7.3.3.5.3 From the Lephalale River to the Masebe Nature Reserve

This stretch runs in a straight corridor eastwards across farms such as Weltevreden 508, De Kuil/Georgetown 532, Alkantrand 535, Lilie Fontein 508, Kirstenbosch 497, across Road 561, along the northern borders of both the Keta Game and Cattle Project and the Moepel Farms before crossing the dirt road that runs to Marken.

7.3.3.5.3.1 Known types and ranges of heritage resources

The following known heritage resources occur along this stretch of Corridor 08, namely:

7.3.3.5.3.1.1 Stone Age remains (including rock art)

At least two Stone Age sites with tools have been recorded on Kirstenbosch 497LR.

Rock art sites depicting a black rhinoceros and human figures occur on Burgersvlei 496. (Rock art sites possibly also occur on the neighbouring farms of Lilliefontein 508 and Alkantrand 535).

At least one rock art site was also recorded on Klipbank 713LR.

7.3.3.5.3.1.2 Iron Age remains

The farm Kirstenbosch 497LR is rich in heritage. The following heritage resources have been recorded on this farm:

- One of the most significant EIA Eiland sites recorded in the northern parts of the country occurs on the farm. It is located on higher ground and is marked by extensive deposits, animal bone waste material and Eiland decorated ceramics .
- A shelter with a deposit and EIA Eiland ceramics.
- Metal working remains (dating from the Iron Age) occur in conjunction with isolated rock art panels on this farm.
- An Iron Age site which possibly dates from the LIA as it is marked by stone walls was also recorded on this farm.

An Iron Age site with at least sixteen grain bins occur on Burgersvlei 496 to the north of Kirstenbosch 497LR.

7.3.3.5.3.1.3 Graveyards

The following graves and graveyards were observed along this stretch, namely:

- A single graveyard with seven graves, three of which are fitted with cement head stones whilst the others are edged with upright stones. A single grave marked with

upright stones occur in close proximity of the graveyard. These features are located on Groot Denteren 533LR.

- Two graves of the Lewies family are located on Georgetown/De Kuil 352.
- Two informal graves occur in a clump of bush along the shoulder of the road running to Villa Nora.

7.3.3.5.4 From the dirt road to the N11

This stretch of the transmission lines bends south-eastwards and then further south-eastwards before crossing the N11. This stretch runs across the Marken/Bakenberg dirt road eastwards to the north of the village of Magagamatala after which it bends to the south-east crossing agricultural fields before crossing a dirt road. It the runs across the farms Nelly 717 and Eerste Geluk 714, runs across another dirt road before reaching the village of Malapile. Hereafter, the transmissions lines bend twice and then run south-eastwards across Vlakfontein 763, Vogelstruisfontein 785, Malakongskop 780 and Noord Holland 777 before reaching the N11.

7.3.3.5.5 From the N11 to the Witkop Substation

From the N11 the transmission line runs south-eastwards across farms such as Zuid Holland 773LR (Option 3, Mokopane Substation), Noord Braband (Option 4, Mokopane Substation), Zuid Braband 719 and Doornfontein 724LS (Option 1, Mokopane Substation).

At Option 01 for the Mokopane Substation the transmission lines bends further to the north-east skirting the southern borders of Masasane which is composed of several clustered townships. On the eastern outskirts of this rural village complex the transmission lines bend to the south-east and cross the farm Rietfontein 731LS, the railway line, the N1 and Road 101 as well as the farm Hollandsdrift 738LS before reaching the Witkop Substation.

7.3.3.5.5.1 Known heritage resources

The following heritage resources were observed along the last stretch of Corridor 08, namely:

7.3.3.5.5.1.1 Remains from the Late Iron Age and/or Historical Period

The following remains dating from the Late Iron Age/Historical Period occurs along this stretch, namely:

- The remains of a site dating from the Late Iron Age or Historical Period are located between the dirt road running to Eerstegoud and the Sand River. The site is composed of a few rudimentary stone heaps and low inconspicuous walls. It is not associated with any archaeological material.

- A Late Iron Age site is situated between the Sand River and the Witkoppen Mountains. This site is composed of several circular enclosures as well as other stone walls. Several large boulders with polished surfaces occur near the site.

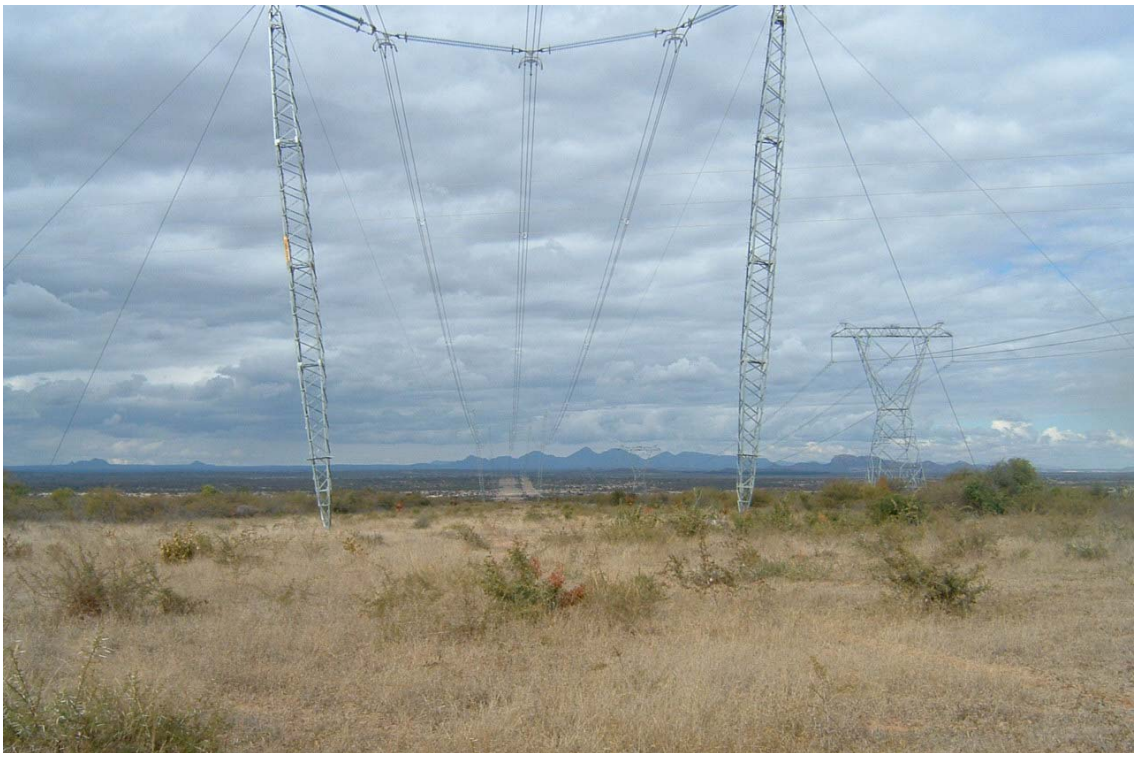

Figure 31 Eskom's existing 400kV power lines constituting Corridor 08 between the N11 and the Witkop Substation (above).

7.3.3.5.5.1.2 Graveyards

- An informal graveyard holding the remains of three individuals is located under Eskom's existing 400kV transmission line corridor at the point where these lines join the Witkoppen Substation.

Farm / owner / village	Heritage Resource	Code	Coordinates
Grootfontein 501 (Also in Corridor 01)	Cluster with five rock art sites	RA	23º 39' 27º 44'
Vogelstruisfontein 472	Graveyard (two graves)	G	23°36'53.1" 27°44'06.4"
Cradock 534LQ	Close to Tafelkoppe, next to Smithfield 536LQ	RA	Not known court injunction
Smithfield 536 (Tafelkoppe)	Rock art site with small shelters	RA	23°45' 27°30
Burgersvlei 496 (Lillifontein 508 Alkantrand 535)	Rock art site	RA	23°39'45.6" 28°20'12.9"

Farm / owner / village	Heritage Resource	Code	Coordinates
Burgersvlei 496 (Lillifontein 508 Alkantrand 535)	Iron Age site with grain bins	IA	23°40'04.9" 28°21'15.9"
Klipbank 713LR	**Rock Art**	**RA**	**23° 39' 28° 30'**
Morgenzon 512	Two Historical Houses	HH	23º 39" 611' 28º 09" 641'
Grootdenteren 533	Graveyard (7 graves)	GY	23º 40" 691' 28º 18" 398'
Grootdenteren 533	Grave	G	23º 40" 691' 28º 18" 415'
Georgetown/De Kuil 532	Graveyard (Two members of the Lewies family)	GY	23º 42" 103' 28º 12" 448'
Kirstenbosch 497LR	EIA Eiland site with high significance	IA	23º 39" 5.3' 28º 24" 19'
Kirstenbosch 497LR	EIA Eiland ceramics in shelter	IA	23º 39" 35' 28º 24" 58.6'
Kirstenbosch 497LR	Meatl working site (with isolated rock art panels)	IA	23º 39" 04' 28º 24" 22.5'
Kirstenbosch 497LR	LIA stone walled site	IA	23º 40" 55' 28º 23" 50'
Kirstenbosch 497LR	LSA site	SA	23º 39" 45' 28º 25" 30'
Kirstenbosch 497LR	LSA site	SA	23º 39" 45' 28º 25" 20'
Windsor 499LR	Rock art	RA	Location unknown
Georgetown/De Kuil 532	Two informal graves in the bush		23º 40" 686' 28º 11" 914'
Zwartkop 742 (Ga Malapile village)	Graveyard (11 graves)	GY	23º 45" 25' 28º 43" 31'
Snymansdrift 738LS	Informal graveyard (3 graves)	GY	24º 02" 41' 29º 20" 33'
Between the Eerstegoud road and the Sand River	Late Iron Age/Historical Period	IA/HS	24º 01"24' 29º 16" 53
Between the Sand River and Thaba Tšheu	Late Iron Age site	IA	24º 01" 31' 29º 18" 38'

Table 7- Heritage resources in and near Corridor 08 for the proposed Mokopane Integration Project (above).

7.4 The heritage potential of the options for the Mokopane Substation and for the power line corridors

The heritage potential of the three options (Option 01, 03 and 04) for the Mokopane Substation and for the various power line corridors (Corridors 01, 02 and 08, 04-06 and 07) is now briefly summarised.

7.4.1 Heritage potential of the options for the Mokopane Substation

Three options are proposed for the Mokopane Substation. All three options for the proposed Mokopane Substation weigh equal with regard to a preference to be used as a site for the proposed Mokopane Substation. No heritage resources with outstanding significance were observed near any of these options.

7.4.2 Heritage potential of the various power line corridors

Three corridors have been identified for the proposed 400kV power lines between the Delta Substation and the Witkop Substation, namely a northern corridor (Corridor 02), a southern corridor (Corridor 01), and a central corridor running along Eskom's existing power line (Corridor 08). The heritage potential of each of these corridors is briefly discussed:

7.4.2.1 Corridor 01

This southern corridor can be divided into three main stretches characterised by the following heritage resources, namely:

- A western stretch running along the Waterberg flats which mainly holds graveyards and historical houses in low numbers. A cluster of five rock art sites occur on Grootfontein 501LQ.
- A central stretch with a sharp bend which runs through the northern edge of the Waterberg. This stretch holds LSA sites in the open and in rock shelters and rock art sites in shelters, overhangs and on isolated boulders. It is marked by EIA Eiland and LIA Moloko settlements as well as historical houses and graveyards in low numbers. A beacon is located in the Kloof Paas.
- An eastern stretch which runs across the Fonthane mountains and the historical sphere of influence of the Langa Ndebele. This area is characterised by remains dating from the Late Iron Age and Historical Period in moderate numbers. Graveyards are scattered throughout this area and many undiscovered graves still occur where settlements dating from the more recent past were located.

CORRIDOR 01		
Section of power line	**Heritage resources**	**Significance**
Western stretch	Hist houses- limited numbers	Med-High
	Graveyards- limited numbers	HIGH
	Rock art site (single)	HIGH
Central stretch	LSA sites, open and in shelters.	Med-High
	Rock art sites – several	HIGH
	EIA Eiland site	HIGH
	LIA Moloko sites	HIGH
	Hist houses- limited numbers	Med-High
	Graveyards- limited numbers	HIGH
	Beacon (single)	Low
Eastern stretch	Late Iron Age sites–moderate numbers	Med-High
	Historical period sites-moderate numbers	Med-High
	Graveyards - high numbers	HIGH
	Undiscovered graves–moderate numbers	HIGH

Table 8- The heritage potential (character) of Corridor 01 and the level of significance of the various types and ranges of heritage resources (above).

7.4.2.2 Corridor 02

This northern corridor can be divided into the following stretches with different heritage significance, namely:

- A western stretch that runs across the Waterberg flats to the farm Pieterman 445LR which holds graveyards and historical houses in low numbers and a few graveyards in the Shongwane area. A rock art site is located on Grootfontein 501LQ.
- An eastern stretch that runs near and along several graveyards located in or near the fringes of villages. This stretch skirts the northern boundary of the Masebe Nature Reserve and the farm Haakdoringdraai 711LR where several rock art sites and LIA settlements occur. It can be expected that LSA sites (open and in shelters) will also occur in the reserve.

CORRIDOR 02		
Section of power line	**Heritage resources**	**Significance**
Western stretch	Hist houses- limited numbers	Med-High
	Graveyards- limited numbers	HIGH
	Rock art site (single)	HIGH
Eastern stretch	Graveyards- limited numbers	HIGH

IN THE MASEBE NATURE RESERVE		
	LSA sites (open/shelters).	Med-High
	Several rock art sites	Med-High
	LIA Moloko sites, e.g. Magagamatala	HIGH

Table 9- The heritage potential (character) of Corridor 02 and the level of significance of the various types and ranges of heritage resources (above).

7.4.2.3 Corridor 08

This central corridor can be divided into the following stretches which are characterised by the following types and ranges of heritage resources;

- A western stretch that runs across the Waterberg flats to the mountains Tafelkoppe and Ga Mabula on Smithfield 536LQ and surrounding farms. These mountains hold high heritage significance. This stretch also holds graveyards and historical houses in low numbers.
- A central stretch that runs across the northern tip of the Waterberg mountains. This stretch holds historical houses and graveyards in low numbers. Several rock art sites and LSA sites occur along this stretch as well as a highly significant EIA Eiland site and LIA Moloko sites. This stretch skirts the southern boundary of the Masbebe Nature Reserve and the farm Haakdoringdraai 711LR where several rock art sites and LIA settlements occur. It can be expected that LSA sites (open and in shelters) will also occur in the reserve.
- An eastern stretch that is marked by a limited number of graveyards.

CORRIDOR 08		
Section of power line	**Heritage resources**	**Significance**
Western stretch	Hist houses-limited numbers	Med-High
	Graveyards- limited numbers	HIGH
	Tafelkoppe and Ga Mabula	HIGH
Central stretch	Hist houses- limited numbers	Med-High
	Graveyards- limited numbers	HIGH
IN THE MASEBE NATURE RESERVE		
	LSA sites (open/shelters).	Med-High
	Several rock art sites	Med-High
	LIA Moloko sites, e.g. Magagamatala	HIGH
Eastern stretch	Graveyards- limited numbers	HIGH

Table 10- The heritage potential (character) of Corridor 08 and the level of significance of the various types and ranges of heritage resources (above).

7.4.2.4 Corridors 04-06

Three possible corridors have been identified between the new Mokopane Substation and the Witkop Substation, namely Corridor 04, 05 and 06.

Corridor 06 holds the highest number and most significant heritage resources. A cluster of stone walled sites which are already impacted by the presence of 132kV power lines is located along this corridor which runs through a poort in Thaba Tsweu.

7.4.2.5 Corridor 07

Corridor 07, which runs from the Delta Substation to the Medupi Power Station, is characterised by the presence of low numbers of historical houses and graveyards.

7.5 Ranking the substation sites and the power line corridors

Considering the presence of the various types and ranges of heritage resources in and near the three options for the Mokopane Substation and for the various power line corridors, the options for the substations and for the various power line corridors can be ranked. This ranking is based on the considering of pre-mitigation as well as post-mitigtation measures for any of the types and ranges of heritage resources that may be affceted by the proposed substation or the various power line corridors.

The scale that was used to rank the substation sites and the power line corridors was graded in three levels, namely: one (1) (least preferred); two (2) medium preferred and three (3) (most preferred).

7.5.1 Ranking the options for the substation

Options 01, 02 and 03 are equally preferred as possible sites for the Mokopane Substation.

7.5.2 Ranking the power line corridors

The three longest power line corridors are ranked as follow:

7.5.2.1 Corridors 01, 02 and 08

- Corridor 02 is most preferred as it seems as if this corridors will affect the lowest number of heritage resources; the least types and ranges of heritage resources as well as no outstanding significant heritage resources (Figure 7, Table Table 9).
- Corridor 08 is medium preferred as it seems as if this corridors will affect the second lowest number of heritage resources; the second lowest number of types and ranges of heritage resources as well as no outstanding significant heritage

resources (Figure 7, Table 10). This ranking applies to Corridor 08 if the follwing deviations can be implemented in order to consider current technical constraints and appeals, namely: Corridor 08 must be constructed to the north of Tafelkoppe and Ga Mabula (along the R518); follow the dirt road to the north of Kleindenteren 485 and Kirstenbosch 497 [avoiding the kloof and reserve]; constructed slightly further to the north or south on Klipbank [in order to avoid the second kloof] and follow its existing corridor in order to avoid crossing the Masbe Nature Reserve.

- Corridor 01 is the least preferred as it seems as if this corridors will affect the highest number of heritage resources; the highest number of types and ranges of heritage resources as well as heritage resources with possible high significance (Figure 7, Table 8).

7.5.2.2 .2 Corridors 04, 05 and 06

When considering Corridors 04, 05 and 06 it is clear that Corridor 06 can be identified as the least preferred corridor amongst these three corridors as it holds the following:

- A cluster of stone walled sites which are already impacted by Eskom's existing 132kV power lines as they run through a poort in Thaba Tsweu in which the power lines are located.
- This corridor is also associated with a possible graves located in a sisal bush.

No specific preference, from a heritage point of view, can be made between Corridor 04 and Corridor 05.

7.5.2.2.3 Corridor 07

Corridor 07 has no alternatives. However it appears as if this Corridor holds no outstanding significant heritage resources other than one or more historical houses and a few graveyards. These heritage resources can either be avoided by Corridor 07, can be incorporated in the power line corridors.

RANKING OF SUBSTATION SITES AND POWER LINES CORRIDORS			
SUBSTATION SITES			
Ranking	**Options/Corridors**	**Heritage character**	**Conditions**
3	Option 01	None particular	Mitigation
3	Option 02	None particular	Mitigation
3	Option 03	None particular	Mitigation

POWER LINES CORRIDORS			
1	Corridor 01	Will affect highest number of heritage resources; highest number of types and ranges of heritage resources heritage resources with possible high significance	Mitigation
2	Corridor 08	Will affect the second lowest number of heritage resources; the second lowest number of types and ranges of heritage resources and no outstanding significant heritage resources	Mitigation Constructed to the north of Tafelkoppe and Ga Mabula (along the R518); Follow dirt road to the north of Kleindenteren 485 and Kirstenbosch 497 [avoiding the kloof and reserve]; Constructed further to the north or south on Klipbank 713 [avoid the second kloof] Follow existing corridor to avoid crossing the Masebe Nature Reserve
3	Corridor 02	Will affect the second lowest number of heritage resources; the second lowest number of types and ranges of heritage resources no outstanding significant heritage resources	Mitigation
1	Corridor 06	Cluster of stone walled sites Associated with possible graves in a sisal bush.	Mitigation
3	Corridors 04, 05	Stone walled site	Mitigation
3	Corridor 07	Historical houses Graveyards	Mitigation

Table 11- Ranking the options for the Mokopane Substation and for the various power line corridors (above).

8 THE SIGNIFICANCE, POTENTIAL IMPACTS ON AND MITIGATION OF THE HERITAGE RESOURCES

8.1 Types and ranges of heritage resources

The Phase I HIA study for the options for the proposed Mokopane Substation and for the various corridors for the Mokopane Integration Project identified the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) in or near the Eskom Project Area namely, (Tables 1-11):

- Scatters of stone tools occur along the Vaalsloot, Klein Sandsloot and Mohlosane Rivers in the Langa Ndebele sphere of influence. LSA sites are more common along the central parts of both Corridor 01 and Corridor 08 in the mountainous Waterberg areas and include open sites as well as sites which are located in rock shelters. These sites mainly date from the last two millennia.
- Rock painting sites occur in the northern mountainous part of the Eskom Project Area, particularly along the central stretches of Corridor 01 and Corridor 08. A cluster with five rock art sites occurs near the start of both these corridors in the west. Here, the mountains of Ga Mabula and Tafelkoppe also hold high heritage significance as rock art sites (not documented as yet) occur in these mountain ranges. These rock art sites date from the last two millennia.
- EIA Eiland sites (AD1100 to AD1300) have been recorded near the central stretch of Corridor 08 and possibly also occur in or near the central stretch of Corridor 01. These sites are inconspicuous as they mostly cover small surface areas and are not associated with any stone walls. Their most characteristic feature, if visible on the surface of the land, is the presence of decorated potsherds.
- LIA Moloko sites (AD1600 to AD1880), some with stone walls and characterised by Moloko styled pottery as well as with Nguni types of pots, occur in and near the central stretches of both Corridor 01 and Corridor 08. These sites are also common in the Masebe Nature Reserve (e.g. Magagamatala) and in the Villa Nora area (e.g. Bobididi) between Corridors 01 and 08. These sites are also common in the Lange Ndebele sphere of influence in the south-east. The eastern stretch of Corridor 01 runs across this area. LIA Moloko stone walled sites in a poort in Thaba Tšweu falls inside Corridor 06 and are associated with the Langa Ndebele.
- Historical remains, mostly consisting of homesteads, occur along the eastern stretch of Corridor 01 along the Fonthane mountains in the Langa Ndebele sphere of influence. Widely dispersed colonial farm residences (historical houses) occur in low numbers along the western and central stretches of Corridors 01, 02 and 08.
- Graveyards occur along all stretches of all the power line corridors. Some of these graveyards are associated with villages which are scattered across the Project Area whilst others are associated with historical remains from the Langa Ndebele sphere of influence. Inconspicuous, undiscovered graves occur along the eastern stretch of Corridor 01. Graveyards in association with colonial farmsteads are generally low in

numbers. Those that are associated with villages are higher in numbers considering the population numbers in these areas.
- A commemorative beacon has been erected in the Kloof Pass.
- Other heritage phenomena such as an open-air church occur near the village of Ga-Mathekgwa.

It is highly likely that more of the following types and ranges of heritage resources may occur in or near some of the power line corridors as they have been missed by this study, due to various reasons. The following types and ranges of heritage resources therefore may be underrepresented in this study and their presence may be revealed by the walk-through study, namely:

- Stone Age sites with scatters of stone tools may occur along any of the major rivers, streams or tributaries in the Eskom Project Area, particularly where these rivers and streams may be crossed by the power lines. Stone tools may also occur in eroded areas and dongas, such as south of Mašašane, or near outcrops that are suitable for the manufacturing of stone tools.
- More historical farmsteads may occur towards the central and western parts of the Eskom Project Area where colonial settlement was more prominent during the late nineteenth century and the early twentieth century. However, farmsteads are generally widely dispersed and therefore low in numbers so that the eventual figure will not rise significantly.
- Undetected graveyards may occur in or near the power line corridors. However, these graveyards will be limited in number as colonial graveyards are usually associated with historical houses. More common are graveyards for farm labourers which tend to be inconspicuous as they are mostly undecorated. Most of the graveyards associated with rural villages are located in these villages whilst those situated on the outskirts of villages, where the power lines may run, have been geo-referenced and mapped. The Lange Ndebele sphere of influence has proven to be an area which is marked with exceptionally high numbers of unmarked graves.

8.2 The Eskom Project and the heritage resources

Before the significance of the heritage resources in the Eskom Project Area, the possible impact of the Eskom Project on these heritage resources as well as mitigation measures for those heritage resources that may be affected by the Eskom Project are discussed, the following comments are raised as they bear an influence on the impact, mitigation and management of heritage resources in the Eskom Project Area.

8.2.1 Heritage resources and power lines

It is generally assumed that impacts caused by linear developments such as power lines on heritage sites may be less severe than impacts which occur as a result of more drastic kinds of development such as mining, town development or dam building

operations where major affects on the environment, including heritage resources which equal the man-made environment, are brought about.

This assumption can be explained by the fact that long, narrow power lines (and their corridors) which extend across short, medium or long distances offer opportunities with regard to the protection of heritage sites by means of the following:

- Power lines are strung on top of towers which cause the only footprints on the landscape after the power line have been constructed. Towers therefore may impact physically on heritage sites which occur on ground level when excavations for these structures are done. (This assumption does not consider the affects of construction or maintenance activities).
- Power lines hang above the surface of the land in which heritage sites were deposited many years ago and primarily may cause a visual impact on these sites if the heritage sites are retained beneath the power lines.
- Towers (and power lines) can be planned and constructed in such a way that they can avoid heritage sites. The narrow corridors which power lines follow are manoevrable so that power lines can be navigated around heritage sites or between heritage sites without necessarily interfering with these sites or with cultural landscapes.
- Heritage sites can be conserved under power lines if towers are spaced in such a way that they do not affect (remove, damage, alter) heritage sites which then are left *in situ*, (unaffected) underneath power lines. (This is possible due the fact that power lines are strung onto towers which are erected considerable distances from each other. The distances between towers vary according to the size of the power line structures which again is dependant on the capacity of the electrical load that it carries. Consequently, heritage sites such as stone walled sites or small clusters of sites can be preserved underneath bigger power lines).
- Although mitigation measure do exist for all types and ranges of heritage resources, mitigation measures do not have to be applied when heritage sites can be left unaffected in power line corridors.

It is therefore possible to say that the development of power lines may have less of an impact on heritage resources than more drastic developmental projects. Power lines therefore are generally more sensitive and conservation friendly towards heritage resources than other kinds of development projects. The impact of power lines on heritage resources therefore, in many instances, can be categorised as medium or as low.

8.2.2 Impacts of power lines on heritage resources

Two main types of impacts can be distinguished with regard to heritage resources and power lines, namely:

- Physical impacts which occur when towers are constructed on top of heritage resources which occur on the surface of the earth..
- Visual impacts occur when power line infrastructure affect the aesthetic and visual appearance, sense of place, context, or other aspects relating to heritage resources in a negative way.

The accuracy with which impacts between heritage sites and power lines corridors is predicted is in some instances a matter of conjecture as the impacts between power lines and heritage resources are determined according to the 'clashes' ('collisions') that appear to occur between the power line corridors and heritage sites on maps. This is not always a true reflection of the real situation. Heritage resources near power line corridors may actually be 'missed' by the power lines which are generally slimmer than power line corridors on maps. Power lines are also not solid structures (such as power line corridors on maps) but are elevated cables which hang above heritage sites which occur on the surface of the land.

The level of impact of power lines on heritage resources may vary if single power lines are kept in a corridor or when a varying number of power lines are grouped together in a single corridor thus creating wider corridors which are filled with more than one power line as well as with more towers that have to carry these power lines.

The higher the number of towers in a power line corridor, the higher the physical impact of the footprints of the towers on the earth will be. More than one power line grouped together is also visually more discernable than a single power line and therefore should cause a higher visual impact. However, grouping more than one power line in a single corridor also may have advantages such as avoiding heritage sites or cultural landscapes which otherwise may have been affected by more than one disperesed power line.

8.2.3 Walk-through studies and the mitigation of heritage resources

The protection and conservation of heritage resources in power lines corridors are advanced by means of walk-through studies which are conducted before the final alignments for power lines are fixed and before the construction of power lines commence. During the walk-through study, the real (factual) impact on recorded heritage resources as well as on earlier undetected heritage resources may be determined. By rerouting the power lines or changing the placement of towers possible impacts on heritage sites can either be minimised or can be avoided.

8.3 The significance of the heritage resources

The proposed power line corridors hold a number of heritage resources. Undiscovered heritage resources may raise this number although it is generally accepted that this number will decrease after a walk-through study has been done and the power lines

have been realigned in order to avoid some of these heritage resources whilst others may continue to exist (unaffected) in the power line corridors. The exact number of heritage resources that may be affected by the proposed power lines and the significance of each of these heritage resources therefore are not yet known.

The significance of heritage resources is usually determined according to criteria such as the following: the scientific, research, esthetical, educational, ideological, tourism, etc value of heritage resources. Other criteria which may apply are the repeatability (scarcity); condition (dilapidated, restored, altered, disturbed) and inherent cultural, historical, industrial, economic and contextual value that each and every heritage resource possesses.

The level of significance of each heritage resource will determine what mitigation measures have to be applied before this heritage resource may be affected by the Eskom Project. The nature and extent of the mitigation measures will again determine the permitting process that has to be followed with the South African Heritage Resources Authority (SAHRA).

The protective status of the various types and ranges of heritage resources that may be affected by the Eskom Project is indicated by means of various sections of the National Heritage Resources Act (No 25 of 1999).

8.3.1 Stone Age sites (including rock paintings)

A limited number of Stone Age sites have been identified in and near the Eskom Project Area. This is primarily the result of the fact that the survey was not done with the same meticulousness and thoroughness that are characteristic of scientific archaeological surveys. Stone Age sites also are difficult to detect as they may be (partly) buried under the ground and that they mostly consist of stone tools that are scattered across the surface of the land.

Stone Age sites are underrepresented in this study and it is clear that some of these sites will be found during the walk-through study or even at a later stage, e.g. when the power line corridors are constructed. Stone tools may be excavated when towers are erected.

Rock paintings sites also occur in moderate numbers along the central stretches of both Corridor 01 and Corridor 08. A cluster of five rock art sites are also located near the western end of these two corridors while unrecorded rock art sites exist in association with the mountains of Ga Mabula and Tafelkoppe. Any impact on these rock painting sites may either be physically or visually, or both.

Stone Age sites, including rock art sites, qualify as archaeological remains and are protected by Section 38 of the National Heritage Resources Act (No 25 of 1999).

8.3.2 Iron Age sites

Most of the Iron Age sites recorded in the Project Area occur towards the central parts of both Corridors 01 and 08. These sites include EIA Eiland and LIA Moloko settlements, the latter with and without stone walls. LIA Moloko settlements also occur near the eastern end of Corridor 01 in the Langa Ndebele sphere of influence. A cluster of stone walled sites occur in a poort in Thaba Tsweu along Corridor 06 which is part of the sphere of influence of the Langa Ndebele.

Iron Age settlements qualify as archaeological and historical remains and are protected by Section 38 of the National Heritage Resources Act (No 25 of 1999).

8.3.3 Historical remains

A low number of widely distributed colonial farmsteads have been recorded in the western and central parts of the Eskom Project Area where colonial settlement took place during the late nineteenth century and the early twentieth century. Many of these farmsteads do not necessarily qualify as historical significant structures as they either have been altered (renovated) in the past whilst others have been abandoned and have fallen into disrepair.

Most of these residences are single structures and are not associated with outbuildings such as wagon sheds or rondavels which then may constitute cultural landscapes of smaller proportions. Criteria such as chronological age (sixty years or older), condition (altered, renovated, dilapidated), etc. determine the level of significance of these structures.

Homesteads with rectangular stone walls in the Langa Ndebele sphere of influence along the eastern end of Corridor 01 have historical significance as many are sixty years old. Several of these homesteads are associated with graves as the occupants of some of these homesteads were interred within the confines of the homesteads after they have been abandoned.

Historical structures such as individual farmsteads (sometimes with outbuildings) and in some instances constituting cultural landscapes of smaller proportions which are older than sixty years are protected by Section 34 and Section 38 of the National Heritage Resources Act (No 25 of 1999).

8.3.4 Memorabilia

At least one commemorative beacon was distinguished in the Project Area, namely the beacon commemorating the opening of the Kloof Pass.

Memorabilia which include monuments, commemorative beacons or Gardens of Remembrance qualify as heritage memorials which are protected by Section 37 of the National Heritage Resources Act (No 25 of 1999).

8.3.5 Graveyards

A significant number of graveyards were recorded which are associated with rural villages in the Eskom Project Area; historical homesteads in the Langa Ndebele sphere of influence; near the village of Phetole in the Luxemburg area, and with colonial farmsteads. These graveyards and graves occur throughout the Eskom Project Area and were found along all three major power line corridors. However, the number of graveyards which were recorded is probably not a true reflection of the real number of graveyards which may exist in the Eskom Project Area. Undetected graves or graveyards may occur anywhere as informal and abandoned graveyards are difficult to detect.

It is therefore likely that more graveyards than those which have been recorded will be discovered during the walk-through study.

All graveyards and graves can be considered to be of high significance and are protected by various laws. Legislation with regard to graves includes Section 36 of the National Heritage Resources Act (No 25 of 1999) whenever graves are older than sixty years. The act also distinguishes various categories of graves and burial grounds.

Other legislation with regard to graves includes those which apply when graves are exhumed and relocated, namely the Ordinance on Exhumations (No 12 of 1980) and the Human Tissues Act (No 65 of 1983 as amended).

8.4 Possible impacts on the heritage resources

Some of the types and ranges of heritage resources in or near the proposed sites for the Mokopane Substation and in or near the proposed power line corridors, including those that hitherto have been undetected, may be impacted (affected, altered, damaged) by the Eskom Project whilst the walk-through study on the other hand may result in the lowering of the impact on the heritage resources.

The number of heritage resources which may be affected by the Eskom Project can be decreased if the power lines are realigned after the walk-through study has been completed.

The significance of possible impacts on the various types and ranges of heritage resources is indicated in Tables 12-16. The tables considers the affects of the impacts during the pre-mitigation phase as well as during the post-mitigation phase.

8.4.1 Stone Age sites

Stone Age sites are underepresented in this study and more sites will be found when the walk-through study is done or when the power line corridors are surveyed and constructed. Stone Age sites may be impacted when towers are constructed on top of concentrations of stone tools. This manily applies to Stone Age sites which are located in the open. Several LSA sites in the Project Area occur in rock shelters and overhangs where they will not be affected by the Eskom Project.

Stone tools are not destroyed by this action but are usually scattered from a an archaeological context which already have been disturbed as a result of natural environmental occurrences in the past. However, the impact that may be caused by the Eskom Project will be due to human intervention and will not be caused by natural environmental processes.

8.4.2 Iron Age sites

The surface of land that is covered by single or clusters of Iron Age sites dating from the EIA Eiland phase and from the LIA Moloko phase (with or without stone walls) vary considerably. The cluster of LIA Moloko stone walled sites in Corridor 06 in a poort in Thaba Tšweu cover a considerable surface area. These stone walled sites have been impacted in the past when Eskom erected towers for 132kV power lines within the perimeters of these sites.

Some of these Iron Age sites may be impacted by the Eskom Project if the towers for the power lines are erected within the perimeters of these sites or when the power lines cuts across these sites which, together, may constitute small cultural landscapes.

8.4.3 Historical structures

The relatively low number of widely distributed colonial homesteads in the Eskom Project Area needs not to be affected by the Eskom Project, also when considering that most of these houses are single structures (without outbuildings) and therfore not constituting cultural landscapes. The homesteads in the Langa Ndebele sphere of influence (some with graves) are mainly concentrated in the Fonthane mountains.

These remains will be affceted if the towers are erected on top of these remains. This impact may be more significant if the homestead also holds graves.

8.4.4 Memorabilia

It is highly unlikely that the commemorative beacon in the Kloof Pass will be affected by the Eskom Project as Corridor 01 will not be constructed along this kloof due to technical reasons and aesthetics.

8.4.5 Graveyards

Any of the recorded graveyards or graves or those detected during the walk-through study of the Eskom Project Area may be impacted when towers are erected on top of these structures.

8.5 Mitigating the heritage resources

Different mitigation measures have to be followed for different types and ranges of heritage resources that may be affected by the Eskom Project. Mitigation measures for various types and ranges of heritage resources are usually conducted by specialists qualified in various disciplines and accredited with the Association for Southern African Professional Archaeologists (ASAPA) or with other professional orginisations.

An important aspect relating to the mitigation (conservation) of heritage resources in power line corridors is the undertaking of walk-through studies which are done before transmission lines are constructed and have the following benefits, namely:

- Transmission lines can be rerouted or realigned in order to avoid (conserve) heritage sites.
- Heritage resources can be conserved unaffected (*in situ*) underneath power lines and can subsequently be managed as long as power lines are operational.

8.5.1 Stone Age sites

Stone Age sites can in some instances be avoided by means of placing towers on opposite ends (outer perimeters) of these sites. Stone Age sites therefore can be kept underneath (*in situ*) any number of power lines.

It is also possible that stone tools which may be affected by the Eskom Project can be collected from the surface before the power lines are constructed. These stone tools can be donated to museums (preferably closest to the project area) or to an accredited institution such as a national museum or a university. Here, it can be safe-kept and be used in displays or in educational programmes.

Rock art sites mostly occur in mountainous areas (overhangs and shelters) where power lines are not preferred to be constructed due to technical reasons. However, some rock

art are located on single boulders in more open areas where power lines may be constructed.

When power lines are constructed above or near rock art sites they may cause a physical and/or visual impact on the rock art. However, it may also be possible that rock art on boulders may be conserved below power lines.

Phase II investigations for Stone Age sites can only be conducted by archaeologists accredited with the Association for Southern African Professional Archaeologists (ASAPA). Rock art sites that are impacted by power lines must be investiagted by specialists from the Rock Art Research Institute (RARI) at the University of the Witwatersrand. These archaeologists have to obtain permits from the South African Heritage Resources Authority (SAHRA) which will authorise the collection of the stone artefacts and the investiagtion of the rock art sites *prior* to the construction of the power lines and any subsequent affect on these heritage resources.

8.5.2 Iron Age sites

Iron Age sites can in some instances be avoided by means of placing towers on opposite ends (outer perimeters) of single or small clusters of sites. Incorporation of a small cluster of sites underneath any number of power lines may impact on these sites if they constitute cultural landscapes. However, the impact will be visual and not necessarly physical. No fixed prescriptions exist for ‘safe distances’ that has to be maintained between power lines and Iron Age sites.

If Iron Age sites have to make way for towers for power lines these sites must be subjected to Phase II investigations. These investigations require that the sites be documented by means of mapping the sites and possibly by means of small test excavations of sites. Phase II investigations are done by archaeologists accredited with ASAPA. The archaeologist has to obtain a permit from SAHRA which will authorise the Phase II investigation and the subsequent destruction of the stone walled sites before the construction of the power lines commences.

8.5.3 Historical remains

Historical houses (sometimes with outbuildings) which may constitute cultural landscapes can in some instances be avoided by means of routing power lines around these structures. Historical infrastructure, however, can not be preserved underneath power lines.

Power lines that avoid historical structures may still impact visually on these remains. No fixed prescriptions exist that outline ‘safe distances’ between power lines and historical structures.

Historical structures may not be affected (demolished, renovated, altered) by the Eskom Project *prior* to their investigation by a historical architect in good standing with SAHRA. The historical architect has to acquire a permit from SAHRA before any historical structures may be impacted as a result of the Eskom Project.

8.5.4 Memorabilia

The commemorative beacon in the Kloof Pass will probably not be affected by the Eskom Project. If the monument, which can also be conserved beneath the power line, has to be moved it must be shifted to a location where it is accessible to the public, tourists and other interested individuals or groups as its holds educational and other values.

8.5.5 Graveyards

Graves and graveyards in the Eskom Project Area can be mitigated by following one of the following strategies, namely:

- Graveyards and graves can be conserved *in situ* beneath power lines. Towers should be erected on opposite ends of graves or graveyards. Consequently, power lines can be strung across and above graves and graveyards. Conserving graves and graveyards in power line corridors create the risk that they may be damaged, accidentally, and that Eskom may be held responsible for such damages. Controlled access must exist for any relatives or friends who wish to visit graves or graveyards in power line corridors.
- Graveyards can also be exhumed and relocated. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.

9 CONCLUSIONS AND RECOMMENDATIONS

The Phase I HIA study for the options for the proposed Mokopane Substation and for the various corridors for the Mokopane Integration Project identified the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) in or near the Eskom Project Area namely, (Tables 1-11):

- Scatters of stone tools occur along the Vaalsloot, Klein Sandsloot and Mohlosane Rivers in the Langa Ndebele sphere of influence. LSA sites are more common along the central parts of both Corridor 01 and Corridor 08 in the mountainous Waterberg areas and include open sites as well as sites which are located in rock shelters. These sites mainly date from the last two millennia.
- Rock painting sites occur in the northern mountainous part of the Eskom Project Area, particularly along the central stretches of Corridor 01 and Corridor 08. A cluster with five rock art sites occurs near the start of both these corridors in the west. Here, the mountains of Ga Mabula and Tafelkoppe also hold high heritage significance as rock art sites (not documented as yet) occur in these mountain ranges. These rock art sites date from the last two millennia.
- EIA Eiland sites (AD1100 to AD1300) have been recorded near the central stretch of Corridor 08 and possibly also occur in or near the central stretch of Corridor 01. These sites are inconspicuous as they mostly cover small surface areas and are not associated with any stone walls. Their most characteristic feature, if visible on the surface of the land, is the presence of decorated potsherds.
- LIA Moloko sites (AD1600 to AD1880), some with stone walls and characterised by Moloko styled pottery as well as with Nguni types of pots, occur in and near the central stretches of both Corridor 01 and Corridor 08. These sites are also common in the Masebe Nature Reserve (e.g. Magagamatala) and in the Villa Nora area (e.g. Bobididi) between Corridors 01 and 08. These sites are also common in the Lange Ndebele sphere of influence in the south-east. The eastern stretch of Corridor 01 runs across this area. LIA Moloko stone walled sites in a poort in Thaba Tšweu falls inside Corridor 06 and are associated with the Langa Ndebele.
- Historical remains, mostly consisting of homesteads, occur along the eastern stretch of Corridor 01 along the Fonthane mountains in the Langa Ndebele sphere of influence. Widely dispersed colonial farm residences (historical houses) occur in low numbers along the western and central stretches of Corridors 01, 02 and 08.
- Graveyards occur along all stretches of all the power line corridors. Some of these graveyards are associated with villages which are scattered across the Project Area whilst others are associated with historical remains from the Langa Ndebele sphere of influence. Inconspicuous, undiscovered graves occur along the eastern stretch of Corridor 01. Graveyards in association with colonial farmsteads are generally low in numbers. Those that are associated with villages are higher in numbers considering the population numbers in these areas.
- A commemorative beacon has been erected in the Kloof Pass.

- Other heritage phenomena such as an open-air church occur near the village of Ga-Mathekgwa.

It is highly likely that more of the following types and ranges of heritage resources may occur in or near some of the power line corridors as they have been missed by this study, due to various reasons. The following types and ranges of heritage resources therefore may be underrepresented in this study and their presence may be revealed by the walk-through study, namely:

- Stone Age sites with scatters of stone tools may occur along any of the major rivers, streams or tributaries in the Eskom Project Area, particularly where these rivers and streams may be crossed by the power lines. Stone tools may also occur in eroded areas and dongas, such as south of Mašašane, or near outcrops that are suitable for the manufacturing of stone tools.
- More historical farmsteads may occur towards the central and western parts of the Eskom Project Area where colonial settlement was more prominent during the late nineteenth century and the early twentieth century. However, farmsteads are generally widely dispersed and therefore low in numbers so that the eventual figure will not rise significantly.
- Undetected graveyards may occur in or near the power line corridors. However, these graveyards will be limited in number as colonial graveyards are usually associated with historical houses. More common are graveyards for farm labourers which tend to be inconspicuous as they are mostly undecorated. Most of the graveyards associated with rural villages are located in these villages whilst those situated on the outskirts of villages, where the power lines may run, have been geo-referenced and mapped. The Lange Ndebele sphere of influence has proven to be an area which is marked with exceptionally high numbers of unmarked graves.

Heritage potential of the options for the Mokopane Substation

Three options are proposed for the Mokopane Substation. All three options for the proposed Mokopane Substation weigh equal with regard to a preference to be used as a site for the proposed Mokopane Substation. No heritage resources with outstanding significance were observed near any of these options.

Heritage potential of the various power line corridors

Three corridors have been identified for the proposed 400kV power lines between the Delta Substation and the Witkop Substation, namely a northern corridor (Corridor 02), a southern corridor (Corridor 01), and a central corridor running along Eskom's existing power line (Corridor 08). The heritage potential of each of these corridors is briefly discussed:

Corridor 01

This southern corridor can be divided into three main stretches characterised by the following heritage resources, namely (Figure 7; Table 8):

- A western stretch running along the Waterberg flats which mainly holds graveyards and historical houses in low numbers. A cluster of five rock art sites occur on Grootfontein 501LQ.
- A central stretch with a sharp bend which runs through the northern edge of the Waterberg. This stretch holds LSA sites in the open and in rock shelters and rock art sites in shelters, overhangs and on isolated boulders. It is marked by EIA Eiland and LIA Moloko settlements as well as historical houses and graveyards in low numbers. A beacon is located in the Kloof Paas.
- An eastern stretch which runs across the Fonthane mountains and the historical sphere of influence of the Langa Ndebele. This area is characterised by remains dating from the Late Iron Age and Historical Period in moderate numbers. Graveyards are scattered throughout this area and many undiscovered graves still occur where settlements dating from the more recent past were located.

Corridor 02

This northern corridor can be divided into the following stretches with different heritage significance, namely (Figure 7; Table 9):

- A western stretch that runs across the Waterberg flats to the farm Pieterman 445LR which holds graveyards and historical houses in low numbers and a few graveyards in the Shongwane area. A rock art site is located on Grootfontein 501LQ.
- An eastern stretch that runs near and along several graveyards located in or near the fringes of villages. This stretch skirts the northern boundary of the Masebe Nature Reserve and the farm Haakdoringdraai 711LR where several rock art sites and LIA settlements occur. It can be expected that LSA sites (open and in shelters) will also occur in the reserve.

Corridor 08

This central corridor can be divided into the following stretches which are characterised by the following types and ranges of heritage resources (Figure 7; Table 10);

- A western stretch that runs across the Waterberg flats to the mountains Tafelkoppe and Ga Mabula on Smithfield 536LQ and surrounding farms. These mountains hold high heritage significance. This stretch also holds graveyards and historical houses in low numbers.
- A central stretch that runs across the northern tip of the Waterberg mountains. This stretch holds historical houses and graveyards in low numbers. Several rock art sites and LSA sites occur along this stretch as well as a highly significant EIA Eiland site and LIA Moloko sites. This stretch skirts the southern boundary of the Masbebe Nature Reserve and the farm Haakdoringdraai 711LR where several rock art sites and LIA settlements occur. It can be expected that LSA sites (open and in shelters) will also occur in the reserve.
- An eastern stretch that is marked by a limited number of graveyards.

Corridors 04-06

Three possible corridors have been identified between the new Mokopane Substation and the Witkop Substation, namely Corridor 04, 05 and 06 (Figure 7; Table 11).

Corridor 06 holds the highest number and most significant heritage resources. A cluster of stone walled sites which are already impacted by the presence of 132kV power lines is located along this corridor which runs through a poort in Thaba Tsweu.

Corridor 07

Corridor 07, which runs from the Delta Substation to the Medupi Power Station, is characterised by the presence of low numbers of historical houses and graveyards.

Ranking the substation sites and the power line corridors

Considering the presence of the various types and ranges of heritage resources in and near the three options for the Mokopane Substation and for the various power line corridors, the options for the substations and for the various power line corridors can be ranked. This ranking is based on the considering of pre-mitigation as well as post-mitigtation measures for any of the types and ranges of heritage resources that may be affceted by the proposed substation or the various power line corridors (Figure 7; Table 11).

The scale that was used to rank the substation sites and the power line corridors was graded in three levels, namely: one (1) (least preferred); two (2) medium preferred and three (3) (most preferred).

Ranking the options for the substation

Options 01, 02 and 03 are equally preferred as possible sites for the Mokopane Substation.

Ranking the power line corridors

The three longest power line corridors are ranked as follow:

Corridors 01, 02 and 08

- Corridor 02 is most preferred as it seems as if this corridors will affect the lowest number of heritage resources; the least types and ranges of heritage resources as well as no outstanding significant heritage resources (Figure 7, Tables 9 & 11).
- Corridor 08 is medium preferred as it seems as if this corridors will affect the second lowest number of heritage resources; the second lowest number of types and ranges of heritage resources as well as no outstanding significant heritage resources (Figure 7, Table 10). This ranking applies to Corridor 08 if the follwing deviations can be implemented in order to consider current technical constraints and appeals, namely: Corridor 08 must be constructed to the north of Tafelkoppe

and Ga Mabula (along the R518); follow the dirt road to the north of Kleindenteren 485 and Kirstenbosch 497 [avoiding the kloof and reserve]; constructed slightly further to the north or south on Klipbank [in order to avoid the second kloof] and follow its existing corridor in order to avoid crossing the Masebe Nature Reserve.

- Corridor 01 is the least preferred as it seems as if this corridors will affect the highest number of heritage resources; the highest number of types and ranges of heritage resources as well as heritage resources with possible high significance (Figure 7, Tables 8 & 11).

Corridors 04, 05 and 06

When considering Corridors 04, 05 and 06 it is clear that Corridor 06 can be identified as the least preferred corridor amongst these three corridors as it holds the following:

- A cluster of stone walled sites which are already impacted by Eskom's existing 132kV power lines as they run through a poort in Thaba Tsweu in which the power lines are located.
- This corridor is also associated with a possible graves located in a sisal bush.

No specific preference, from a heritage point of view, can be made between Corridor 04 and Corridor 05 (Figure 7; Table 11) .

Corridor 07

Corridor 07 has no alternatives. However it appears as if this Corridor holds no outstanding significant heritage resources other than one or more historical houses and a few graveyards. These heritage resources can either be avoided by Corridor 07, can be incorporated in the power line corridors (Figure 7; Table 11).

The significance of the heritage resources

The proposed power line corridors hold a number of heritage resources. Undiscovered heritage resources may raise this number although it is generally accepted that this number will decrease after a walk-through study has been done and the power lines have been realigned in order to avoid some of these heritage resources whilst others may continue to exist (unaffected) in the power line corridors. The exact number of heritage resources that may be affected by the proposed power lines and the significance of each of these heritage resources therefore are not yet known.

The significance of heritage resources is usually determined according to criteria such as the following: the scientific, research, esthetical, educational, ideological, tourism, etc value of heritage resources. Other criteria which may apply are the repeatability (scarcity); condition (dilapidated, restored, altered, disturbed) and inherent cultural, historical, industrial, economic and contextual value that each and every heritage resource possesses.

The level of significance of each heritage resource will determine what mitigation measures have to be applied before this heritage resource may be affected by the Eskom Project. The nature and extent of the mitigation measures will again determine the permitting process that has to be followed with the South African Heritage Resources Authority (SAHRA).

The protective status of the various types and ranges of heritage resources that may be affected by the Eskom Project is indicated by means of various sections of the National Heritage Resources Act (No 25 of 1999).

Stone Age sites (including rock paintings)

A limited number of Stone Age sites have been identified in and near the Eskom Project Area. This is primarily the result of the fact that the survey was not done with the same meticulousness and thoroughness that are characteristic of scientific archaeological surveys. Stone Age sites also are difficult to detect as they may be (partly) buried under the ground and that they mostly consist of stone tools that are scattered across the surface of the land.

Stone Age sites are underrepresented in this study and it is clear that some of these sites will be found during the walk-through study or even at a later stage, e.g. when the power line corridors are constructed. Stone tools may be excavated when towers are erected.

Rock paintings sites also occur in moderate numbers along the central stretches of both Corridor 01 and Corridor 08. A cluster of five rock art sites are also located near the western end of these two corridors while unrecorded rock art sites exist in association with the mountains of Ga Mabula and Tafelkoppe. Any impact on these rock painting sites may either be physically or visually, or both.

Stone Age sites, including rock art sites, qualify as archaeological remains and are protected by Section 38 of the National Heritage Resources Act (No 25 of 1999).

Iron Age sites

Most of the Iron Age sites recorded in the Project Area occur towards the central parts of both Corridors 01 and 08. These sites include EIA Eiland and LIA Moloko settlements, the latter with and without stone walls. LIA Moloko settlements also occur near the eastern end of Corridor 01 in the Langa Ndebele sphere of influence. A cluster of stone walled sites occur in a poort in Thaba Tsweu along Corridor 06 which is part of the sphere of influence of the Langa Ndebele.

Iron Age settlements qualify as archaeological and historical remains and are protected by Section 38 of the National Heritage Resources Act (No 25 of 1999).

Historical structures

A low number of widely distributed colonial farmsteads have been recorded in the western and central parts of the Eskom Project Area where colonial settlement took place during the late nineteenth century and the early twentieth century. Many of these farmsteads do not necessarily qualify as historical significant structures as they either have been altered (renovated) in the past whilst others have been abandoned and have fallen into disrepair.

Most of these residences are single structures and are not associated with outbuildings such as wagon sheds or rondavels which then may constitute cultural landscapes of smaller proportions. Criteria such as chronological age (sixty years or older), condition (altered, renovated, dilapidated), etc. determine the level of significance of these structures.

Homesteads with rectangular stone walls in the Langa Ndebele sphere of influence along the eastern end of Corridor 01 have historical significance as many are sixty years old. Several of these homesteads are associated with graves as the occupants of some of these homesteads were interred within the confines of the homesteads after they have been abandoned.

Historical structures such as individual farmsteads (sometimes with outbuildings) and in some instances constituting cultural landscapes of smaller proportions which are older than sixty years are protected by Section 34 and Section 38 of the National Heritage Resources Act (No 25 of 1999).

Memorabilia

At least one commemorative beacon was distinguished in the Project Area, namely the beacon commemorating the opening of the Kloof Pass.

Memorabilia which include monuments, commemorative beacons or Gardens of Remembrance qualify as heritage memorials which are protected by Section 37 of the National Heritage Resources Act (No 25 of 1999).

Graveyards

A significant number of graveyards were recorded which are associated with rural villages in the Eskom Project Area; historical homesteads in the Langa Ndebele sphere of influence; near the village of Phetole in the Luxemburg area, and with colonial farmsteads. These graveyards and graves occur throughout the Eskom Project Area and were found along all three major power line corridors. However, the number of graveyards which were recorded is probably not a true reflection of the real number of graveyards which may exist in the Eskom Project Area. Undetected graves or graveyards may occur anywhere as informal and abandoned graveyards are difficult to detect.

It is therefore likely that more graveyards than those which have been recorded will be discovered during the walk-through study.

All graveyards and graves can be considered to be of high significance and are protected by various laws. Legislation with regard to graves includes Section 36 of the National Heritage Resources Act (No 25 of 1999) whenever graves are older than sixty years. The act also distinguishes various categories of graves and burial grounds.
Other legislation with regard to graves includes those which apply when graves are exhumed and relocated, namely the Ordinance on Exhumations (No 12 of 1980) and the Human Tissues Act (No 65 of 1983 as amended).

Possible impacts on the heritage resources

Some of the types and ranges of heritage resources in or near the proposed sites for the Mokopane Substation and in or near the proposed power line corridors, including those that hitherto have been undetected, may be impacted (affected, altered, damaged) by the Eskom Project whilst the walk-through study on the other hand may result in the lowering of the impact on the heritage resources.

The number of heritage resources which may be affected by the Eskom Project can be decreased if the power lines are realigned after the walk-through study has been completed.

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Stone tools are not destroyed by this action but are usually scattered from a an archaeological context which already have been disturbed as a result of natural environmental occurrences in the past. However, the impact that may be caused by the Eskom Project will be due to human intervention and will not be caused by natural environmental processes.

Iron Age sites

The surface of land that is covered by single or clusters of Iron Age sites dating from the EIA Eiland phase and from the LIA Moloko phase (with or without stone walls) vary considerably. The cluster of LIA Moloko stone walled sites in Corridor 06 in a poort in Thaba Tšweu cover a considerable surface area. These stone walled sites have been impacted in the past when Eskom erected towers for 132kV power lines within the perimeters of these sites.

Some of these Iron Age sites may be impacted by the Eskom Project if the towers for the power lines are erected within the perimeters of these sites or when the power lines cuts across these sites which, together, may constitute small cultural landscapes.

Historical structures

The relatively low number of widely distributed colonial homesteads in the Eskom Project Area needs not to be affected by the Eskom Project, also when considering that most of these houses are single structures (without outbuildings) and therfore not constituting cultural landscapes. The homesteads in the Langa Ndebele sphere of influence (some with graves) are mainly concentrated in the Fonthane mountains.

These remains will be affceted if the towers are erected on top of these remains. This impact may be more significant if the homestead also holds graves.

Memorabilia

It is highly unlikely that the commemorative beacon in the Kloof Pass will be affected by the Eskom Project as Corridor 01 will not be constructed along this kloof due to technical reasons and aesthetics.

Graveyards

Any of the recorded graveyards or graves or those detected during the walk-through study of the Eskom Project Area may be impacted when towers are erected on top of these structures.

Mitigating the heritage resources

Different mitigation measures have to be followed for different types and ranges of heritage resources that may be affected by the Eskom Project. Mitigation measures for various types and ranges of heritage resources are usually conducted by specialists qualified in various disciplines and accredited with the Association for Southern African Professional Archaeologists (ASAPA) or with other professional orginisations.

An important aspect relating to the mitigation (conservation) of heritage resources in power line corridors is the undertaking of walk-through studies which are done before transmission lines are constructed and have the following benefits, namely:

- Transmission lines can be rerouted or realigned in order to avoid (conserve) heritage sites.
- Heritage resources can be conserved unaffected (*in situ*) underneath power lines and can subsequently be managed as long as power lines are operational.

Stone Age sites

Stone Age sites can in some instances be avoided by means of placing towers on opposite ends (outer perimeters) of these sites. Stone Age sites therefore can be kept underneath (*in situ*) any number of power lines.

It is also possible that stone tools which may be affected by the Eskom Project can be collected from the surface before the power lines are constructed. These stone tools can be donated to museums (preferably closest to the project area) or to an accredited institution such as a national museum or a university. Here, it can be safe-kept and be used in displays or in educational programmes.

Rock art sites mostly occur in mountainous areas (overhangs and shelters) where power lines are not preferred to be constructed due to technical reasons. However, some rock art are located on single boulders in more open areas where power lines may be constructed.

When power lines are constructed above or near rock art sites they may cause a physical and/or visual impact on the rock art. However, it may also be possible that rock art on boulders may be conserved below power lines.

Phase II investigations for Stone Age sites can only be conducted by archaeologists accredited with the Association for Southern African Professional Archaeologists (ASAPA). Rock art sites that are impacted by power lines must be investiagted by specialists from the Rock Art Research Institute (RARI) at the University of the Witwatersrand. These archaeologists have to obtain permits from the South African Heritage Resources Authority (SAHRA) which will authorise the collection of the stone artefacts and the investiagtion of the rock art sites *prior* to the construction of the power lines and any subsequent affect on these heritage resources.

Iron Age sites

Iron Age sites can in some instances be avoided by means of placing towers on opposite ends (outer perimeters) of single or small clusters of sites. Incorporation of a small cluster of sites underneath any number of power lines may impact on these sites if they constitute cultural landscapes. However, the impact will be visual and not necessarly physical. No fixed prescriptions exist for ‘safe distances’ that has to be maintained between power lines and Iron Age sites.

If Iron Age sites have to make way for towers for power lines these sites must be subjected to Phase II investigations. These investigations require that the sites be documented by means of mapping the sites and possibly by means of small test excavations of sites. Phase II investigations are done by archaeologists accredited with ASAPA. The archaeologist has to obtain a permit from SAHRA which will authorise the Phase II investigation and the subsequent destruction of the stone walled sites before the construction of the power lines commences.

Historical structures

Historical houses (sometimes with outbuildings) which may constitute cultural landscapes can in some instances be avoided by means of routing power lines around these structures. Historical infrastructure, however, can not be preserved underneath power lines.

Power lines that avoid historical structures may still impact visually on these remains. No fixed prescriptions exist that outline 'safe distances' between power lines and historical structures.

Historical structures may not be affected (demolished, renovated, altered) by the Eskom Project *prior* to their investigation by a historical architect in good standing with SAHRA. The historical architect has to acquire a permit from SAHRA before any historical structures may be impacted as a result of the Eskom Project.

Memorabilia

The commemorative beacon in the Kloof Pass will probably not be affected by the Eskom Project. If the monument, which can also be conserved beneath the power line, has to be moved it must be shifted to a location where it is accessible to the public, tourists and other interested individuals or groups as its holds educational and other values.

Graveyards

Graves and graveyards in the Eskom Project Area can be mitigated by following one of the following strategies, namely:

- Graveyards and graves can be conserved *in situ* beneath power lines. Towers should be erected on opposite ends of graves or graveyards. Consequently, power lines can be strung across and above graves and graveyards. Conserving graves and graveyards in power line corridors create the risk that they may be damaged, accidentally, and that Eskom may be held responsible for such damages. Controlled access must exist for any relatives or friends who wish to visit graves or graveyards in power line corridors.
- Graveyards can also be exhumed and relocated. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.

General comments with regard to mitigation

Two main types of impacts can be distinguished with regard to heritage resources and power lines, namely:

- Physical impacts which occur when towers are constructed on top of heritage resources which occur on the surface of the earth..
- Visual impacts occur when power line infrastructure affect the aesthetic and visual appearance, sense of place, context, or other aspects relating to heritage resources in a negative way.

However, it is generally assumed that impacts caused by linear developments such as power lines on heritage sites may be less severe than impacts which occur as a result of more drastic kinds of development. This assumption can be explained by the fact that long, narrow power lines (and their corridors) which extend across short, medium or long distances offer opportunities with regard to the protection of heritage sites by means of the following:

- Power lines are strung on top of towers which cause the only footprints on the landscape after the power line have been constructed.
- Power lines hang above the surface of the land in which heritage sites were deposited many years ago and primarily may cause a visual impact on these sites if the heritage sites are retained beneath the power lines.
- Towers (and power lines) can be planned and constructed in such a way that they can avoid heritage sites and cultural landscapes.
- Heritage sites can be conserved under power lines if towers are spaced in such a way that they do not affect (remove, damage, alter) heritage sites which then are left *in situ*, (unaffected) underneath power lines.
- Although mitigation measure do exist for all types and ranges of heritage resources, mitigation measures do not have to be applied when heritage sites can be left unaffected in power line corridors.

Walk-through studies and the mitigation of heritage resources

The protection and conservation of heritage resources in power lines corridors are advanced by means of walk-through studies which are conducted before the final alignments for power lines are fixed and before the construction of power lines commence. During the walk-through study, the real (factual) impact on recorded heritage resources as well as on earlier undetected heritage resources may be determined. By rerouting the power lines or changing the placement of towers possible impacts on heritage sites can either be minimised or can be avoided.

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45LQ, Grootfontein 501LQ, Boschpoort 551LQ, Witpoort 123LR, Windsor 499LQ, Touwfontein 528LQ, Bloemendal 991LQ, Hamburg 381LR, Boschkop 87IQ, Witfontein 86IQ, and others. Unpublished reports prepared for Eskom, Northern Region.

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11 SPOKESPERSONS CONSULTED

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Beyers and Susan van der Westhuizen. Rondeboschje 429LQ

Kobus Nel (snr). Farm owner. Annexatie 544LQ.

Kobus Nel (jnr). Farm owner. Annexatie 544LQ.

Katrien van Staden. Farm owner. Beaumont 550LR.

Robert Kruger. Foreman. Caledon 547 and Spreeuwal.

Joseph Fonthane. Farm laborer. Daggakraal 591LR.

Johan Kloppers. Farm owner. Daggakraal 591LR.

Joseph Sephokole. Resident in the Monareng village.

Johannes Mabodja. Farm laborer. Pieterman 445LR.

Dinah Madira. Farm laborer. Melckboschkraal 431LQ.

Johannes Tlou. Farm laborer. Wellington 432LQ.

Louis Bester. Farm owner. Daggakraal 591LR.
Etiene Rossouw. Representative for a portion of the farm Zwellendam 548.
Jan Tefu. Former resident of Ga Puka village.
Darius Masebe. Farm labourer. Weltevreden 508LR.
Engela Nel. Farm owner. Kleindenteren 485LR .
Jan Lewies. Farm owner. Kirstenbosch 497
Charl Rudolph. Farm owner. De Kuil 532LR.
Japie Maphuting. Farm labourer. Grootdenteren 533LR
Daniel Sebeta. Farm worker. Georgetown 532LR.
Jan van Rensburg. Farm owner. Hannover 555LR.
Herbert Mosimo of the Mosimo community. The Mosimo community is awaiting the outcome of a land claim near Tafelkoppe.

Potential environmental impact	Project Activity or issue	Environmental significance before mitigation							Environmental significance after mitigation as per EMP						
		M	E	D		P	TOTAL	SI	M	E	D		P	TOTAL	SI
Alter, damage, destroy Stone Age sites in/near the power line corridors	as a result of pre-construction, construction, or operational activities	5	1	5		3	33	M	1	1	5		1	7	L

Table 12: Impact significance assessment for Stone Age sites (and rock art sites) in/near power line corridors

Potential environmental impact	Project Activity or issue	Environmental significance before mitigation							Environmental significance after mitigation as per EMP						
		M	E	D		P	TOTAL	SI	M	E	D		P	TOTAL	SI
Alter, damage, destroy Iron Age sites in/near the power line corridors	as a result of pre-construction, construction, or operational activities	5	1	5		3	33	M	3	1	5		1	9	L

Table 13: Impact significance assessment for Iron Age sites in/near power line corridors

Potential environmental impact	Project Activity or issue	Environmental significance before mitigation							Environmental significance after mitigation as per EMP						
		M	E	D		P	TOTAL	SI	M	E	D		P	TOTAL	SI
Alter, damage, destroy Historical Houses in/near the power line corridors	as a result of pre-construction, construction, or operational activities	5	1	5		3	33	M	3	1	5		1	9	L

Table 14: Impact significance assessment for historical remains (such as houses) in/near power line corridors

Potential environmental impact	Project Activity or issue	Environmental significance before mitigation							Environmental significance after mitigation as per EMP						
		M	E	D		P	TOTAL	SI	M	E	D		P	TOTAL	SI
Alter, damage, destroy battlefields/memorabilia in/near the power line corridors	as a result of pre-construction, construction, or operational activities	5	1	5		3	33	M	3	1	5		1	9	L

Table 15: Impact significance assessment for memorabilia in/near power line corridors

Potential environmental impact	Project Activity or issue	Environmental significance before mitigation							Environmental significance after mitigation as per EMP						
		M	E	D		P	TOTAL	SP	M	E	D		P	TOTAL	SP
Alter, damage, destroy graves and graveyards in/near the power line corridors	as a result of pre-construction, construction, or operational activities	5	1	5		3	33	M	3	1	5		1	9	L

Table 16: Impact significance assessment for graves and graveyards in/near power line corridors