'44.7615599999992"S
93	29,42051	-25,3501		29°25'13.8212399999944"E	25°21'0.3153599999942"S
94	29,42012	-25,3544		29°25'12.4496400000041"E	25°21'15.9562799999969"S
95	29,41978	-25,3583		29°25'11.2213199999999"E	25°21'29.9642399999991"S
96	29,41943	-25,3624		29°25'9.94943999999833"E	25°21'44.4650400000052"S
97	29,41911	-25,366		29°25'8.78772000000509"E	25°21'57.7152000000021"S
98	29,42118	-25,3686		29°25'16.2454799999949"E	25°22'6.81780000000344"S
99	29,4234	-25,3713		29°25'24.2403599999946"E	25°22'16.5748800000048"S
100	29,42584	-25,3743		29°25'33.0311999999978"E	25°22'27.3028799999952"S
101	29,42723	-25,3759		29°25'38.0110799999997"E	25°22'33.3796800000005"S
102	29,43052	-25,38		29°25'49.8853199999942"E	25°22'47.8689599999998"S
103	29,43213	-25,3819		29°25'55.6611599999997"E	25°22'54.9163200000027"S
104	29,43557	-25,3824		29°26'8.05991999999748"E	25°22'56.7785999999973"S
105	29,4387	-25,3829		29°26'19.3325999999965"E	25°22'58.4709600000014"S
106	29,44185	-25,3834		29°26'30.650279999997"E	25°23'0.17015999999586"S
107	29,44572	-25,384		29°26'44.5934399999965"E	25°23'2.26320000000129"S
108	29,44976	-25,3846		29°26'59.1345600000005"E	25°23'4.4455200000013"S
109	29,45434	-25,3853		29°27'15.640559999996"E	25°23'6.92232000000217"S
110	29,45892	-25,3859		29°27'32.1238799999949"E	25°23'9.39515999999514"S
111	29,4628	-25,3865		29°27'46.0972800000025"E	25°23'11.4910799999959"S
112	29,46336	-25,3872		29°27'48.0790799999997"E	25°23'13.7425199999979"S
113	29,46635	-25,3905		29°27'58.8484800000006"E	25°23'25.9792799999954"S
114	29,46881	-25,3933		29°28'7.69836000000311"E	25°23'36.0344400000014"S
115	29,47135	-25,3962		29°28'16.8762000000012"E	25°23'46.4614800000047"S
116	29,4736	-25,3988		29°28'24.9553200000005"E	25°23'55.6393200000028"S
117	29,47581	-25,4013		29°28'32.9253600000041"E	25°24'4.69331999999895"S
118	29,47818	-25,404		29°28'41.4357600000042"E	25°24'14.3603999999974"S
119	29,47891	-25,4048		29°28'44.0799600000045"E	25°24'17.363519999997"S
120	29,47993	-25,4081		29°28'47.7519600000062"E	25°24'29.3133600000053"S
121	29,48055	-25,4102		29°28'49.9835999999942"E	25°24'36.5749200000045"S
122	29,48162	-25,4136		29°28'53.831639999994"E	25°24'49.0946399999962"S
123	29,48183	-25,4143		29°28'54.5768400000054"E	25°24'51.5196000000051"S
124	29,48042	-25,4174		29°28'49.5263999999975"E	25°25'2.77356000000282"S
125	29,4795	-25,4195		29°28'46.1827199999956"E	25°25'10.2234000000024"S
126	29,47834	-25,4221		29°28'42.0060000000046"E	25°25'19.5294000000018"S
127	29,4769	-25,4253		29°28'36.8525999999957"E	25°25'31.0101600000024"S
128	29,47551	-25,4284		29°28'31.8295200000006"E	25°25'42.2007600000015"S
129	29,47483	-25,4299		29°28'29.3984399999968"E	25°25'47.6162400000035"S
130	29,4742	-25,4318		29°28'27.1106400000048"E	25°25'54.4015200000004"S
131	29,47344	-25,434		29°28'24.3922799999947"E	25°26'2.46479999999366"S
132	29,47206	-25,4381		29°28'19.4286000000031"E	25°26'17.1859200000037"S
133	29,47116	-25,4408		29°28'16.1641200000059"E	25°26'26.8674000000041"S

134	29,47007	-25,444		29°28'12.2588400000024"E	25°26'38.4478800000062"S
135	29,46898	-25,4458		29°28'8.32367999999491"E	25°26'44.9501999999961"S
136	29,46794	-25,4475		29°28'4.59660000000184"E	25°26'51.1080000000015"S
137	29,46711	-25,4489		29°28'1.60032000000541"E	25°26'56.0583600000038"S
138	29,46488	-25,4526		29°27'53.5539600000052"E	25°27'9.35207999999818"S
139	29,4641	-25,4548		29°27'50.744160000001"E	25°27'17.4556800000022"S
140	29,46297	-25,4581		29°27'46.6992000000022"E	25°27'29.1196799999955"S
141	29,46101	-25,4638		29°27'39.6233999999995"E	25°27'49.5233999999957"S
142	29,46046	-25,4653		29°27'37.6394400000027"E	25°27'55.2445200000011"S
143	29,45927	-25,4688		29°27'33.3741599999999"E	25°28'7.54139999999779"S
144	29,45878	-25,4702		29°27'31.5972000000048"E	25°28'12.6649200000028"S
145	29,4595	-25,4728		29°27'34.2035999999982"E	25°28'22.0706400000037"S
146	29,4601	-25,475		29°27'36.3722400000046"E	25°28'29.8970400000042"S
147	29,46073	-25,4772		29°27'38.6409600000039"E	25°28'38.0841599999994"S
148	29,46192	-25,4792		29°27'42.9138000000054"E	25°28'45.2197199999969"S
149	29,46374	-25,4817		29°27'49.4582400000016"E	25°28'53.9612399999993"S
150	29,46532	-25,4838		29°27'55.1397600000047"E	25°29'1.54967999999428"S
151	29,46727	-25,4864		29°28'2.17523999999656"E	25°29'10.9467599999965"S
152	29,46886	-25,4885		29°28'7.90968000000419"E	25°29'18.6050400000019"S
153	29,4708	-25,4911		29°28'14.8731599999988"E	25°29'27.9041999999981"S
154	29,47303	-25,4941		29°28'22.901520000006"E	25°29'38.6257200000023"S
155	29,47496	-25,4966		29°28'29.8657199999963"E	25°29'47.9245199999943"S
156	29,47667	-25,4989		29°28'36.0105600000037"E	25°29'56.1296399999952"S
157	29,47877	-25,5017		29°28'43.5730800000027"E	25°30'6.22656000000319"S
158	29,48085	-25,5045		29°28'51.045960000003"E	25°30'16.2039599999957"S
159	29,48269	-25,507		29°28'57.6818400000062"E	25°30'25.0628400000011"S
160	29,48307	-25,5101		29°28'59.0620799999951"E	25°30'36.4694400000047"S
161	29,48343	-25,5131		29°29'0.335039999996525"E	25°30'46.9890000000021"S
162	29,48378	-25,516		29°29'1.61052000000183"E	25°30'57.5287200000048"S
163	29,48417	-25,5192		29°29'3.00624000000539"E	25°31'9.06023999999746"S
164	29,48458	-25,5226		29°29'4.49159999999495"E	25°31'21.3348000000019"S
165	29,48495	-25,5256		29°29'5.8210800000046"E	25°31'32.3173199999994"S
166	29,48538	-25,5292		29°29'7.38492000000321"E	25°31'45.2380799999966"S
167	29,48579	-25,5325		29°29'8.82779999999514"E	25°31'57.1569600000012"S
168	29,4862	-25,5359		29°29'10.3117200000062"E	25°32'9.4153199999954"S
169	29,48659	-25,5392		29°29'11.7214799999948"E	25°32'21.0602399999959"S
170	29,48702	-25,5428		29°29'13.2781199999988"E	25°32'33.9162000000033"S
171	29,48723	-25,5445		29°29'14.028000000001"E	25°32'40.110720000003"S
172	29,48625	-25,5472		29°29'10.483440000005"E	25°32'49.7677199999987"S
173	29,48511	-25,5503		29°29'6.39528000000013"E	25°33'0.903599999997766"S
174	29,48387	-25,5536		29°29'1.93812000000605"E	25°33'13.044960000006"S
175	29,48273	-25,5567		29°28'57.8362799999948"E	25°33'24.2171999999951"S
176	29,48149	-25,5601		29°28'53.3467200000058"E	25°33'36.445319999994"S
177	29,48028	-25,5634		29°28'49.0112400000012"E	25°33'48.2536799999988"S
178	29,47916	-25,5665		29°28'44.9615999999989"E	25°33'59.2819200000062"S
179	29,47781	-25,5701		29°28'40.1185199999969"E	25°34'12.4701599999958"S

180	29,47677	-25,573		29°28'36.3586800000047"E	25°34'22.708200000003"S
181	29,47533	-25,5769		29°28'31.1869199999987"E	25°34'36.7903200000021"S
182	29,47397	-25,5806		29°28'26.3028000000031"E	25°34'50.0883599999958"S
183	29,47296	-25,5833		29°28'22.6639200000048"E	25°34'59.9955599999993"S
184	29,47185	-25,5864		29°28'18.6610799999994"E	25°35'10.8927599999973"S
185	29,47074	-25,5894		29°28'14.6531999999991"E	25°35'21.8029200000061"S
186	29,46972	-25,5922		29°28'10.987320000005"E	25°35'31.7821199999941"S
187	29,46849	-25,5955		29°28'6.55967999999774"E	25°35'43.8341999999949"S
188	29,46722	-25,599		29°28'2.00604000000169"E	25°35'56.2286400000062"S
189	29,46609	-25,602		29°27'57.9279599999995"E	25°36'7.327439999994"S
190	29,46496	-25,6051		29°27'53.8498799999974"E	25°36'18.4258800000032"S
191	29,46418	-25,6072		29°27'51.044040000001"E	25°36'26.0614799999993"S
192	29,46277	-25,6111		29°27'45.9795599999953"E	25°36'39.8433599999942"S
193	29,46132	-25,615		29°27'40.7534400000063"E	25°36'54.0644400000056"S
194	29,46006	-25,6184		29°27'36.221399999994"E	25°37'6.39587999999691"S
195	29,45893	-25,6215		29°27'32.1422400000048"E	25°37'17.4943200000061"S
196	29,45792	-25,6243		29°27'28.5047999999978"E	25°37'27.3907199999985"S
197	29,45839	-25,6274		29°27'30.2115600000039"E	25°37'38.7101999999945"S
198	29,45895	-25,6311		29°27'32.2124399999939"E	25°37'51.9794399999969"S
199	29,45951	-25,6348		29°27'34.224119999995"E	25°38'5.32104000000089"S
200	29,46002	-25,6382		29°27'36.0615600000062"E	25°38'17.5052399999981"S
201	29,46049	-25,6413		29°27'37.7730000000031"E	25°38'28.8520799999941"S
202	29,46244	-25,6453		29°27'44.7937200000015"E	25°38'43.2578400000023"S
203	29,46399	-25,6492		29°27'50.363640000005"E	25°38'57.245639999999"S
204	29,46512	-25,6521		29°27'54.4251600000055"E	25°39'7.44516000000374"S
205	29,46503	-25,655		29°27'54.1054800000043"E	25°39'17.9431200000045"S
206	29,46493	-25,6583		29°27'53.7415199999973"E	25°39'29.9005199999988"S
207	29,46484	-25,6613		29°27'53.4175199999967"E	25°39'40.5432000000025"S
208	29,46556	-25,6649		29°27'56.0015999999979"E	25°39'53.579160000003"S
209	29,46622	-25,6682		29°27'58.3941599999991"E	25°40'5.65031999999661"S
210	29,46579	-25,6711		29°27'56.8346399999999"E	25°40'15.9646800000004"S
211	29,46538	-25,6738		29°27'55.3831199999965"E	25°40'25.5651600000007"S
212	29,465	-25,6763		29°27'53.9884800000056"E	25°40'34.79016"S
213	29,46441	-25,6782		29°27'51.8652000000048"E	25°40'41.4681599999966"S
214	29,46374	-25,6803		29°27'49.466519999996"E	25°40'49.0119599999943"S
215	29,46321	-25,6819		29°27'47.5685999999942"E	25°40'54.9807600000037"S
216	29,46273	-25,6835		29°27'45.8215200000029"E	25°41'0.476160000006018"S
217	29,46247	-25,6868		29°27'44.8812000000007"E	25°41'12.4044000000049"S
218	29,46224	-25,6896		29°27'44.0791200000024"E	25°41'22.5769200000011"S
219	29,46202	-25,6924		29°27'43.2792000000038"E	25°41'32.7220799999972"S
220	29,46176	-25,6957		29°27'42.3457200000047"E	25°41'44.5653600000009"S
221	29,46153	-25,6987		29°27'41.5033199999957"E	25°41'55.2487199999939"S
222	29,46117	-25,7032		29°27'40.2285599999988"E	25°42'11.418119999995"S
223	29,46084	-25,7074		29°27'39.015360000005"E	25°42'26.8016399999954"S
224	29,45833	-25,7091		29°27'29.9912399999999"E	25°42'32.7229199999994"S
225	29,45548	-25,711		29°27'19.7114400000035"E	25°42'39.4678799999983"S

226	29,45247	-25,7129		29°27'8.87544000000446"E	25°42'46.5775199999999"S
227	29,44941	-25,7149		29°26'57.885000000004"E	25°42'53.7875999999986"S
228	29,44697	-25,7165		29°26'49.1053200000033"E	25°42'59.5472399999937"S
229	29,44368	-25,7187		29°26'37.2656400000034"E	25°43'7.31351999999504"S
230	29,44107	-25,7204		29°26'27.8620800000022"E	25°43'13.4817599999946"S
231	29,4392	-25,722		29°26'21.131160000001"E	25°43'19.2363599999948"S
232	29,43725	-25,7237		29°26'14.1046799999992"E	25°43'25.2436799999938"S
233	29,43435	-25,7262		29°26'3.66899999999731"E	25°43'34.1652000000022"S
234	29,43178	-25,7284		29°25'54.4133999999985"E	25°43'42.0772800000063"S
235	29,42935	-25,7304		29°25'45.6448800000004"E	25°43'49.5724799999988"S
236	29,42708	-25,7324		29°25'37.4735999999984"E	25°43'56.5571999999986"S
237	29,42452	-25,7346		29°25'28.2889199999971"E	25°44'4.40735999999532"S
238	29,42189	-25,7368		29°25'18.8108399999948"E	25°44'12.508080000004"S
239	29,4191	-25,7392		29°25'8.77008000000359"E	25°44'21.088680000006"S
240	29,41685	-25,7411		29°25'0.65423999999723"E	25°44'28.024080000005"S
241	29,4146	-25,743		29°24'52.5524400000015"E	25°44'34.9476000000058"S
242	29,41171	-25,7455		29°24'42.1513199999941"E	25°44'43.834559999994"S
243	29,40968	-25,7472		29°24'34.8440399999978"E	25°44'50.0783999999945"S
244	29,40772	-25,7489		29°24'27.7970399999992"E	25°44'56.0990399999957"S
245	29,40504	-25,7512		29°24'18.1407599999991"E	25°45'4.34879999999396"S
246	29,40231	-25,7535		29°24'8.30340000000604"E	25°45'12.7526400000022"S
247	29,39952	-25,7559		29°23'58.2557999999989"E	25°45'21.3357599999952"S
248	29,39741	-25,7577		29°23'50.6885999999963"E	25°45'27.7995599999954"S
249	29,39517	-25,7596		29°23'42.6123600000051"E	25°45'34.697879999996"S
250	29,39246	-25,7619		29°23'32.8693200000015"E	25°45'43.0196400000042"S
251	29,393	-25,7642		29°23'34.8125999999962"E	25°45'51.1729200000005"S
252	29,3935	-25,7663		29°23'36.5838000000008"E	25°45'58.6033200000031"S
253	29,39429	-25,7696		29°23'39.4616399999944"E	25°46'10.6755599999966"S
254	29,39499	-25,7725		29°23'41.9603999999961"E	25°46'21.1583999999996"S
255	29,39785	-25,7754		29°23'52.2668399999969"E	25°46'31.2690000000012"S
256	29,4005	-25,7766		29°24'1.81404000000128"E	25°46'35.848560000006"S
257	29,40265	-25,7777		29°24'9.54683999999503"E	25°46'39.5579999999975"S
258	29,40713	-25,778		29°24'25.6510800000021"E	25°46'40.9403999999989"S
259	29,41176	-25,7784		29°24'42.3496799999972"E	25°46'42.373200000001"S
260	29,4152	-25,7795		29°24'54.7343999999973"E	25°46'46.1424000000002"S
261	29,41664	-25,7821		29°24'59.9040000000036"E	25°46'55.5495600000052"S
262	29,41978	-25,7831		29°25'11.2033199999942"E	25°46'59.1427200000064"S
263	29,42003	-25,7861		29°25'12.0943199999957"E	25°47'9.90636000000393"S
264	29,4203	-25,7893		29°25'13.0666800000014"E	25°47'21.6495600000019"S
265	29,42051	-25,7919		29°25'13.8396000000043"E	25°47'30.9861600000008"S
266	29,4207	-25,7943		29°25'14.5376400000018"E	25°47'39.4188000000003"S
267	29,42099	-25,7978		29°25'15.5733600000062"E	25°47'51.926999999998"S
268	29,42119	-25,8002		29°25'16.29516"E	25°48'0.643320000000074"S
269	29,42139	-25,8025		29°25'17.0014800000047"E	25°48'9.17315999999715"S
270	29,42353	-25,8048		29°25'24.6900000000053"E	25°48'17.3304000000013"S
271	29,42618	-25,8058		29°25'34.2408000000006"E	25°48'20.8871999999997"S

272	29,4275	-25,8081		29°25'38.9848799999967"E	25°48'29.1401999999974"S
273	29,42883	-25,8104		29°25'43.7728799999945"E	25°48'37.4691600000003"S
274	29,42803	-25,8131		29°25'40.9206000000054"E	25°48'47.0131200000051"S
275	29,42707	-25,8163		29°25'37.4516399999976"E	25°48'58.6187999999947"S
276	29,42724	-25,8187		29°25'38.047799999994"E	25°49'7.14791999999619"S
277	29,4274	-25,821		29°25'38.6439600000031"E	25°49'15.6723599999941"S
278	29,42658	-25,8226		29°25'35.6869200000048"E	25°49'21.2102399999941"S
279	29,42476	-25,826		29°25'29.1320400000018"E	25°49'33.4862400000026"S
280	29,42294	-25,8294		29°25'22.5746399999949"E	25°49'45.7662000000062"S
281	29,41901	-25,8298		29°25'8.41907999999449"E	25°49'47.3638800000037"S
282	29,41534	-25,8302		29°24'55.2330000000046"E	25°49'48.8517599999972"S
283	29,41162	-25,8307		29°24'41.8229999999943"E	25°49'50.3644799999995"S
284	29,40849	-25,8328		29°24'30.5557199999944"E	25°49'58.1455199999942"S
285	29,40554	-25,8349		29°24'19.9475999999981"E	25°50'5.47079999999625"S
286	29,40418	-25,838		29°24'15.0400799999977"E	25°50'16.7186399999991"S
287	29,40324	-25,8401		29°24'11.6747999999993"E	25°50'24.4319999999959"S
288	29,4012	-25,8418		29°24'4.31423999999424"E	25°50'30.5901600000055"S
289	29,39863	-25,844		29°23'55.0518000000051"E	25°50'38.339520000001"S
290	29,39657	-25,8457		29°23'47.6556000000056"E	25°50'44.5271999999974"S
291	29,39553	-25,8485		29°23'43.8986399999959"E	25°50'54.5107199999975"S
292	29,39476	-25,8505		29°23'41.1503999999948"E	25°51'1.81440000000293"S
293	29,39601	-25,8532		29°23'45.6410399999965"E	25°51'11.655720000004"S
294	29,39724	-25,8559		29°23'50.0495999999981"E	25°51'21.3163200000034"S
295	29,40069	-25,8584		29°24'2.49048000000215"E	25°51'30.0718800000035"S
296	29,40484	-25,8613		29°24'17.4315599999991"E	25°51'40.5867599999974"S
297	29,40866	-25,864		29°24'31.179599999995"E	25°51'50.260679999999"S
298	29,40831	-25,8664		29°24'29.9257199999991"E	25°51'58.8654000000014"S
299	29,40801	-25,8684		29°24'28.8277199999959"E	25°52'6.4027200000001"S
300	29,40437	-25,8707		29°24'15.7139999999947"E	25°52'14.6841599999976"S
301	29,40141	-25,8726		29°24'5.07095999999962"E	25°52'21.4046400000046"S
302	29,40079	-25,873		29°24'2.8501199999971"E	25°52'22.8068399999944"S

5.2 Assumptions and Limitations

The field survey did not include any form of subsurface inspection beyond the inspection of proposed tower positions and sections of the 80km long servitude. Attention was given to the sections exposed by erosion or earth moving disturbances. 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.

1. The proposed powerline and substation project development will be limited to specific portions of servitude and laydown areas of the development (see figure 1 & 2).

2. Given the previous surface disturbance nature on most affected project servitude areas and the levels of existing developments within most of the affected landscape, most sections of the project area still have low to high potential to yield high significant in situ archaeological or physical cultural properties.
3. No excavations or sampling was undertaken, since a permit from heritage authorities is required to disturb a heritage resource. As such the results herein discussed are based on surface indicators. However, these surface observations concentrated on areas accessed and sampled since it was not viable at this stage to conduct 100% coverage of the entire servitude and substation sites.
4. No Palaeontological study was conducted as part of this HIA.
5. This study did not include any ethnographic and oral interviews. The existing studies from current and historic researches are accepted as adequate for the purposes of this HIA.

6 BRIEF CULTURE HISTORY BACKGROUND OF THE PROJECT AREA

Based on the literature survey, the description of the archaeology and history of the area is as follows:

6.1 STONE AGE

In South Africa the Stone Age can be divided in three periods showing the human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996; Korsman & Meyer, 1999):

- Early Stone Age (ESA) 2 million – 150 000 years ago
- Middle Stone Age (MSA) 150 000 – 30 000 years ago
- Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

The project area has not been researched in detail enough to gauge the density of the Stone Age site in the area. As such, there are no known significant or listed Stone Age sites from this area. However, significant Stone Age sites of Middle and Late Stone Age sites have been recorded to the west of the project area stretching to areas such Bela Bela (Bergh 1999).

Rock art site which are usually associated with the Late Stone Age period have also been recorded in areas east of the project areas at locations such as close to Roossenekal (Bergh 1999).

This is evidence enough to suggest that there is potential to encounter stone age sites along the project servitude.

6.2 IRON AGE

The Iron Age in South Africa it can be divided in three separate phases according to Huffman (2007) namely:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

The general project area falls within a region that has yield significant archaeological sites both in density and size. A large number of sites are found to the south-east of the project milieu around Roossenekal, Belfast and Machadodorp as well east to Lydenberg (Huffman, 2007). An iron working site was also identified to the east of Groblersdal, close to the Gauteng border (Bergh 1999). This indicates that the project area falls within an active archaeological zone with potential to yield significant sites.

6.3 HISTORICAL AGE

The Historical Age of South Africa relates to the period covered by oral history and written records. This period relate to the recent peopling of the region extending to the colonial historic period.

The historic peopling of the project region relates to Bantu language speaking communities in the area who were ancestors of the Kgatla, a Tswana-speaking group who settled to the north-west of the Elands River and the Kôpa, a siPedi-speaking group, who stayed to the south-eats of Groblersdal (Bergh 1999).

Missionaries such R Moffat and J Archbell as well as D Livingstone and traders such as R Scoon travelled in this region and their records highlight areas between the Elands and Apies River during the mid 1800s (Bergh 1999).
Another prominant part of the history of this region related to the early white settlers that migrated into the Groblersdal – Marble Hall and Middleberg areas. From the 1830s, Voortrekker party of H van Rensburg trekked through the region and eventually White farmers permanently settled in the western parts of the surveyed area between 1841 and 1850 (Bergh 1999).

The project area has a rich historic period heritage related to the bantu-speaking communities and subsequently colonial historic heritage associated with White farming communities. The current cultural characteristics of the region were largely shaped during the colonial period from mid 1800s to the end of apartheid at the beginning of the 1990s.

7 BRIEF DESCRIPTION OF THE APPROVED SERVITUDE EMKHIWENI TO [LIMPOPO] TO SILIMELA [MPUMALANGA]

Phase 1 AIA and HIA studies conducted in 2009 highlighted the potential for the affected landscape between formal known as Rockdale Substation and Marble Hall Substation (Emkhiweni to Silimela) site to yield archaeological and cultural heritage resources. The study also identified contemporary cultural sites such as the remains of historic farmsteads that were associated with different sections of the route that was presented. This potential to affect such sites triggered the necessity of conducting a detailed Walk-down survey once the final route was approved. This route having been approved, a detailed walk-down survey covering 302 specific powerline pylon locations was conducted (see Figure 1 and 2).

Figure 3 & 4: The Powerline will traverse from Silimela substation (top). The line will run through largely agricultural landscape bypassing farm settlements, villages and town settlement

Figure 5: The powerline will cut through agriculture fields. Note the irrigation pivots in the background

The proposed powerline traverse approximately 80km with the first tower at Silimela in a commercial agricultural landscape South of Mable Hall traversing to the southeast passing between Groblerdal to the east and Aquaville to the west.

The line starts from 25°5'10.31"S; 29°17'55.02"E on cultivated and disturbed land.

The line will proceed through agricultural and game farming landscapes crossing the Olifants River valley. The proposed servitude will cross from Limpopo into Mpumalanga Province just east of Kranspoort Vakansiedor.

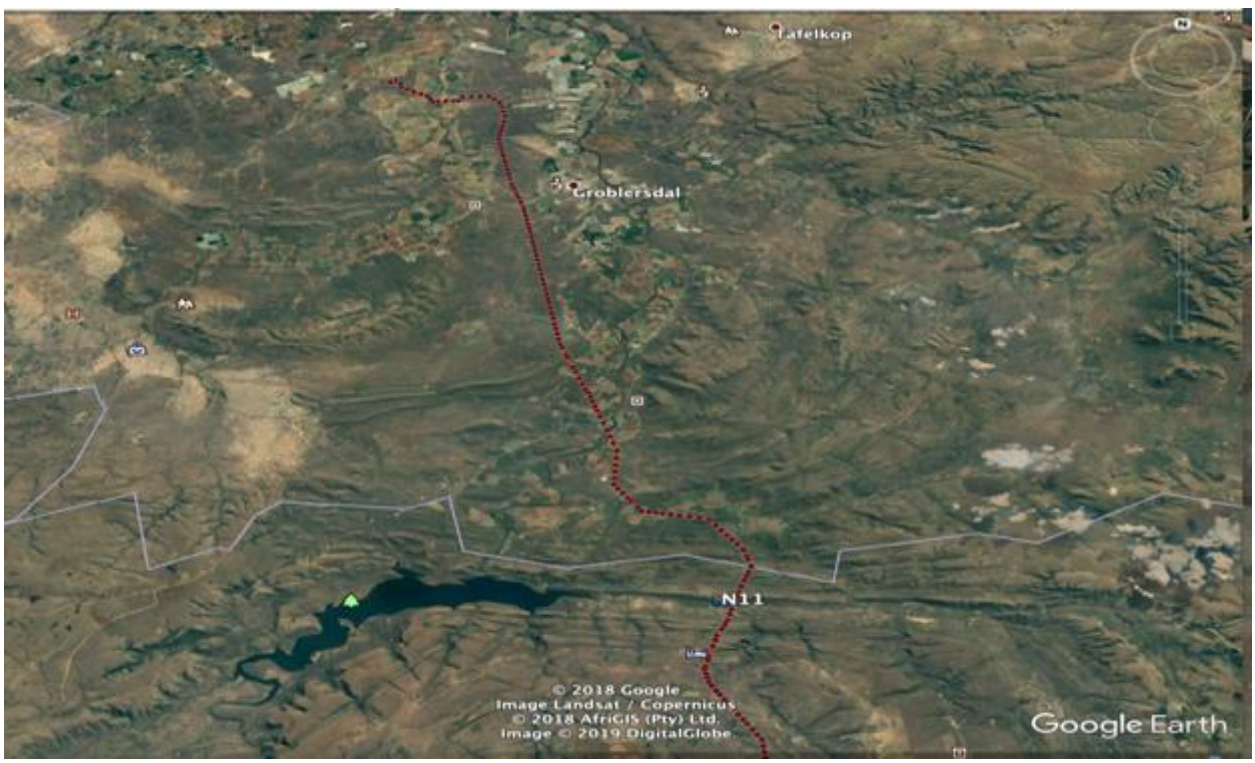


Figure 6: The location of the proposed transmission line running from Silimela through the agricultural landscape southwards past Groblersdal town and across the Olifants River Valley east of the Loskop Dam.

From here the line maintains a southwards trajectory rough along the N11 heading to Middleburg.

The line will run on the periphery of Middleburg town on the western boundary of Mhlizi Township navigating between the township and the coal mining complexes of Uitkyk. It will snake through a servitude crossing the R575 from east to west then cross the N4 Highway before crossing the R575 rod eastward and terminating southwards on agricultural landscapes at Emkhiweni just on eastern side of the R575.

Figure 7: The location of the proposed transmission line running past Middleburg urban region through disturbed peri-urban and mining areas terminating in agricultural landscape south the Middleburg town, Mpumalanga Province.

The power line terminates at 25°52'22.73"S; 29°24'2.89"E

8 RESULTS OF THE ARCHAEOLOGICAL/HERITAGE ASSESSMENT STUDY - DESCRIPTION OF PROJECT AREA

The previous Phase 1 AIA and HIA studies conducted in 2013 (Murimbika, 2013) highlighted the potential for the affected landscape specifically areas around Silimela Substation site where the proposed line would start to yield archaeological and cultural heritage resources. The study also identified contemporary cultural sites such as the remains of historic farmsteads that were associated with different sections of the route that was presented.


Figure 8 and 9: The proposed powerline will cut through agriculture fields.

Figure 8 and 9 shows portions of previously degraded and disturbed land portions where existing minor reticulation powerlines already traverses across the farm marked with irrigation infrastructure, farm roads, boundary fence lines. Inspection of the disturbed sections did not yield archaeological materials or possible sites on direct path of the powerline.

The area is significantly disturbed from previous and current agricultural land use activities (Figure 10 & 11). The proposed powerline servitude runs parallel to Groblersdal –Wolwekraal 88 kv powerline.


Figure 10 & 11: Thickly vegetated grazing areas. Note the thick grass cover and leaf cover which compromised visibility of possible surface remains.

The area between Groblersdal and the Olifants River Valley is characterised by existing high and medium voltage powerlines, irrigation infrastructure, farm settlements, farm tracks, farm processing sites, farm labourer's dwellings, boundary fence lines. There is an existing 88kv powerline that runs parallel to the proposed powerline. As such, the development will be an in situ addition to an already altered cultural landscape.

Figure 12: From Groblersdal toward the Olifants river valley, the proposed powerline will run along existing 88kv powerline servitude.

8. 1. LOCATIONS STRUCTURE 1 TO STRUCTURE 22

Structures 1 to 22 shown in Figure 13 are all situated on portion of previously degraded and disturbed land portions where existing minor reticulation powerlines already traverses across the farm marked with irrigation infrastructure, farm roads, boundary fence lines and an 88kv powerline. The survey of Pylon Structures positions 1 to 22 did not yield archaeological materials or possible sites on direct path of the powerline development.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
None	Low	None	Unsure	Short term

Mitigation

None required. All towers are positioned within currently and previously cultivated land which left no trace for surficial visible archaeological material (Plate 1). However, in the unlikely event that chance archaeological materials are disturbed at any of the tower position, salvage and chance finds procedures should be implemented.

Figure 13: The powerline pylon positions follow the servitude that cuts across commercial farming area characterised by agriculture fields, irrigation infrastructure settlements, along main roads and across open lands with existing powerlines and other developments.

Figure 14: Pylon Structures 1 to 22 are located in predominantly commercial agriculture area characterised by commercial farming infrastructure

8.2 Locations Structure 21 to Structure 44

Towers 22 to 44 are located within Portion 6 Vaalfontein 14, Portion 996 Loskop Noord 12 JS, Portion 39, 47 & 54 Klipbank 26 JS. The area is significantly disturbed from previous and current agricultural land use activities (see Figure 14). The proposed powerline servitude runs parallel to Groblersdal – Wolwekraal 88 kv powerline.

Figure 15: Some pylons from tower 22 to 44 will cut through thickly vegetated grazing areas. Note the thick grass cover and leaf cover which compromised visibility of possible surface remains.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
Low	Low	None to Undetermined	Unsure	Short term

Mitigation

No further mitigation is required prior to construction phase. However, in the unlikely event that chance archaeological materials are disturbed at any of the remaining tower positions in this section, salvage and chance finds procedures should be implemented.

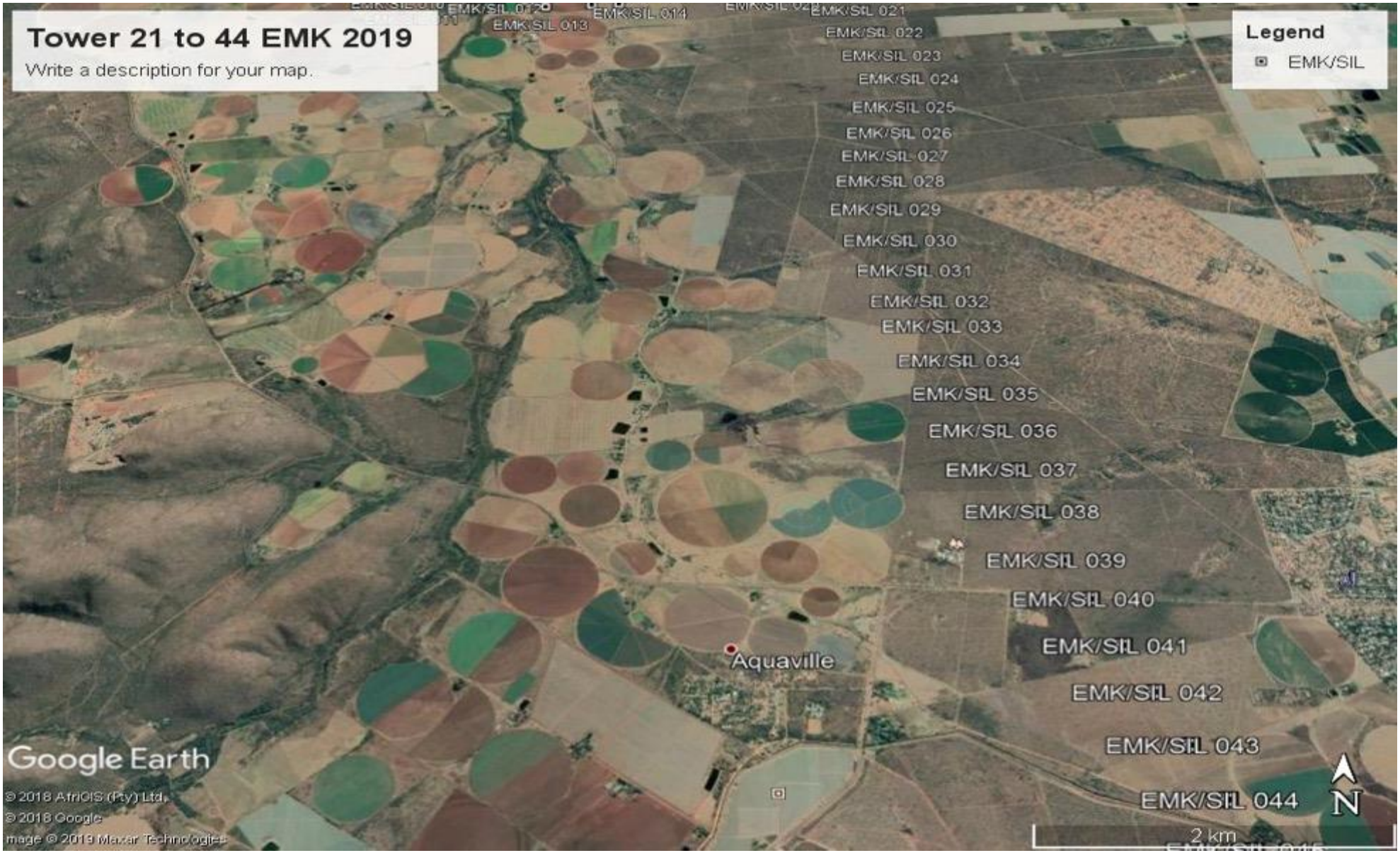


Figure 16: Powerline Pylon Structures 21 to 44 are also located in commercial agriculture lands characterised by cultivated land and irrigation infrastructure.

8.3 LOCATIONS STRUCTURE 44 TO STRUCTURE 80

Structures 44 to 80 are located in an area characterised by existing high and medium voltage powerlines, irrigation infrastructure, farm settlements, farm tracks, farm processing sites, farm labourer's dwellings, and boundary fence lines.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
None	Medium-low	None to Undetermined	Unsure	Short term

Mitigation

No further mitigation is required prior to construction phase. However, in the unlikely event that chance archaeological materials are disturbed at any of the remaining tower position s in this section, salvage and chance finds procedures should be implemented.

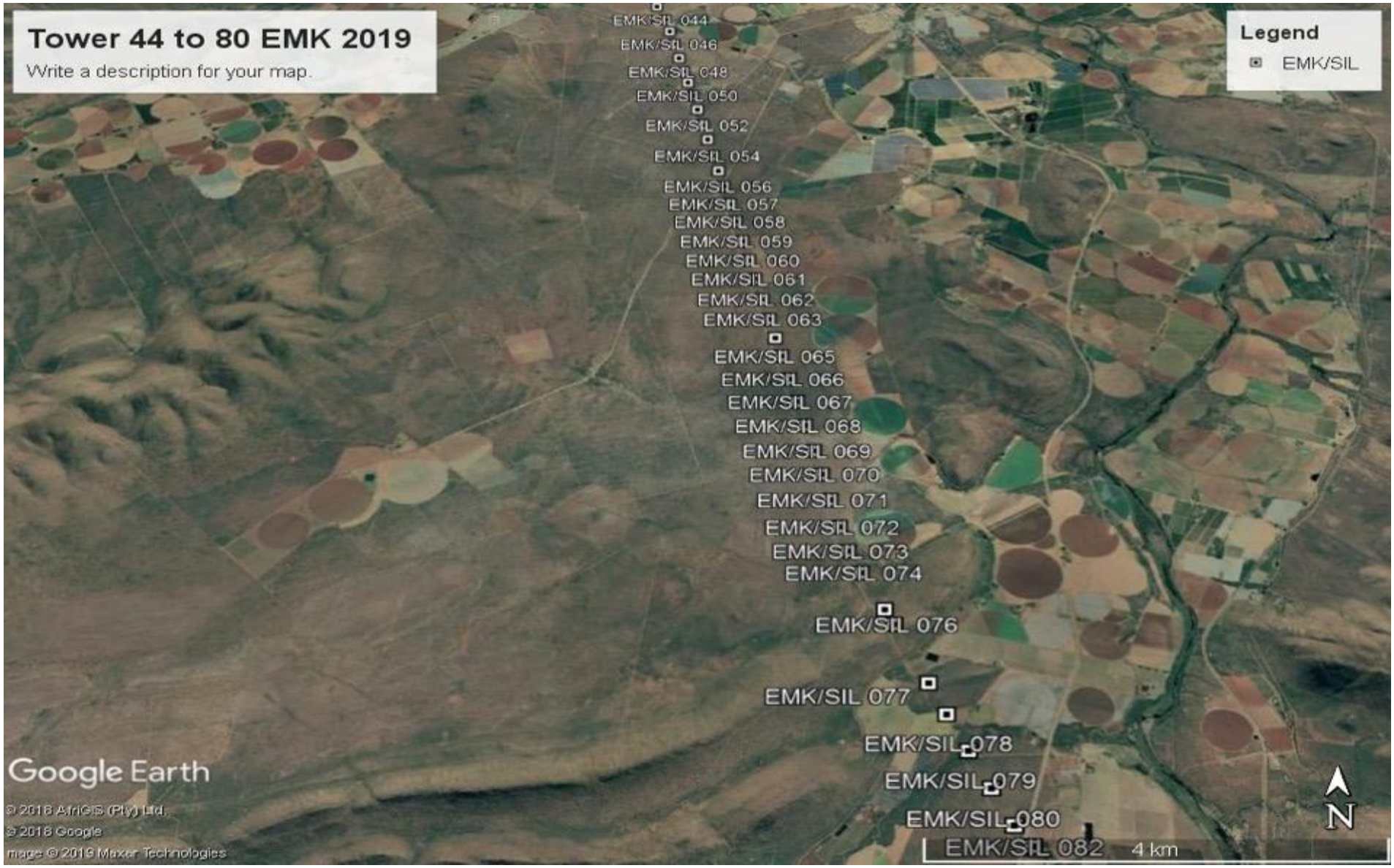


Figure 17: Structures 44 to 80 are situated along commercial grazing and agriculture area. Note some farm dwellings in the vicinity of tower 41 to tower 45

8.4 Locations Structure 80 to Structure 90

The survey of Pylon Structures positions 80 to 90 archaeological small pieces of potsherd materials on between specifically tower 83 and 84 within the servitude path of the development. Where the servitude crosses the N11 after Groblersdal, inspection of the farm road on agricultural land yielded archaeological potsherds and small grinding stone (Fig. 18).

Figure18: small pieces of potsherds and grinding stone recovered on farm road cut. These finds did not yield a clear provenance but they indicate the presence of Iron Age site in this vicinity.

The survey of area close to the N11 after Groblersdal yield archaeological materials or possible sites on direct path of the powerline development (Fig 18). These archaeological materials were identified at at **Lat.** 29°24' 31.09" E**Long.** 25°18'51.60" S on cultivated and disturbed land.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
Potential disturbance of previously unknown archaeological sites	Low	unknown	Unsure	Short term

Mitigation

The artefacts indicate the presence of archaeological sites in the project foot print. (Fig. 19). CEO should closely monitor the area. In the event that chance archaeological materials are disturbed at any of the tower positions in this area, salvage and chance finds procedures should be implemented as would be directed by the SAHRA.

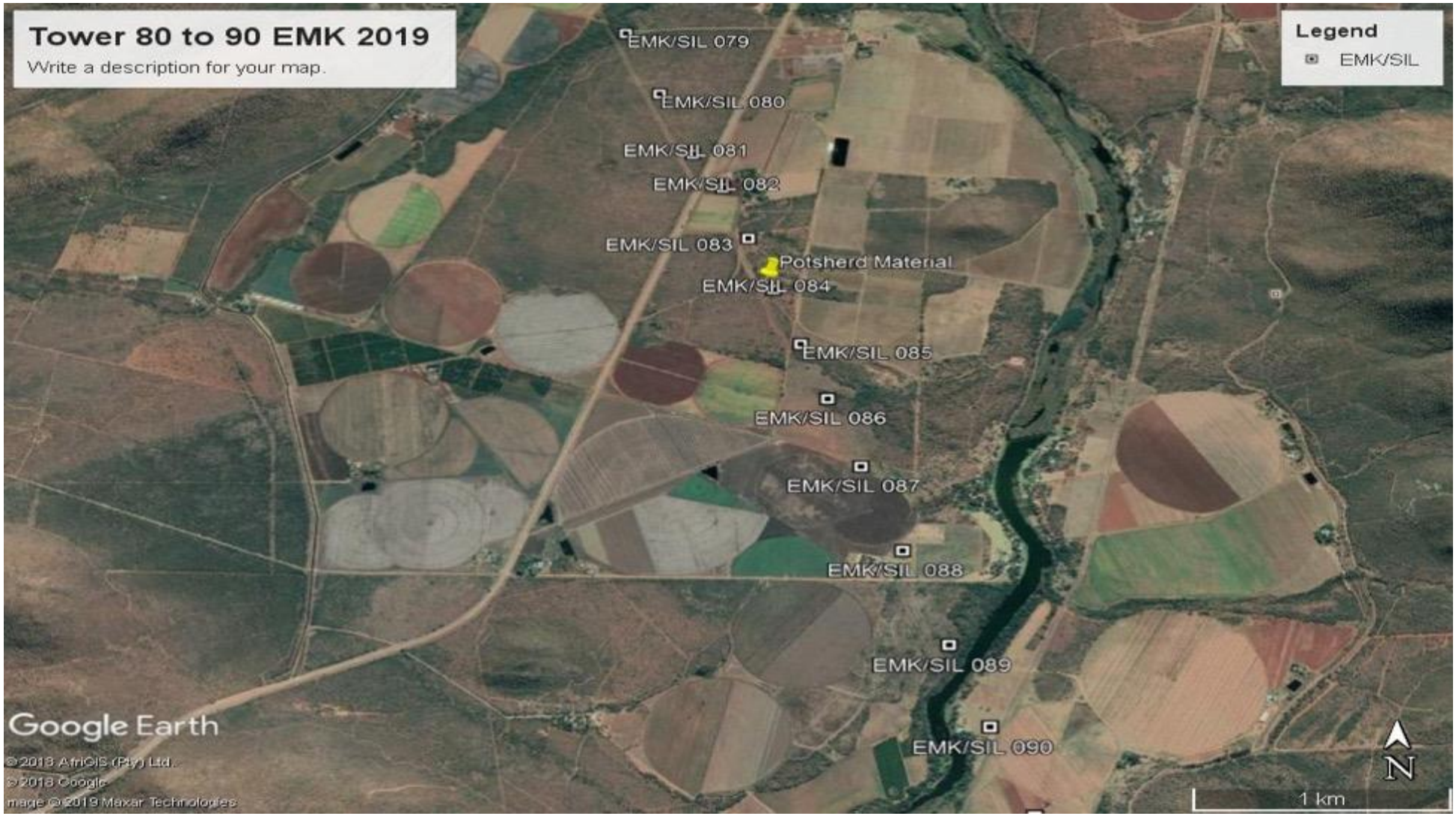


Figure 19: TWR 80 to 90 located along the meandering Olifants River valley within a mixture of disturbed agricultural land, river valley and ravines. Prehistoric potshed materials were identified in the vicinity of towers 82 and 88. The powerline will cross the Olifants River between tower 89 and tower 90.

8.5 Locations Structure 91 to Structure 106

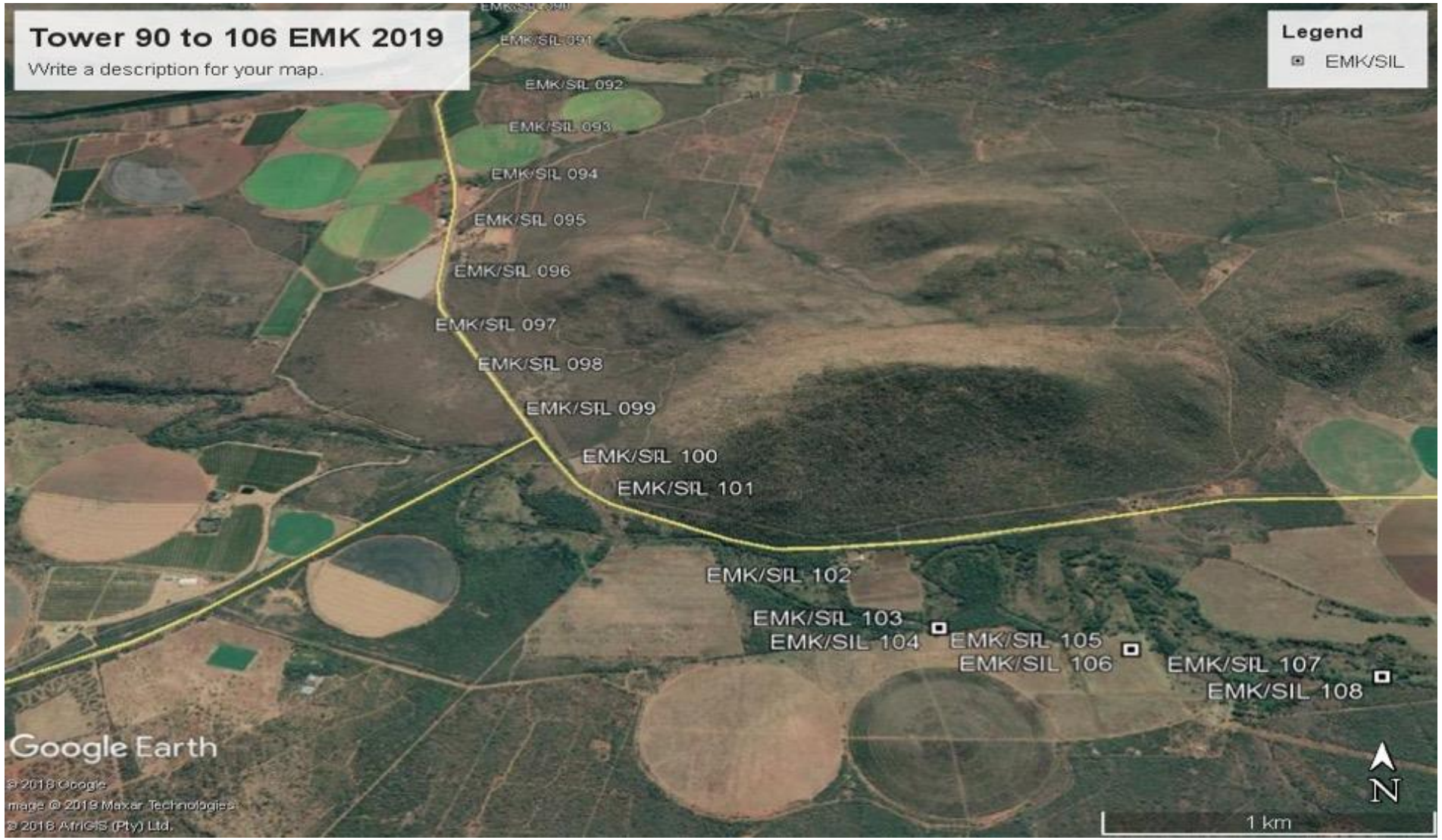
Most of the receiving land portions were previously degraded and disturbed with existing powerline, access roads, farm dwellings and agricultural fields (Fig. 20). The survey of Pylon Structures positions 91 to 106 did not yield classified archaeological sites on direct path of the development. However, portions of the section have potential to yield archaeological site as evidence by such sites recorded in previous studies in the vicinity of the servitude.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
None	Low	Low	Unsure	Short term

Mitigation

None required. However, in the unlikely event that chance archaeological materials are disturbed at any of the tower position, salvage and change finds procedures should be implemented. No further mitigation is required prior to construction phase. However, should chance archaeological materials are disturbed at any of the remaining tower positions in this section, salvage and chance finds procedures should be implemented.

Figure 20: Powerline will cut across cultivated land and patches of grazing land.



8.6 Locations Structure 107 to Structure 150

Structures 107 to 150 shown in Figure 21 are all situated on portions of land consisting of access and N11 main road servitude, farm dwellings, high and low voltage powerlines, irrigation agricultural land, irrigation infrastructure, streams and grazing lands. Most of the receiving land portions were previously degraded and disturbed with existing powerline, access roads, rural homesteads and agricultural fields. A gravel road also cuts across the powerline servitude. No archaeological sites were recorded on direct path of the development.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
None	Low	None	Unsure	Short term

Mitigation

None required. However, in the unlikely event that chance archaeological materials are disturbed at any of the tower position, salvage and change finds procedures should be implemented. No further mitigation is required prior to construction phase. However, should chance archaeological materials are disturbed at any of the remaining tower positions in this section, salvage and chance finds procedures should be implemented.

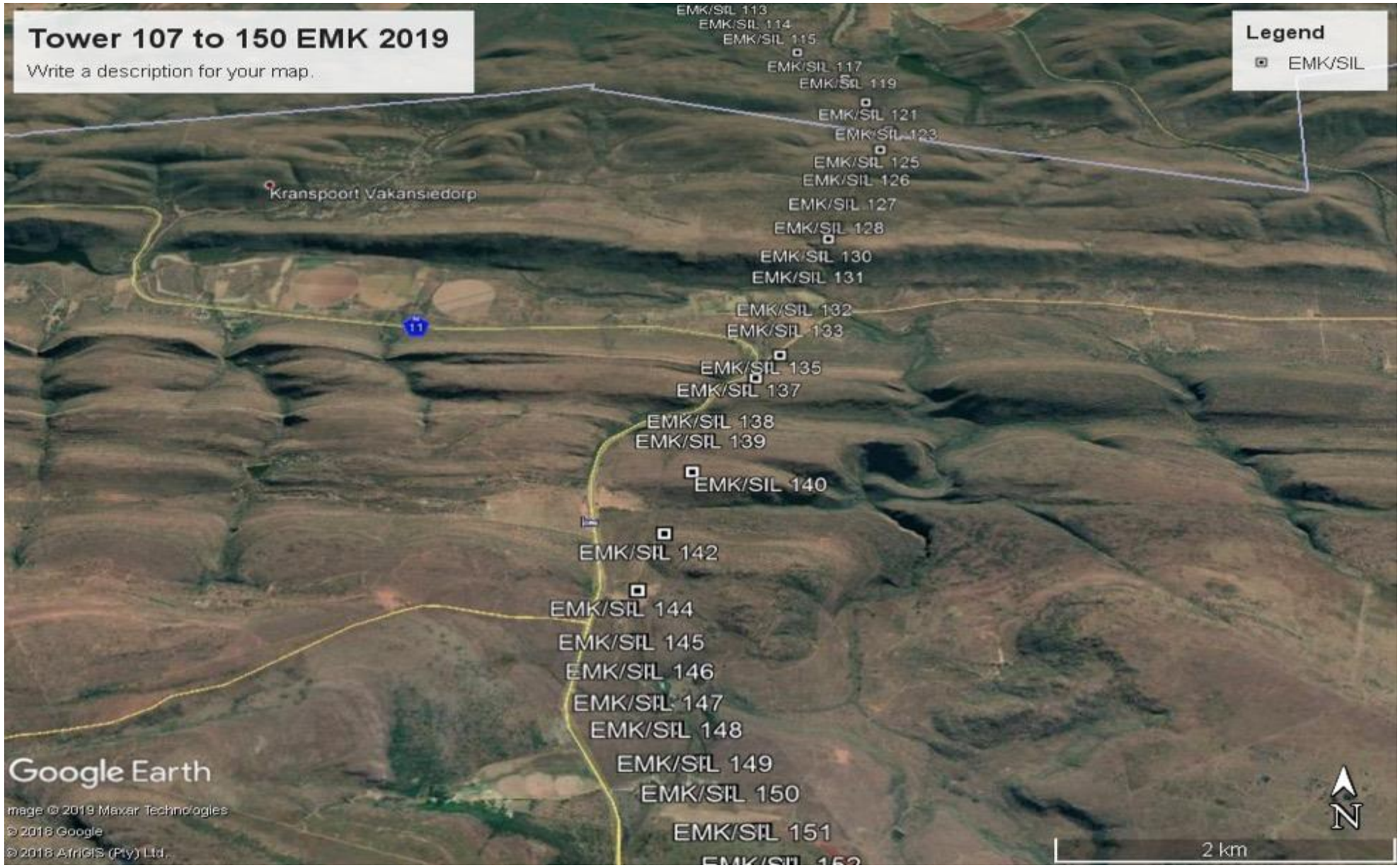


Figure 21: Powerline will cut through sloppy mountainous area.

8.7 Locations Structure 151 to Structure 181

Structures 151 to 181 shown in Figure 22 are all situated on portions of land consisting of main road servitude, farm dwellings, high and low voltage powerlines, irrigation agricultural land and infrastructure, and grazing lands. Most of the receiving land portions were previously degraded and disturbed with existing powerline, access roads, rural homesteads and agricultural fields.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
None	Low	None	Unsure	Short term

Mitigation

No further mitigation is required prior to construction phase. However, should chance archaeological materials are disturbed at any of the remaining tower positions in this section, salvage and chance finds procedures should be implemented. Abandoned historic homesteads should not be interfered with without a clearance of Destruction Permit from SAHRA since some of the building remains may be 60 years of. Such old structures enjoy automatic legal protection from the NHRA. Such site may also yield previously unknown burial sites.

Figure 22: Power line towers from 151 to 181

8.8 Locations Structure 181 to Structure 200

The powerline route traverses deeper into Mpumalanga Province descending into the Olifants River valley (Fig. 23 & 24). The area is hilly with some steep sided hills. From here on, the route cross the river and run long the N11 national road.

Figure23& 24: View of section of the Olifants River whose banks were surveyed for potential archaeological materials being washed into the river bed.

Structures 181 to 200 shown in Figure 25 are all situated on portions of land consisting of main road servitude, farm dwellings, high and low voltage powerlines, substation, irrigation agricultural land, irrigation infrastructure, streams and grazing lands. Most of the receiving land portions were previously degraded and disturbed with existing powerline, access roads, rural homesteads and agricultural fields. Two 88kv powerlines run parallel to the proposed powerline servitude. The survey of Pylon Structures positions 181 to 200 yielded prehistoric potsherd material between tower 197 and 198 directly on the path of the development (Fig 26). Several isolated potsherd were identified highlighting the existence of possible archaeological sites on direct path of the powerline development (Fig 25). A fair density of archaeological potsherd materials were identified at **Lat.** 29°27' 32.38" E **Long.** 25°37'51.94" S on previously cultivated and disturbed land (Fig. 25). The potsherd scatter could not be confirmed as part of a distinct archaeological site.

Impact	**Impact Significance**	**Heritage Significance**	**Certainty**	**Duration**
Low	Low-medium	Unknown	Unsure	Short term

Mitigation

ECO should closely monitor the foundation excavations and installation construction work for Towers 190 to 200 where potsherd materials were identified. By association, these towers locations have high potential to yield subsurface discernable archaeological remains that may require to be recorded during construction work. No further mitigation is required prior to construction phase. However, should chance archaeological materials be disturbed at any of the unmonitored tower positions in this section, salvage and chance finds procedures should be implemented. Abandoned historic homesteads should not be interfered with without a clearance of destruction Permit from SAHRA since some of the building remains may be 60 years of. Such old structures enjoy automatic legal protection from the NHRA.

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Figure 25: Powerline is located in a heavily disturbed area and built up residential area.

8.9 Locations Structure 201 to Structure 220

The survey of Pylon Structures positions 201 to 220 did not yield archaeological sites on direct path of the development. However, there are a number or contemporary abandoned homesteads near Tower 220. The ruins are more than 60m from the tower position. Although such sites are not significant from a heritage classification, they potentially have burial grounds associated with them.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
None to Low	Low	Low	Unsure	Short term

Mitigation

None required. However, in the unlikely event that chance archaeological materials are disturbed at any of the tower position, salvage and change finds procedures should be implemented. Abandoned homesteads should be avoided since they may yield burial sites. No further mitigation is required prior to construction phase. However, should chance archaeological materials are disturbed at any of the remaining tower positions in this section, salvage and chance finds procedures should be implemented. Abandoned historic homesteads should not be interfered with without a clearance of Destruction Permit from SAHRA since some of the building remains may be 60 years of. Such old structure enjoy automatic legal protection from the NHRA. Such site may also yield previously unknown burial sites.

Figure 26: This section of the powerline is located near Middleburg; the area is heavily disturbed by urban development, farming and mining activities that are characteristic of the area.

8.10 LOCATIONS STRUCTURE 222 TO STRUCTURE 240

Structures 222 to 240 shown in Figure 27 are all situated on portions of land consisting of N11 main road servitude, farm tracks, telephone lines, farm dwellings, built up residential areas, high and low voltage powerlines, eroded sections, irrigation agricultural land, irrigation infrastructure, streams and grazing lands. Most of the receiving land portions were previously degraded and disturbed with existing powerline, access roads, rural homesteads and agricultural fields. Two 88kv powerlines run parallel to the proposed powerline servitude. The survey of Pylon Structures positions 221 to 240 identified archaeological potshed material between tower 228 and 229 directly path of the development.

This area is south west of Dennesig Township northern area of Middleburg. The survey of tower positions yielded several areas with a mixture of historic settlement or farm residence areas. In the vicinity of the powerline route, multiple location with identifiable archaeological (preliminary classified as LIA) were recorded in situ (Fig. 27). Scatter of archaeological potsherd materials were identified at Lat**.** 29°26' 43.98" E **Long.** 25°43'02.29" S on previously cultivated and disturbed land (Fig. 27).

Impact	**Impact Significance**	**Heritage Significance**	**Certainty**	**Duration**
None	Low	Unknown	Unsure	Short term

Mitigation

Sub surface construction work for tower 220 to 240 should be closely monitored by ECO during construction work. In the event that chance archaeological materials are disturbed at any of the tower positions during construction, salvage and change finds procedures should be implemented in line with SAHRA regulations and NHRA requirements. No further mitigation is required prior to construction phase. Abandoned historic homesteads should not be interfered with without a clearance of destruction Permit from SAHRA since some of the building remains may be 60 years of. Such old structures enjoy automatic legal protection from the NHRA.

The area north of Middleburg has a long history of rural and peri urban settlements. Such areas have potential to yield previously unknown recent historic human burial and grave sites usually associated with some abandoned human settlements which are common in this region. As such, excavation of tower foundations between tower 220 and 2240 should be monitored by a professional archaeologist during the construction works.

Figure 27: Powerline cuts through disturbed and built up area.

8.11 LOCATIONS STRUCTURE 240 TO STRUCTURE 280

Most of the receiving land portions are heavily degraded and disturbed with existing powerline, access roads, settlements and industrial infrastructure. The survey of Pylon Structures positions 240 to 280 did not yield archaeological sites on direct path of the development.

Impact	Impact Significance	Heritage Significance	Certainty	Duration
None	Low	None	Unsure	Short term

Mitigation

None required. However, in the unlikely event that chance archaeological materials are disturbed at any of the tower position, salvage and change finds procedures should be implemented. No further mitigation is required prior to construction phase. However, should chance archaeological materials are disturbed at any of the remaining tower positions in this section, salvage and chance finds procedures should be implemented. Abandoned historic homesteads should not be interfered with without a clearance of Destruction Permit from SAHRA since some of the building remains may be 60 years of. Such old structures enjoy automatic legal protection from the NHRA. Such site may also yield previously unknown burial sites.

Figure 28: Powerline cuts through disturbed and built up area, all cutting through main roads R575 and R555

8.12 LOCATIONS STRUCTURE 281 TO STRUCTURE 302

Structures 281 to 302 shown in Figure 29 are all located on portions of land consisting of urban infrastructure that include main road servitudes, high and low voltage powerlines, substation, streams, mining and industrial infrastructure. Most of the receiving land portions were previously degraded and disturbed with existing powerline, access roads, rural homesteads and agricultural fields. Two 88kv powerlines run parallel to the proposed powerline servitude. The survey of Pylon Structures positions 281 to 302 identified potshed material directly on path of the development.

The area south of Middleburg where the line will terminate has rural commercial agriculture and peri urban settlements. The area yielded archaeological remains marked with potsherds. (Fig. 29 archaeological potsherd materials were identified at **Lat.** 29°24' 07.85" E **Long.** 25°51'34.05" S on previously cultivated and disturbed land (Fig. 29).

Impact	**Impact Significance**	**Heritage Significance**	**Certainty**	**Duration**
Low	Low	Unkown	Unsure	Short term

Mitigation

ECO should closely monitor installation of Towers 292 to 298 during foundation excavations. By association, these towers locations have high potential to yield subsurface discernable archaeological remains. No further mitigation is required prior to construction phase. However, should chance archaeological materials be disturbed at any of the unmonitored tower positions in this section, salvage and chance finds procedures should be implemented.

The proposed termination point for the powerline is the proposed site for the EmKhiweni substation on farmland at Lat**.** 29°24' 02.90" E **Long.** 25°52'22.86" S.

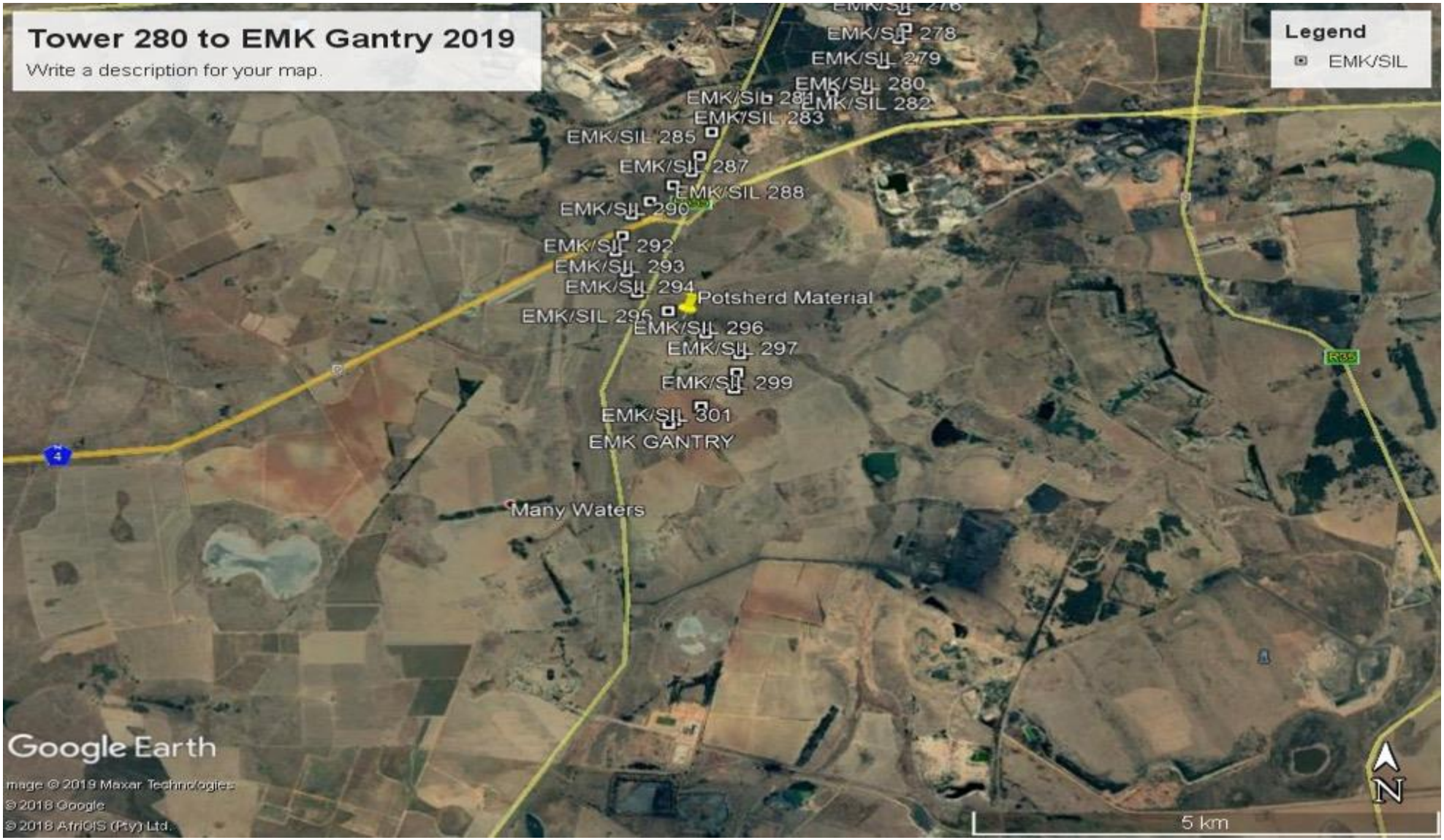

Figure 29: Powerline will terminate EMK gantry.

9. ASSUMPTIONS AND LIMITATIONS

The heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources potentially present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover in some areas. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted. Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time as the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development the procedures and requirements pertaining to graves and burials will apply as set out below.

The assessment excludes the evaluation of ancillary infrastructure such as additional access roads; borrow pits, construction camps and other components that may be situated outside the 55m servitude surveyed in this study. These need to be assessed as they are identified during the construction phase of the project. These sites should be inspected by the ECO prior to establishment and should any heritage features or objects be found a heritage specialist should be contacted or SAHRA should be notified

10. DISCUSSION

The proposed powerline runs from the north in the vicinity of Silimela traversing west of Groblersdal town, crosses the Olifants River valley and continue along the N11 to the western periphery of Middleburg. The lone terminates across the N4 south of Middleburg on proposed site of the Emkhiweni substation. All 302 approved powerline structure locations (refer to Table 1 for Coordinates of locations) were surveyed along the approved servitude. None of these locations fell directly on any high significant cultural property or Grade 1, 2 or 3 archaeological or historical sites. However, archaeological materials were recorded on some portions within the vicinity of different selections of tower positions along the 108km servitude. Affected tower positions with potential to yield archaeological materials were flagged and recommended for monitoring during construction phase. This means, when the construction teams begin work on the flagged locations, ECO should be on site inspecting all subsurface construction work to ensure that no chance finds materials are destroyed.

Overall, it is very highly unlikely that any high significant (Grade 1 or 2) archaeological or cultural physical resource will negatively be impact by the 302-powerline structures to be installed as part of the Emkhiweni substation and 400 kv line from Emkhiweni substation to Silimela.

10.1 Cultural Heritage Assessment of Significance

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.

10.2 Assessment Criteria

The Guidelines to the SAHRA Guidelines and the Burra Charter define the following criterion for the assessment of cultural significance:

Aesthetic Value

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and material of the fabric; sense of place, the smells and sounds associated with the place and its use.

Historic Value

Historic value encompasses the history of aesthetics, science and society, and therefore to a large extent underlies all of the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.

Scientific value

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place may contribute further substantial information. Scientific value is also enshrined in natural resources that have significant social value. For example, pockets of forests and bushvelds have high ethnobotany value.

Social Value

Social value embraces the qualities for which a place has become a focus of spiritual, religious, political, local, national or other cultural sentiment to a majority or minority group. Social value also extend to natural resources such as bushes, trees and herbs that are collected and harvested from nature for herbal and medicinal purposes.

In case of this specific AIA and HIA study, no listed Grade 1-3 heritage sites were associated with the development area, However, archaeological signatures of potsherds and historical burial sites across old farm lands were identified and rated to be of low – medium heritage significance under archaeological resources and historical remains. These cultural materials are not part of clearly defined archaeological or historic sites but are signature and indicators of existence of such site in within the powerline servitude. It is on this basis that the study recommended ECO monitoring during the construction of the affected tower positions. The monitoring program should also cover chance finds procedures for previously unknown archaeological or cultural materials that may accidentally be discovered during the proposed powerline construction work.

Be that as it may, this walkdown survey did not identify any permanently prohibitive or significant archaeological or cultural sites to block the proposed construction.

11 CONSTRUCTION HERITAGE MANAGEMENT PLAN

The heritage management principles in Table below apply during construction and operational phases of the project.

Table 3: Construction Heritage Management Plan.

No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Contacted	Informed
Objective	• Protection of chance archaeological sites and land considered to be of cultural value; • Protection of chance 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 – Phase 1 HIA Study of Alternative routes & Walk-down Survey of Final Approved Route								

No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Contacted	Informed
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. **No known or protected sites were recorded in the HIA and AIA studies**	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 SAHRA 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		When necessary	C CECO	SM	ECO	EA EM PM

No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Contacted	Informed
		the area affected and the Contractor will immediately inform the Construction Manager who in turn will inform SAHRA.						
		Should any remains be found on site that is potentially human remains, the SAHRA 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.						

Table 4: Roles and responsibilities of archaeological and heritage management.

ROLE	RESPONSIBILITY	IMPLEMENTATION
A responsible specialist needs to be allocated and should sit in at all relevant meetings, especially when changes in design are discussed, and liaise with SAHRA.	The client	Environmental consultancy (ECO)
If chance finds and/or graves or burial grounds are identified during construction or operational phases, a specialist must be contacted in due course for evaluation.	The client	Archaeologist and a competent archaeology supportive team
Comply with defined national and local cultural heritage regulations on management plans for identified sites.	The client	Environmental Consultancy
Consult the managers, local communities and other key stakeholders on mitigation of archaeological sites.	The client	Environmental Consultancy and the Archaeologist
Implement additional programs, as appropriate, to promote the safeguarding of our cultural heritage. (i.e. integrate the archaeological components into employee induction course).	The client	Environmental Consultancy and the Archaeologist,
If required, conservation or relocation of burial grounds and/or graves according to the applicable regulations and legislation.	The client	Archaeologist, and/or competent authority for relocation services
Ensure that recommendations made in the Heritage Report are adhered to.	The client	The client
Provision of services and activities related to the management and monitoring of significant archaeological sites.	The client	Environmental Consultancy and the Archaeologist
After the specialist/archaeologist has been appointed, comprehensive feedback reports should be submitted to relevant authorities during each phase of development.	Client and Archaeologist	Archaeologist

12 IMPACT MANAGEMENT

12.1 PRE-CONSTRUCTION PHASE

Based on the findings of the AWD, all stakeholders and key personnel should undergo an archaeological induction course during this phase. Induction courses generally form part of the employees' overall training and the archaeological component can easily be integrated into these training sessions aimed more at managers and supervisors, highlighting the value of this exercise and the appropriate communication channels that should be followed after chance finds, and the second targeting the actual workers and getting them to recognize artefacts, features and significant sites. This ECO should use report for training as well as the mitigation measures stated on this report.

12.2 CONSTRUCTION PHASE

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction operations and may be recoverable, but this is the high-cost front of the operation, and so any delays should be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, but construction trenches do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure is often changed or added to the subsequent history of the project. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

ECO should monitor all tower positions flagged as possible sites for chance finds by location or association during construction. During the construction phase, it is important to recognize any significant chance material being unearthed, making the correct judgment on which actions should be taken. ECO to inspect the flagged site and any development recurrently, with more frequent visits to the actual workface and operational areas.

Should an archaeological site or cultural material be discovered during construction (or operation), such as burials or grave sites, the project needs to be able to call on a qualified expert to decide on what is required and if it is necessary to carry out emergency recovery. SAHRA/LIHRA would need to be informed and may give advice on procedure. The developers therefore should have some sort of

contingency plan so that operations could move elsewhere temporarily while the material and data are recovered.

13 CONCLUSIONS & RECOMMENDATIONS

None of the surveyed 302 powerline structure locations fell directly on high significance graded cultural heritage or archaeological sites (Grade 1, 2 or 3 as classified by the NHRA). The study did not find any unmitigatable barrier to powerline construction within the approved servitude. Therefore, subject to recommendations herein made, no direct conflicts between archaeological and physical cultural heritage properties including burial grounds and the proposed development are anticipated when construction begins.

The following general mitigation measures are recommended:

- If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contacted for an assessment of the find.
- As precautionary measure and in line with applicable best heritage management principles, the following holds:

- *The Heritage management plan (HMP) issued in this report is applicable especially in chance finds context once construction begins.*
- *The foot print impact of each Powerline Structure and associated construction activities should be kept to minimal and within the approved servitude to limit the possibility of encountering additional or chance finds within the powerline servitude.*
- *In situations where unpredicted impacts occur (such as accidentally disturbing a previously unknown grave during subsurface construction work), construction activities should be stopped and the heritage authority notified immediately.*
- *In the unlikely event of chance archaeological material or previously unknown human remains being disturbed during subsurface construction, the finds should be left in situ subject to further instruction from the heritage authorities (refer to Appendix 1 for additional details).*
- *The overriding objective, in the unlikely event of chance findings, 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 LIHRA and SAHRA regulations.*

It is the author's final and considered recommendation that there being no heritage barriers on the path of the powerline development; the proposed powerline and related infrastructure development may

proceed, subject to recommendations, as planned and within the approved powerline servitude and structure locations.

14 BIBLIOGRAPHY

AUSTRALIA ICOMOS (1999) *The Burra Charter: The Australia ICOMOS charter for places of cultural significance*. Burwood.

BICKFORD, A AND SULLIVAN, S. 1977. *"Assessing the research significance of historic sites"* in S Sullivan and S Bowdler (eds) Site Surveys and Significance assessment in Australian Archaeology. Canberra: ANU.

BURKE, H. And SMITH, C. 2004. *The archaeologist's field handbook.* Australia. Allen and Unwin.

COOPER,M. A.,FIRTH,A.,CARMAN,J. & WHEATLEY,D. (eds.)1995: Managing Archaeology. London: Routledge.

GLAZEWSKI, J., 2000: Environmental Law in South Africa. Durban: Butterworths.

MURIMBIKA, M. 2012. PROPOSED NAGLE DAM 132/11KV SUBSTATION ESTABLISHEMENT AND ASSOCIATED 132KV POWERLINE, KWAZULU NATAL PROVINCE: PHASE 1 ARCHAEOLOGICAL AND HERITAGE IMPACT ASSESSESSMENT STUDY REPORT.

SOUTH AFRICA,1983. *Human Tissue Act.* Government Gazette.

SOUTH AFRICA 1999. *NATIONAL HERITAGE RESOURCES ACT (No 25 of 1999),* Government Gazette. Cape Town.

SAHRA APMHOB. 2004. *Policy for the management of Archaeology, Palaeontology, Meteorites and Heritage Object.* . SAHRA: Cape Town.

SAHRA APM. 2006. *Guidelines: Minimum standards for the archaeological and palaeontological Component of Impact Assessment Reports.* . SAHRA: Cape Town.

SAHRA APMHOB 2002. General Introduction to surveys, impact assessments and management plans. . SAHRA: CT.

SAHRA. 2002. General guidelines to Archaeological Permitting Policy. SAHRA: Cape Town.

SAHRA. 2002. General Introduction to surveys, impact assessments and management plans.

SAHRA. What to do when Graves are uncovered accidentally.

WHITELAW, G. 1991. Precolonial iron production around Durban and in southern Natal. *Natal Museum Journal of Humanities* **3**: 29–39. *ARCHAEOLOGICAL & HERITAGE IMPACT ASSESSMENT STUDY FOR PROPOSED NAGLE DAM SUBSTATION AND POWERLINE DEVELOPMENT, 2ND EDITION VERSION. 3.0*

Heritage Impact Assessment Specialist Study by M. Murimbika (Ph.D.) 2012

WHITELAW, G. 1993. Customs and settlement patterns in the first millennium AD: evidence from Nanda, an Early Iron Age site in the Mngeni Valley, Natal. *Natal Museum Journal of Humanities* **5**: 47–81.

WHITELAW, G. 1994. KwaGandaganda: settlement patterns in the Natal Early Iron Age. *Natal Museum Journalof Humanities* **6**: 1–64.

WHITELAW, G. 1997. What Da Gama missed on his way to Sofala. *Natalia* **27**: 30–41.

WILSON, M. 1969. Changes in social structure in southern Africa: the relevance of kinship studies to the historian. In: L. Thompson, ed., *African societies in southern Africa*. London: Heinemann, pp. 71–85.

WRIGHT, J. 2009. The Thuli

15 SAHRA HIA RECORD OF DECISION

Copy of ROD not available during the compilation of this report. This report will be submitted to the local Heritage Resource Agencies (Mpumalanga and Limpopo) and SAHRA during the Draft EIA review

16 APPENDIX 1: HUMAN REMAINS AND BURIALS IN DEVELOPMENT CONTEXT

BY Dr Murimbika M. [2012]

Developers, land use planners and professional specialist service providers often encounter difficult situations with regards to burial grounds, cemeteries and graves that may be encountered in development contexts. This may be before or during a development project. There are different procedures that need to be followed when a development is considered on an area that will impact upon or destroy existing burial grounds, cemeteries or individual graves. In contexts where human remains are accidentally found during development work such as road construction or building construction, there are different sets of intervention regulations that should be instigated. This brief is an attempt to highlight the relevant regulations with emphasis on procedures to be followed when burial grounds, cemeteries and graves are found in development planning and development work contexts. The applicable regulations operate within the national heritage and local government legislations and ordinances passed in this regard. These guidelines assist you to follow the legal pathway.

1. First, establish the context of the burial:
A. Are the remains less than 60 years old? If so, they may be subject to provisions of the Human Tissue Act, Cemeteries Ordinance(s) and to local, regional, or municipal regulations, which vary from place to place. The finding of such remains must be reported to the police but are not automatically protected by the National Heritage Resources Act (Act 25 of 1999).
B. Is this the grave of a victim of conflict? If so, it is protected by the National Heritage Resources Act (Section 36(3a)). (Relevant extracts from the Act and Regulations are included below).
C. Is it a grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority? If so, it is protected by the National Heritage Resources Act (Section 36(3b)).
D. Are the human or hominid remains older than 100 years? If so, they are protected by the National Heritage Resources Act (Section 35(4), see also definition of "archaeological" in Section 2).
2. Second, refer to the terms of the National Heritage Resources Act most appropriate to the situation, or to other Acts and Ordinances:
A. Human remains that are NOT protected in terms of the National Heritage Resources Act (i.e. less than 60 years old and not a grave of a victim of conflict or of cultural significance) are subject to provisions of the Human Tissue Act and to local and regional regulations, for example Cemeteries Ordinances applicable in different Provincial and local Authorities.
B). All finds of human remains must be reported to the nearest police station to ascertain whether or not a crime has been committed.
C). If there is no evidence for a crime having been committed, and if the person cannot be identified so that their relatives can be contacted, the remains may be kept in an institution where certain conditions are fulfilled. These conditions are laid down in the Human Tissue Act (Act No. 65 of 1983). In contexts where the local traditional authorities given their consent to the unknown remains to be re-buried in their area, such re-interment may be conducted under the same regulations as would apply for known human remains.

3. In the event that a graveyard is to be moved or developed for another purpose, it is incumbent on the local authority to publish a list of the names of all the persons buried in the graveyard if there are gravestones or simply a notification that graves in the relevant graveyard are to be disturbed. Such a list would have to be compiled from the names on the gravestones or from parish or other records. The published list would call on the relatives of the deceased to react within a certain period to claim the remains for re-interment. If the relatives do not react to the advertisement, the remains may be re-interred at the discretion of the local authority.

A. However, it is the responsibility of the developer to ensure that none of the affected graves within the cemetery are burials of victims of conflict. The applicant is also required in line with the heritage legislation to verify that the graves have no social significance to the local communities.
B. It is illegal in terms of the Human Tissue Act for individuals to keep human remains, even if they have a permit, and even if the material was found on their own land.

4. The Exhumations Ordinance (Ordinance No. 12 of 1980 and as amended) is also relevant. Its purpose is "To prohibit the desecration, destruction and damaging of graves in cemeteries and receptacles containing bodies; to regulate the exhumation, disturbance, removal and re-interment of bodies, and to provide for matters incidental thereto". This ordinance is supplemented and support by local authorities regulations, municipality by-laws and ordinances.

DEFINITIONS AND APPLICABLE REGULATIONS
1). A "Cemetery" is defined as any land, whether public or private, containing one or more graves.
2). A "grave" includes "(a) any place, whether wholly or partly above or below the level of ground and whether public or private, in which a body is permanently interred or intended to be permanently interred, whether in a coffin or other receptacle or not, and (b) any monument, tombstone, cross, inscription, rail, fence, chain, erection or other structure of whatsoever nature forming part of or appurtenant to a grave.
3). No person shall desecrate, destroy or damage any grave in a cemetery, or any coffin or urn without written approval of the Administrator.
4). No person shall exhume, disturb, remove or re-inter anybody in a cemetery, or any coffin or urn without written approval of the Administrator.
5). Application must be made for such approval in writing, together with:
a). A statement of where the body is to be re-interred.
b). Why it is to be exhumed.
c). The methods proposed for exhumation.
d). Written permission from local authorities, nearest available relatives and their religious body owning or managing the cemetery, and where all such permission cannot be obtained, the application must give reasons why not.

6). The Administrator has the power to vary any conditions and to impose additional conditions.
7). Anyone found guilty and convicted is liable for a maximum fine of R200 and maximum prison sentence of six months.
5. Human remains from the graves of victims of conflict, or any burial ground or part thereof which contains such graves and any other graves that are deemed to be of cultural significance may not be destroyed, damaged, altered, exhumed or removed from their original positions without a permit from the National Heritage Resources Agency. They are administered by the Graves of Conflict Division at the SAHRA offices in Johannesburg.
"Victims of Conflict" are:
a). Those who died in this country as a result of any war or conflict but excluding those covered by the Commonwealth War Graves Act, 1992 (Act No. 8 of 1992).
b). Members of the forces of Great Britain and the former British Empire who died in active service before 4 August 1914.
c). Those who, during the Anglo Boer War (1899-1902) were removed from South Africa as prisoners and died outside South Africa, and,
d). Those people, as defined in the regulations, who died in the "liberation struggle" both within and outside South Africa.
6. Any burial that is older than 60 years, which is outside a formal cemetery administered by a local authority, is protected in terms of Section 36(3b) of the National Heritage Resources Act. No person shall destroy damage, alter, exhume or remove from its original position, remove from its original site or export from the Republic any such grave without a permit from the SAHRA.
There are some important new considerations applicable to B & C (above).
SAHRA may, for various reasons, issue a permit to disturb a burial that is known to be a grave of conflict or older than 65 years, or to use, at a burial ground, equipment for excavation or the detection or the recovery of metals.
(Permit applications must be made on the official form Application for Permit: Burial Grounds and Graves available from SAHRA or provincial heritage resources authorities.) Before doing so, however, SAHRA must be satisfied that the applicant:
a). Has made satisfactory arrangements for the exhumation and re- interment of the contents of such a grave at the cost of the applicant.
b). Has made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such a grave and,
c). Has reached an agreement with these communities and individuals regarding the future of such a grave or burial ground.

PROCEDURE FOR CONSULTATION

The regulations in the schedule describe the procedure of consultation regarding the burial grounds and graves. These apply to anyone who intends to apply for a permit to destroy damage, alter, remove from its original position or otherwise disturb any grave or burial ground older than 60 years that is situated outside a formal cemetery administered by a local authority. The applicant must make a concerted effort to identify the descendants and family members of the persons buried in and/or any other person or community by tradition concerned with such grave or burial ground by:
1). Archival and documentary research regarding the origin of the grave or burial ground;
2). Direct consultation with local community organizations and/or members;
3). The erection for at least 60 days of a notice at the grave or burial ground, displaying in all the official languages of the province concerned, information about the proposals affecting the site, the telephone number and address at which the applicant can be contacted by any interested person and the date by which contact must be made, which must be at least 7 days after the end of the period of erection of the notice; and
4). Advertising in the local press.
The applicant must keep records of the actions undertaken, including the names and contact details of all persons and organizations contacted and their response, and a copy of such records must be submitted to the provincial heritage resources authority with the application.
Unless otherwise agreed by the interested parties, the applicant is responsible for the cost of any remedial action required.
If the consultation fails to research in agreement, the applicant must submit records of the consultation and the comments of all interested parties as part of the application to the provincial heritage resources authority.
In the case of a burial discovered by accident, the regulations state that when a grave is discovered accidentally in the course of development or other activity:
a). SAHRA or the provincial heritage resources authority (or delegated representative) must, in co-operation with the Police, inspect the grave and decide whether it is likely to be older than 60 years or otherwise protected in terms of the Act; and whether any further graves exist in the vicinity.
b). If the grave is likely to be so protected, no activity may be resumed in the immediate vicinity of the grave, without due investigation approved by SAHRA or the provincial heritage resources authority; and
c). SAHRA or the provincial heritage resources authority may at its discretion modify these provisions in order to expedite the satisfactory resolution of the matter.
d. Archaeological material, which includes human and hominid remains that are older than 100 years (see definition in section 2 of the Act), is protected by the National Heritage Resources Act (Section 35(4)), which states that no person may, without a permit issued by the responsible heritage resources authority - destroy, damage, excavate, alter or remove from its original site any archaeological or palaeontological material.
The implications are that anyone who has removed human remains of this description from the original site must have a permit to do so. If they do not have a permit, and if they are convicted of an offence in terms of the National Heritage Resources Act as a result, they must be liable to a maximum fine of R100 000 or five years imprisonment, or both.

TREAT HUMAN REMAINS WITH RESPECT

a). Every attempt should be made to conserve graves in situ. Graves should not be moved unless this is the only means of ensuring their conservation.
b). The removal of any grave or graveyard or the exhumation of any remains should be preceded by an historical and archaeological report and a complete recording of original location, layout, appearance and inscriptions by means of measured drawings and photographs. The report and recording should be placed in a permanent archive.

c). Where the site is to be re-used, it is essential that all human and other remains be properly exhumed and the site left completely clear.
d). Exhumations should be done under the supervision of an archaeologist, who would assist with the identification, classification, recording and preservation of the remains.
e). No buried artifacts should be removed from any protected grave or graveyard without the prior approval of SAHRA. All artifacts should be re-buried with the remains with which they are associated. If this is not possible, proper arrangements should be made for the storage of such relics with the approval of SAHRA.
f). The remains from each grave should be placed in individual caskets or other suitable containers, permanently marked for identification.
g). The site, layout and design of the area for re-interment should take into account the history and culture associated with, and the design of, the original grave or graveyard.
h). Re-burials in mass graves and the use of common vaults are not recommended.
i). Remains from each grave should be re-buried individually and marked with the original grave markers and surrounds.
j). Grouping of graves, e.g. in families, should be retained in the new layout.
k). Material from the original grave or graveyard such as chains, kerbstones, railing and should be re-used at the new site wherever possible.
l). A plaque recording the origin of the graves should be erected at the site of re-burial.
m). Individuals or groups related to the deceased who claim the return of human remains in museums and other institutions should be assisted to obtain documentary proof of their ancestral linkages.