

**MULALO MAIN TRANSMISSION SUBSTATION AND
ASSOCIATED POWER LINES PROJECT, SECUNDA,
MPUMALANGA PROVINCE**

Phase 1 Heritage Impact Assessment

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EXECUTIVE SUMMARY

Introduction:

Sasol applied to Eskom Holdings for the integration of their new Open Cycle Gas Turbine plant into Eskom's North East transmission and distribution electricity network as well as requiring that their notified maximum demand be increased from 1100MVA to 1600MVA. Eskom Distribution Northern Region also indicated the need of an alternative 132kV source to the distribution network around the Secunda area due to applications received for new supply points from the mining industry. It was established that the existing Sol Main Transmission Substation (MTS) supplying the area was operating at full capacity and was not be capable of sustaining future load growth. Eskom decided that in order to address the above needs, a new 400/132kV MTS (Mulalo MTS) would be built that would be integrated with the existing power network through loop-in-out connections on existing transmission and distribution power lines.

This report serves as the Phase 1 Heritage Impact Assessment (HIA) for the proposed Mulalo MTS and associated power lines. The planned development triggers several sub-sections of section 38 of the National Heritage Resources Act (NHRA), 1999 (Act No 25 of 1999) that refers to developments that require a heritage impact assessment (HIA). The relevant sub-sections that were triggered by the project are: 38 (1) (a) (c)(i) and (d). The proposed development could also impact on graves, structures, archaeological and palaeontological resources that are protected in terms of sections 34, 35, and 36 of the NHRA.

Location of project:

The project is situated within the Govan Mbeki Local Municipality which is located within the Gert Sibande District Municipality in the Mpumalanga Province. The study area is situated south of the town of Secunda with the potential substation sites situated south east of eMbalenhle and south of the Sasol Refinery.

A site inspection was undertaken on 28 and 29 November 2016. Some sections of the power line routes could not be accessed as landowners were unavailable to provide access; however most affected areas were inspected. The report will be submitted to the Mpumalanga Provincial Heritage Resources Agency (MPHRA) for their assessment and comment.

Results of site inspection:

Substation site B is used for the cultivation of maize. Small areas between the maize fields are less impacted but are also disturbed by tractors, etc., which access the fields through these areas. The site is highly disturbed and no heritage sites were observed during the site inspection.

Substation site C is situated further south and is used for the grazing of livestock. Several graves were found in the south-west corner/footprint of the proposed substation site. These graves are well over 60 years old. There is also a pile of rocks close to the graves without a headstone which could also be a grave.

Some 320 m east of the above-mentioned graves, the remains of a house were found. These remains fall within the footprint of proposed substation site C. The walls of the house are still in place but the roof, windows and doors have been removed. Situated close to this house are the remains of several buildings and a walled off area. Both the graves and the structures are over 60 years and therefore protected by the NHRA.

Along the proposed power line routes to the existing Kriel-Tutuka and Kriel-Zeus power lines, several grave sites and the remains of structures were found. Most of these sites are situated directly below the power lines. Power lines have less of an impact on heritage sites than a substation as the pylon positions can be adjusted slightly to avoid graves and other identified heritage sites. However, the construction of these power lines can impact on such sites hence it has been recommended that buffer areas of 20 m be placed around all identified sites to protect them from construction and operational activities.

Along the proposed power line routes to the existing Sasol 2 and Sasol 3 power lines, no protected heritage sites were found. However, close to the boundary of the Sasol Refinery both sets of power lines are situated close to the foundations of buildings that were used, reportedly, to house the workers who built the Refinery. It has been recommended that the foundations situated outside the servitude of the power lines are avoided as they do provide a reminder of the development of the Refinery.

The South African Heritage Resources Agency's Fossil Sensitivity Map indicated that the project area is situated in an area that is mainly described as having insignificant palaeontological / fossil sensitivity interspersed with some areas of very high fossil sensitivity. The areas of high sensitivity in the north close to the Sasol Refinery are, ironically, situated in areas of high disturbance created by the Sasol Refinery and associated activities. The possibility of find intact fossils along the route of the power lines between the substation sites and the existing Sasol 2 and Sasol 3 power lines is expected to be very low.

The second area of very high fossil sensitivity is the last section (< 3 km) of all the proposed power lines looping into the existing Kriel-Tutuka and Kriel-Zeus power lines. It is recommended that a palaeontologist is appointed as part of the specialist walk down team and that he or she inspect

the approximate 3km referred to above to see if fossils will be impacted by the construction of the power lines.

Assessment of impacts:

Impacts identified were:

- Destruction / removal of graves older than 60 years
- Damage and/or destruction of structures older than 60 years
- Damage and/or destruction of fossils

The assessment indicated that with the implementation of mitigation measures, most impacts could be reduced to a low-medium rating. The impact that remains at a high impact was the removal of the graves if the location of substation site C cannot be altered to avoid the graves and structures found within its current footprint.

From a heritage perspective, **substation site B** is the preferred site as it is highly disturbed by maize cultivation and no heritage sites were found in the areas that were undisturbed. Substation site C is located on graves and structures that are over 60 years which means that they are protected by the NHRA and are of heritage significance.

Based on the findings of the HIA, the project can proceed with the provision that the recommendations provided throughout the report are implemented and that the mitigation measures provided are adhered to where necessary.

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AUTHOR DETAILS

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1. INTRODUCTION

Sasol applied to Eskom Holdings (SOE) (referred to Eskom in the report) several years ago for the integration of their new Open Cycle Gas Turbine (OCGT) plant into Eskom's North East transmission and distribution electricity network as well as requiring that their notified maximum demand be increased from 1100MVA to 1600MVA.

Eskom Distribution Northern Region also indicated the need of an alternative 132kV source to the distribution network around the Secunda area due to applications received for new supply points from the mining industry. It was established that the existing Sol Main Transmission Substation (MTS) supplying the area was operating at full capacity and was not be capable of sustaining future load growth and because of voltage dips, concerns were raised regarding the quality of supply from this substation.

Eskom decided that in order to address the above needs, a new 400/132kV MTS would have to be built that would be integrated with the existing power network through loop-in-loop-out connections on existing transmission and distribution power lines. The scope of the proposed development is as follows:

- Construction of a new 400/132kV MTS to be called Mulalo MTS
- Equipping the MTS with 8x 132kV feeder bays for Sasol and Eskom Distribution
- Construction of two 400kV loop-in-loop-out transmission power lines on the Kriel-Tutuka 400kV line to the proposed Mulalo MTS
- Construction of two 400kV loop-in-loop-out transmission power lines from the Kriel-Zeus 400kV line to the proposed Mulalo MTS.
- Construction of two 400kV distribution power lines from the proposed Mulalo MTS to the existing Sasol 2 power lines. These lines will be designed at 400kV and operated at 132kV.
- Construction of two 400kV distribution power lines from the proposed Mulalo MTS to the existing Sasol 3 power lines. These lines will be designed at 400kV and operated at 132kV.
- Decommissioning the existing 132kV power lines between the existing Sol substation and Sasol 2 substation at the point where the new lines from the Mulalo substation will connect with the existing lines.
- Construction of two 132kV lines to join the Open Cycle Gas Turbine with the existing Sasol 3 substation.

This report serves as the Phase 1 Heritage Impact Assessment (HIA) for the proposed construction of the Mulalo MTS and associated power lines.

2. LEGISLATIVE CONTEXT

The planned development triggers several provisions of section 38 of the National Heritage Resources Act (NHRA), 1999 (Act No 25 of 1999) that refers to the management of heritage resources. The provisions describes developments that require a heritage impact assessment for such developments. The relevant sub-sections of section 38 (1) that are triggered by the project are:

- (a) The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length. The proposed loop-in-loop out power lines are longer than 300m in length thus triggering this section;
- (c) Any development or other activity which will change the character of a site—
 - (i) exceeding 5 000 m² in extent – the proposed substation is 64 hectares in size
- (d) The re-zoning of a site exceeding 10 000 m² in extent. The location of the substation may be rezoned by Eskom.

The proposed power line and substation development may also impact on graves, structures, archaeological and palaeontological resources that are protected in terms of sections 34, 35, and 36 of the NHRA.

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

- (a) places, buildings, structures and equipment of cultural significance;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features of cultural significance;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and paleontological sites;
- (g) graves and burial grounds, including—
 - (i) ancestral graves;
 - (ii) royal graves and graves of traditional leaders;
 - (iii) graves of victims of conflict;
 - (iv) graves of individuals designated by the Minister by notice in the *Gazette*;
 - (v) historical graves and cemeteries; and
 - (vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- (h) sites of significance relating to the history of slavery in South Africa;

(i) movable objects, including:

- (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- (ii) objects to which oral traditions are attached or which are associated with living heritage;
- (iii) ethnographic art and objects;
- (iv) military objects;
- (v) objects of decorative or fine art;
- (vi) objects of scientific or technological interest; and
- (vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

The Phase I HIA was undertaken to assess whether any heritage resources would be impacted by the proposed construction of the Mulalo MTS and associated power lines.

3. LOCATION

The project is situated within the Govan Mbeki Local Municipality (GMLM) which is located within the Gert Sibande District Municipality (GSDM) in the Mpumalanga Province. The study area is situated south of the town of Secunda with the potential substation sites situated south east of eMbalenhle and south of the Sasol Refinery (see **Figure 1** below).

The study area also includes the existing Kriel-Tutuka 400kV transmission line and the Kriel-Zeus 400kV transmission lines and existing Sasol 2 and Sasol 3 distribution lines.

The study area is already disturbed by existing mining and industrial operations related to the Sasol Refinery as well as farming activities. The R546 road, a major arterial road between Secunda and Standerton runs through the study area. There are several minor roads in and around the study area.

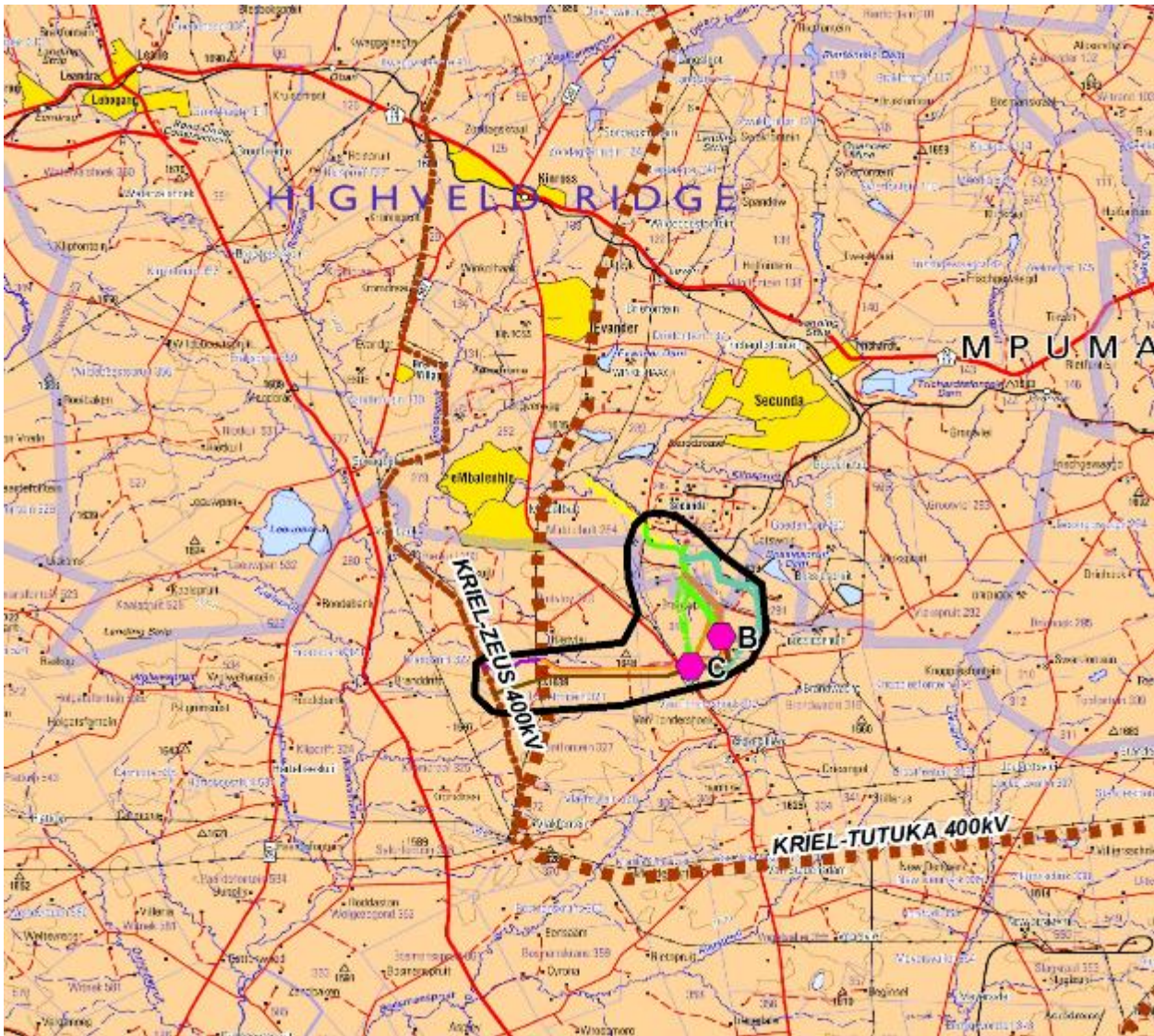


Figure 1: Regional location of study area

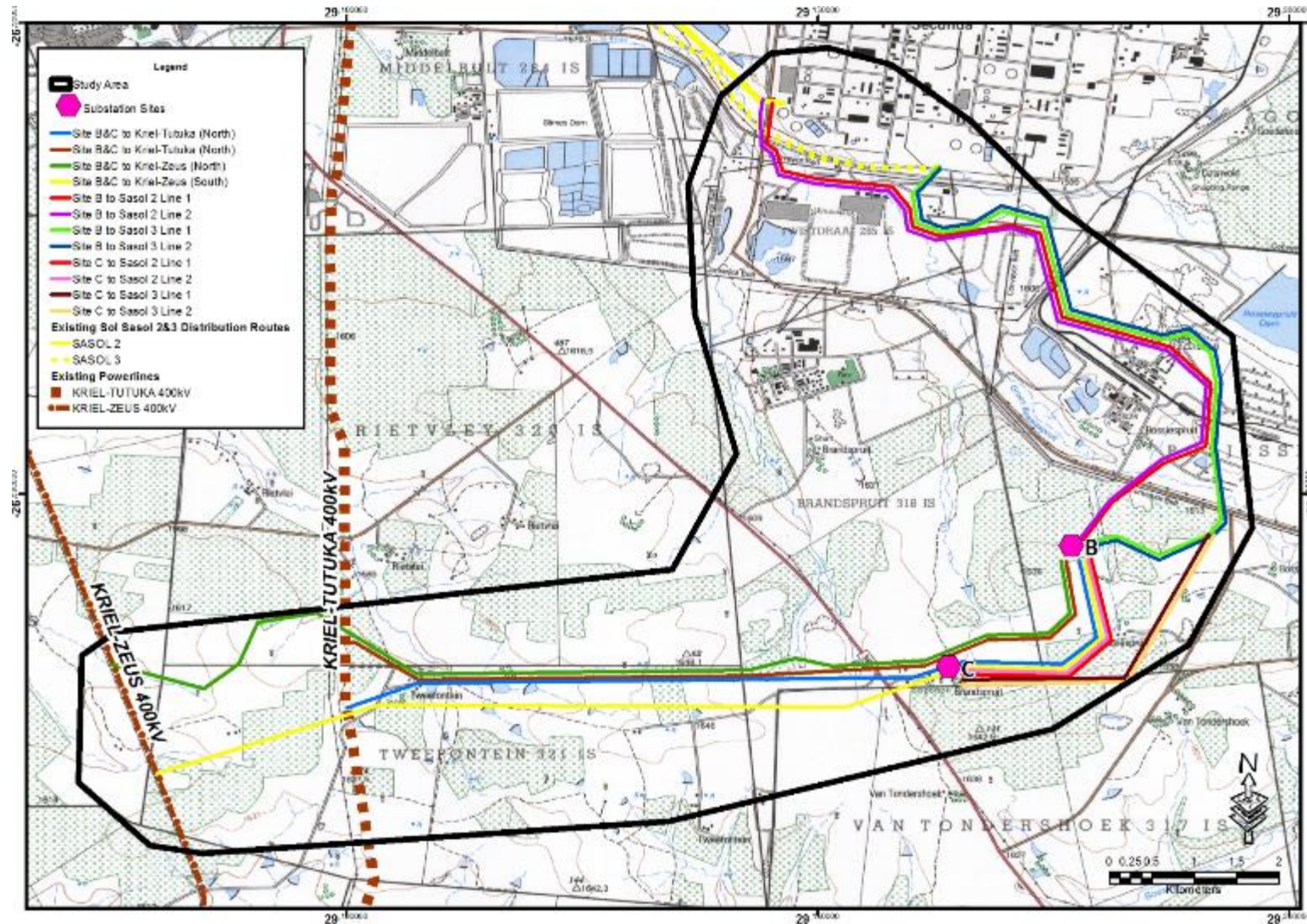


Figure 2: Substation sites and power line routes

4. TERMS OF REFERENCE

The terms of reference as provided by the EAP (Senkosi Environmental) were as follows:

- Undertake a site visit of the study area, substation sites and proposed alternative power line corridors and routes.
- Identify potential impacts on heritage resources including cultural landscapes, historical sites and structures, and on archaeological sites.
- Identify the risk of the development on the palaeontology / fossils of the area.
- Collect oral history of the area in conjunction with the public participation team where possible.
- Identify and map heritage resources including 'no-go' areas in the study area.
- Identify and assess impacts as per methodology provided for each substation site and for each of the power line corridors and routes.
- Provide detailed mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and risks (to be implemented during design, construction and operation, rehabilitation and closure of the proposed project).
- Ensure that the report meets the requirements of Appendix 6 of GNR 982 that lists the information required from specialist reports as well as the requirements of the relevant heritage authority.
- Liaise with the national and provincial heritage resources agencies for approvals, permits and data.
- Inform the relevant heritage bodies about the project and to submit the HIA report to the Mpumalanga provincial heritage resources agency and any other responsible authority.

5. METHODOLOGY

A survey of literature was undertaken of the larger area in order to place the project in a historical context. A few HIAs, undertaken in the Secunda area, were found on the SAHRIS database that provided some additional historical and archaeological data regarding the area.

A site inspection of as much of the project area as possible was undertaken on 28 and 29 November 2016. Some sections of the power line routes could not be accessed as landowners were unavailable to provide access; however most affected areas were inspected.

This HIA report will be submitted to the heritage authority of Mpumalanga, namely the Mpumalanga Provincial Heritage Resources Agency for their assessment and comment.

6. HISTORICAL BACKGROUND OF THE STUDY AREA

Dongas and eroded areas at Maleoskop near Groblersdal is one of only a few places in Mpumalanga where Early Stone Age (ESA) Olduwan and Acheulian artefacts have been recorded. Evidence for the Middle Stone Age (MSA) has been excavated at the Bushman Rock Shelter near Ohrigstad. This cave was repeatedly visited over a prolonged period. The oldest layers date back to 40 000BP (Before Present) years and the youngest to 27 000BP. Late Stone Age (LSA) occupation of the Mpumalanga Province also has been researched at Bushman Rock Shelter where it dates back 12 000BP to 9 000BP and at Höningnestkrans near Badfontein where a LSA site dates back to 4 870BP to 200BP (Pistorius 2015:28).

The LSA is associated with rock paintings and engravings which were done by San hunter-gatherers and Khoi Khoi herders. Approximately 400 rock art sites are distributed throughout the Mpumalanga Province, notably in the northern and eastern regions at places such as Emalahleni, Lydenburg, White River and the southern Kruger National Park (Pistorius 2015:28). The closest known Stone Age site in the vicinity of Secunda is a rock art site to the south of Witbank (van Vollenhoven & Pelsler 2010:13).

During the LSA and Historical Period, San people called the Batwa lived in sandstone caves and rock shelters near Lake Chrissie in the Ermelo area. The Batwa are descendants of the San, the majority of which intermarried with Black people such as the Nhlapo from Swazi descent and Sotho-Tswana clans such as the Pai and Pulana (Pistorius 2015: 29).

The Iron Age is associated with the first agro-pastoralists or farming communities who lived in semi-permanent villages and practised metal working. Evidence for the first farming communities in Mpumalanga is derived from a few Early Iron Age (EIA) potsherds which occur in association with LSA occupation of the Höningnest Shelter near Badfontein. The co-existence of EIA potsherds and LSA stone tools suggest some form of symbiotic relationship between the Stone Age hunter-gatherers who lived in the cave and EIA farmers in the area (Pistorius 2015: 29).

The Late Iron Age, according to Pistorius (2015:30), is well represented in Mpumalanga and stretches from AD1500 well into the nineteenth century. Several areas, mostly associated with stone walled sites, can be distinguished in the region. The closest known Iron Age occurrences to the Secunda area are Late Iron Age sites that have been identified to the west of Bronkhorstspuit and in the vicinity of Bethal (van Vollenhoven & Pelsler 2010:15).

Coal mining on the Eastern Highveld is older than a century and the earliest use of coal (charcoal) in South Africa was during the Iron Age (300-1880AD) when metal workers used charcoal, iron and copper ores and fluxes to smelt iron and copper in clay furnaces. The explorer, Thomas Baines mentioned that farmers worked coal deposits in the neighbourhood of Bethal in 1868 (Pistorius 2015:32-33).

The name of Secunda means 'second', which originated from the Latin language, and was so-called due to the fact that it was the second extraction refinery making oil from coal. This opening was a result of the oil crisis in the years 1973 to 1974. The location of Secunda was determined not only by the coal fields but also by the volume of water that was available to Sasol from the Grootdraai Dam. The first section of the town was established on the 28 June 1976 (Showme 2009:1).

Two acts of sabotage by the Umkhonto we Sizwe (MK) to weaken the apartheid government were undertaken against the Sasol oil from coal plants in Secunda on 28 November 1985. These attacks failed to successfully hit their target (SA History Online 2011:1).

7. RESULTS OF SITE INSPECTION

Substation site B:

The site of Site B is situated south east of the Sasol Refinery and on an area that is currently utilised for the cultivation of maize. Small areas between the maize fields are less impacted on but are also disturbed by tractors, etc., which access the fields through these areas. The site is highly disturbed and no heritage sites were observed during the site inspection (see **Figure 3** below).

Substation site C

Site C is located further south of the Sasol Refinery in an area that is used for the grazing of livestock. This is evidenced by the existence of several water and food troughs in the proposed substation site.

Several graves were found in the south-west corner of the proposed substation site. These graves are well over 60 years old with the oldest death occurring in 1890 and the most recent in 1939. There is also a pile of rocks close to the graves without a headstone that could be a grave. The graves are situated at: S26°37'13.98", E29°09'43.64".



Figure 3: Substation site B

The graves are protected by section 36 (3) (a) (b) of the NHRA that states that: no person may, without a permit issued by SAHRA or a provincial heritage resources authority—

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



Figure 4: Graves at substation site C

Approximately 320 m east of the above-mentioned graves, the remains of a house were found. These remains fall within the footprint of proposed substation site C. The walls of the house are still in place but the roof, windows, doors, etc, have been removed as can be seen in Figure 6 below. The structure is situated at: S26°37'12.89", E29°09'56.09".

Close to the house are the remains of several buildings (S26°37'11.45", E29°09'52.78") and an area walled off with stone walling that has fallen into disrepair (S26°37'09.73", E29°09'55.73").



Figure 5: Remains of house



Figure 6: Remains of other structures



Figure 7: Remains of stone wall

The graves, remains of the house and other buildings will also be crossed by the power lines between substation site B and the existing Kriel-Tutuka and Kriel-Zeus power lines. The impact of power lines on these heritage resources is less severe than that of the substation site as the lines can either pass over the sites without impacting on them or the placement of the pylons can be altered / shifted to avoid the sites. However, during the construction phase these sites can be damaged by construction activities and will need to be secured by the imposition of a buffer around them to avoid damage.

The buildings, together with the, graves indicate a farm unit that has fallen into disrepair. All of the structures appear to be over 60 years old indicating that the structures are protected by section 34 (1) of the NHRA that states that no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. It is recommended that if site C is selected as the substation site, then the position of the substation should be moved well away from the graves and the structures as described.

Power line routes to Kriel Tutuka and Kriel Zeus

The northern corridor consists of 3 power lines. Two lines loop into the existing Kriel Tutuka power line and one line loops into the existing Kriel-Zeus power line. Due to undermining along the route, one line runs south of the northern corridor and connects to the existing Kriel-Zeus power line.

Routes between substation B and substation C

From substation site B, two of the power line routes (depicted in blue and yellow on **Figure 2** above) cross over the remains of a structure situated at: S26°36'47.25", E29°10'44.91". The remains appear to be that of a house. However, there are no other buildings in the vicinity. It appears to be older than 60 years and is therefore protected by section 34 (1) of the NHRA. It is not highly significant due to its lack of context and state of disrepair but it is recommended no pylons are situated on the structure.

Routes from substation site B and C to Kriel-Tutuka and Kriel-Zeus

As the northern corridor lines exit substation site C, they cross several clusters of structures that house farm workers. The groups of structures are situated at: S26°37'07.74", E29°09'34.97" and S26°37'03.67", E29°09'35.64". The structures are made from brick and corrugated iron and most are in a state of disrepair. No graves were found during the site inspection but it is possible that there are unmarked graves that were missed during the inspection. It is recommended that before construction, the specialist walk down of the power lines is used confirm whether there are graves associated with these structures or not.



Figure 8: Structures housing farm workers

After the R546 road, the northern corridors crosses property owned by Mr. L. Botha. There are two houses and some outbuildings as well as an iron ore mine and two graveyards. The iron ore mine and one graveyard are currently north of the proposed power lines. However, if the power lines are moved northwards to avoid the houses, then these two sites may be impacted especially the graveyard which is situated at: S26°36'59.73", E29°08'56.66". Those graves with headstones indicate that the graves are over 60 years of age with the individuals dying in 1910 and in 1933.



Figure 9: Graves over 60 years of age

The graveyard where farm workers are buried falls under the power lines in the northern corridor. The graveyard is situated at: S26°37'07.34", E29°08'31.28". A number of the graves are older than 60 years therefore the site is protected in terms of sub-sections (1) and (3) (a) (b) of section 36 of the NHRA. There are formal graves and mounds of stone that could indicate the site of a grave. The placement of pylons must be done in a way that they avoid the graves and a buffer is placed around the graves to avoid damage during the construction of the power lines.



Figure 10: Graveyard of farm workers

Further to the west on the property of Rhino Lodge, three graves were located at: S26°37'06.15", E29°07'04.08". All the graves are older than 60 years and are therefore protected by section 36 (3) (a) (b). The graves are not fenced and are unkept with broken headstones and graves that

are subsiding. The graves are situated below the northern corridor. A buffer must be placed around them to protect them from construction activities.



Figure 11: Graves on Rhino Lodge property

Further west along the northern corridor, a graveyard fenced with a dry stone wall was found at: $S26^{\circ}37'20.06''$, $E29^{\circ}06'43.84''$. The graveyard contains a single grave with a headstone that had no inscription on it. The low stone wall is collapsing and in a state of disrepair. Although there is no date, the grave should not be disturbed as graves are important heritage resources and the disturbance of graves is not only illegal but a sensitive issue. The graveyard is situated about 15 m north of the southernmost power line and will fall within the servitude of this power line. A buffer must be placed around the graveyard to protect it from construction activities.



Figure 12: Graveyard with single grave

The grave may be linked to the remains of structures that are situated about 500 m north-west of the grave. The remains of a residence and outbuildings is still fenced and it appears to have been farm dwellings that are no longer used. A dam is situated within the complex and a number of water reservoirs. A boma or kraal used for game capture is situated on the fence line with the adjoining property close to the structures. No graves were noted during the site inspection but the site could not be accessed hence there is a possibility that graves may have been missed during the inspection. It is recommended that during the specialist walkdown of the power lines, the existence or not of graves be confirmed.

The date of the buildings could not be established hence the precautionary principle is applied with the assumption that some of the buildings are older than 60 years and are therefore protected by section 34 (1) of the NHRA. As can be seen in **Figure 13** below, the structures are situated at the point where the lines in the northern corridor turn to the north west and south west. The concern is that the bend towers will impact directly onto these buildings and it is recommended that the point where the lines turn is moved 40 m west to avoid placing the bend towers near the structures.



Figure 13: Google Earth close-up of affected structures



Figure 14: Remains of structure with animal kraal on left

A heap of rubble was found to the south of the enclosed area discussed above. It appears to be broken down plastered wall/s. It is unclear what it was used for and is of no significance. It is situated at: S26°37'22.36", E29°06'30.93".



Figure 15: Pile of rubble with existing power lines in background

Routes from substation sites B and C to Sasol 2 and Sasol 3

Where the alignment of the Sites B and C to Sasol 3 Line 1 route crosses the Sasol wildlife area, the proposed line is situated within 50 m of an abandoned structure at S26°35'52.70", E29°11'29.62". The Sasol representative who accompanied the specialist did not know what the structure had been used for. It is below 60 years of age and is of no heritage value.



Figure 16: Abandoned house Sasol wildlife area



Figure 17: Wetland areas with Refinery in background

The power lines cross busy areas around the Sasol Refinery in terms of existing structures including existing power lines and conveyor belts. About 500 m before the power lines enter the Sasol Refinery they cross large wetland areas (see **Figure 17** above). Close to these wetlands, both sets of power lines (Sasol 2 and Sasol 3) are aligned close to the foundations of many structures that were, reportedly, the accommodation for the people who built the Sasol Refinery in the 1980s. Although not protected by the NHRA, it is recommended that the areas are avoided where possible as they are a reminder of the development of the Refinery. Some of the foundations will fall within the servitude of the power lines and will be damaged unavoidably by the construction process, but those that fall outside / away from the servitude should be avoided.

Power lines to the OCGT

The proposed two 132kV lines that will join the Open Cycle Gas Turbine (OCGT) in the Sasol Refinery with the existing Sasol 3 substation do not impact on any heritage resources. They cross an area that is highly impacted by existing infrastructure including roads, existing power lines, etc. (see **Figures 18 and 19** below).



Figure 18: Foundations of structures



Figure 19: Remains of structure



Figure 20: View of existing power lines and OCGT in background

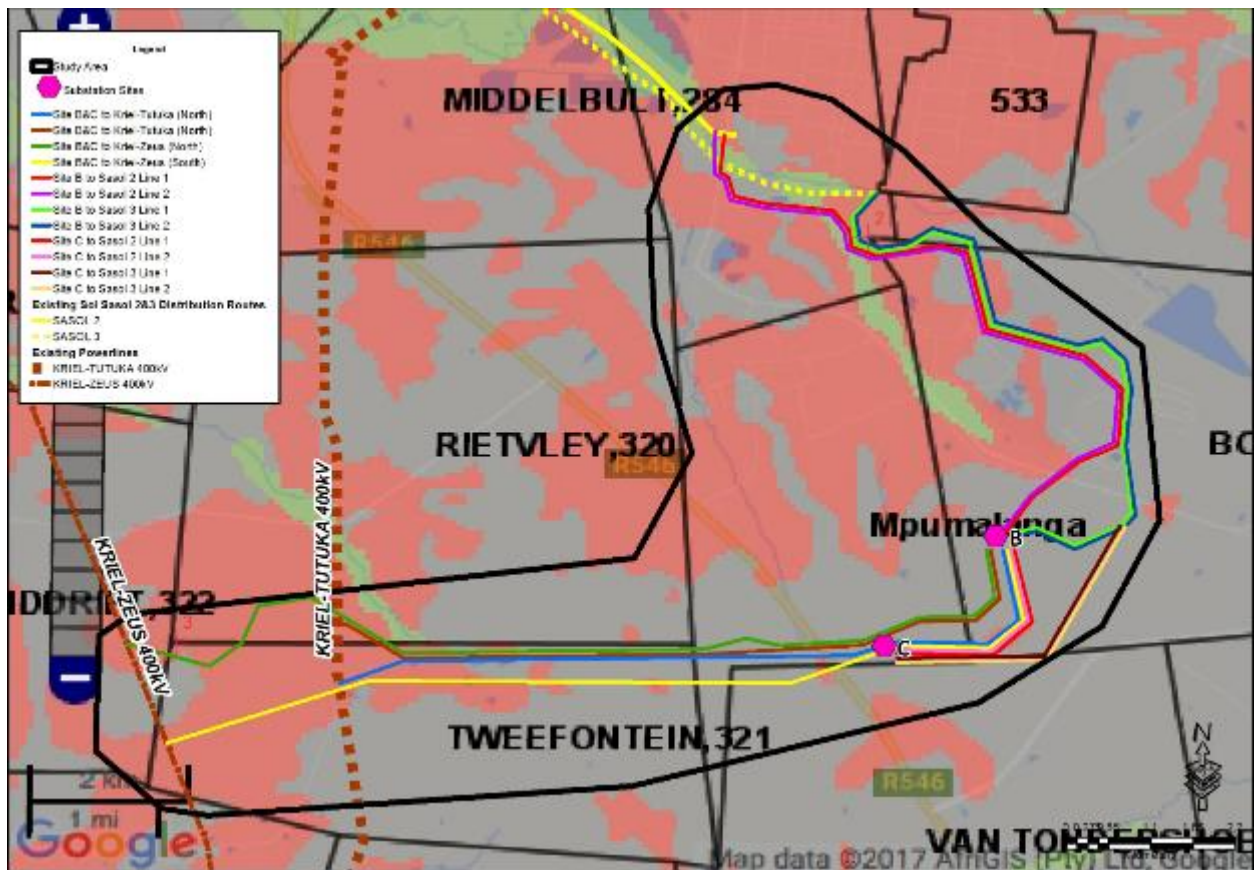


Figure 21: View of area around OCGT

Decommissioning of power lines

The decommissioning of the existing 132kV power lines between the existing Sol substation and Sasol 2 substation at the point where the new lines from the Mulalo substation will connect with the existing lines will have no impact on heritage resources as the area is already highly disturbed hence the possibility of finding intact and significant heritage sites is very low.

The South African Heritage Resources Agency's Fossil Sensitivity Map indicates that the project area is situated in an area that is mainly described as having insignificant palaeontological / fossil sensitivity (indicated in grey in the map below) interspersed with some areas of very high fossil sensitivity (indicated in red on **Figure 22** below).



Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 22: Fossil sensitivity of study area

The areas of high sensitivity in the area close to the Sasol Refinery are, ironically, situated in areas of high disturbance created by the Sasol Refinery and associated activities. The possibility of find intact fossils along the route of the power lines between the substation sites and the existing Sasol 2 and Sasol 3 power lines is expected to be very low.

The second area of very high fossil sensitivity is the last section (< 3 km) of all the proposed power lines looping into the existing Kriel-Tutuka and Kriel-Zeus power lines. It is recommended that a palaeontologist is appointed as part of the specialist walk down team and that he or she inspect the approximate 3km referred to above to see if fossils will be impacted by the construction of the power lines.

8. ASSESSMENT OF IMPACTS

Impacts identified were:

- Destruction / removal of graves older than 60 years
- Damage or destruction of structures older than 60 years
- Destruction of highly sensitive fossils

The assessment of significance of these impacts is undertaken below according to the assessment methodology provided by the environmental assessment practitioner:

Table 1: Assessment of substation site B impacts

Environmental Feature	Cultural heritage, fossils, archaeological sites, etc
Relevant Alternatives & Activities	SUBSTATION SITE B
Potential Impact	Proposed Management Objectives / Mitigation Measures
Destruction or damage to heritage sites including structures older than 60 years including graves	<p>1. During construction, if any heritage resources are found (chance finds) the following protocol must be followed:</p> <p>a All work must stop in the vicinity of the find</p> <p>b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage</p> <p>c The Mpumalanga Provincial Heritage Resources Authority (MPHRA) must be informed and a registered heritage specialist must be appointed to undertake an assessment of the find.</p> <p>d Depending of what is found and the significance thereof, the specialist will advise on the way forward.</p> <p>e If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from the MPHRA/SAHRA.</p> <p>f Only once the specialist gives the go-ahead can work commence in the area</p> <p>g Under no circumstance can heritage material be destroyed or removed from the site</p> <p>h Should any remains be found that could potentially be human remains then the SAPS must be contacted.</p> <p>i If there are chance finds of fossils, a palaeontologist must be called to the site in order to assess the fossils and rescue them if necessary (with a MPHRA/SAHRA permit). The fossils must then be housed in a suitable, recognized institution.</p>

	+/- Impact	Reversibility	Cumulative impact	Extent	Magnitude	Duration	Probability	Significance
Before mitigation	-	No	Negligible	Site (1)	Moderate (3)	Permanent (5)	Low (2)	18 (low-medium)
After mitigation	-	No		Site (1)	Low (2)	Permanent (5)	Improbable (1)	8 (low)

Table 2: Assessment of substation site C impacts

Environmental Feature	Cultural heritage, fossils, archaeological sites, etc	
Relevant Alternatives & Activities	SUBSTATION SITE C	
Potential Impact	Proposed Management Objectives / Mitigation Measures	
<p>Destruction or damage to heritage sites including graves, buildings older than 60 years, etc.</p> <ul style="list-style-type: none"> • Damage / destruction / removal of graves and remains of structures within the footprint of site C 	<p>1. During construction, if any heritage resources are found (chance finds) the following protocol must be followed:</p> <ul style="list-style-type: none"> a All work must stop in the vicinity of the find b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage. c The MPHRA must be informed & a registered heritage specialist must be appointed to undertake an assessment of the find. d Depending of what is found and the significance thereof, the specialist will advise on the way forward e If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from the MPHRA / SAHRA f Only once the specialist gives the go-ahead can work commence in the area g Under no circumstance can heritage material be destroyed or removed from the site h Should any remains be found that could potentially be human remains then the SAPS must be contacted i If there are chance finds of fossils, a palaeontologist must be called to site in order to assess the fossils and rescue them if necessary (with the suitable MPHRA/SAHRA permit). The fossils must then be housed in a suitable, recognised institution. 	
	<p>2. If Site C is selected as the substation site, then the proposed site must be moved at least 300 m north of the current site to avoid impacting on the graves and structures</p> <p>3. The graves and structures must have a 20 m buffer around them to avoid any impacts by the construction of the substation</p> <p>4. The buffer area must be barricaded off with highly visible danger tape or other method so that the buffer area is clearly visible to all construction personnel</p> <p>5. Permanent fencing around the graves must be considered by the Applicant in order that both construction and operational activities such as maintenance and repair of the substation do not impact on the identified heritage resources</p> <p>6. <u>If the location of the substation cannot be moved</u>, then the process to have the graves moved must be undertaken. A Phase 2 HIA will need to be undertaken to identify all the graves that will need to be moved. <u>The exhumation and removal of graves is not recommended.</u> Appendix 1 provides a brief outline of the process to be undertaken if the graves are to be moved. Any additional requirements from the MPHRA must be adhered to.</p> <p>7. An application to have the structures destroyed must be made to the MPHRA / SAHRA.</p>	

IF LOCATION OF SITE C	+/-	Reversibility	Cumulative	Extent	Magnitude	Duration	Probability	Significance
	Impact		impact					

CANNOT BE MOVED								
Before mitigation	-	No	Marginal	Local (2)	High (4)	Permanent (5)	Very High (5)	55 (medium - high)
After mitigation	-	No		Local (2)	Moderate (3)	Permanent (5)	High (4)	40 (medium)
IF LOCATION OF SITE C CAN BE MOVED								
Before mitigation			Negligible	Local (2)	Moderate (3)	Permanent (5)	Medium (3)	30 (low-medium)
After mitigation				Local (2)	Moderate (3)	Permanent (5)	Low (2)	20 (low – medium)

Table 3: Assessment of Kriel-Tutuka and Kriel-Zeus power lines

Environmental Feature	Cultural heritage, fossils, archaeological sites, etc
Relevant Alternatives & Activities	KRIEL-TUTUKA AND KRIEL-ZEUS POWER LINES
Potential Impact	Proposed Management Objectives / Mitigation Measures
<p>Destruction or damage to heritage sites including graves, buildings older than 60 years, etc.</p> <ul style="list-style-type: none"> • Damage/destruction/ removal of graves and remains of structures along the route of the northern options and southern option as well as between substation sites B and C 	<p>1. During construction, if any heritage resources are found (chance finds) the following protocol must be followed:</p> <ul style="list-style-type: none"> a All work must stop in the vicinity of the find b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage. c The MPHRA must be informed & a registered heritage specialist must be appointed to undertake an assessment of the find. d Depending of what is found and the significance thereof, the specialist will advise on the way forward e If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from the MPHRA / SAHRA f Only once the specialist gives the go-ahead can work commence in the area g Under no circumstance can heritage material be destroyed or removed from the site h Should any remains be found that could potentially be human remains then the SAPS must be contacted. <p>2. It is recommended that all heritage sites (old structures, remains of old structures and graves) identified along the power lines are not destroyed, damaged with the adjustment of the pylon positions to avoid impacting directly on the identified sites</p> <p>3. The graves and structures must have a 20 m buffer around them to avoid any impacts by the construction of the power lines</p> <p>4. The buffer area must be barricaded off with highly visible danger tape or other method so that the buffer area is clearly visible to all construction personnel</p>

<ul style="list-style-type: none"> Potential damage/destruction to fossils situated along the last 2-3 km before the lines loop into the existing power lines 	<ol style="list-style-type: none"> Permanent fencing around the unfenced graves should be considered by the Applicant in order that both construction and operational activities such as maintenance and repair of the power lines does not impact on the graves and structures. A palaeontologist is joins the specialist walk down team to investigate the section of power line routes that crosses the area of fossil sensitivity towards the end of the routes. If there are chance finds of fossils during construction, a palaeontologist must be called to site in order to assess the fossils and rescue them if necessary (with the suitable MPHRA/SAHRA permit). The fossils must then be housed in a suitable, recognised institution
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	+/- Impact	Reversibility	Cumulative impact	Extent	Magnitude	Duration	Probability	Significance
Before mitigation	-	No	Marginal	Local (2)	High (4)	Permanent (5)	Medium (3)	3 (medium)
After mitigation	-	No		Local (2)	Moderate (3)	Permanent (5)	Low (2)	20 (low - medium)

Table 4: Assessment of Sasol 2 and Sasol 3 power lines

Environmental Feature	Cultural heritage, fossils, archaeological sites, etc
Relevant Alternatives & Activities	SASOL 2 AND SASOL 3 POWER LINE ROUTES
Potential Impact	Proposed Management Objectives / Mitigation Measures
<p>Destruction or damage to heritage sites including graves, buildings older than 60 years, etc.</p> <p>• Damage/destruction of foundations situated close to power line routes</p>	<p>1. During construction, if any heritage resources are found (chance finds) the following protocol must be followed:</p> <ul style="list-style-type: none"> a All work must stop in the vicinity of the find b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage. c The MPHRA must be informed & a registered heritage specialist must be appointed to undertake an assessment of the find. d Depending of what is found and the significance thereof, the specialist will advise on the way forward e If the resource needs to be removed/alterd/destroyed then the necessary permit/s must be obtained from the MPHRA / SAHRA f Only once the specialist gives the go-ahead can work commence in the area g Under no circumstance can heritage material be destroyed or removed from the site h Should any remains be found that could potentially be human remains then the SAPS must be contacted i If there are chance finds of fossils, a palaeontologist must be called to site in order to assess the fossils and rescue them if necessary (with the suitable MPHRA/SAHRA permit). The fossils must then be housed in a suitable, recognised institution. <p>2. It is recommended that the remains of the accommodation for the workers who built the Sasol refinery are avoided where possible. Some of the foundations will fall within the servitude of the power lines and damage to these is unavoidable. However, those situated outside / beyond the servitude should be avoided.</p>

	+/- Impact	Reversibility	Cumulative impact	Extent	Magnitude	Duration	Probability	Significance
Before mitigation	-	No	Marginal	Local (2)	Low (2)	Permanent (5)	High (4)	36 (medium)
After mitigation	-	No		Local (2)	Low (2)	Permanent (5)	Medium (3)	27 (low - medium)

Table 5: Power lines to OCGT

Environmental Feature	Cultural heritage, fossils, archaeological sites, etc
Relevant Alternatives & Activities	132KV POWER LINES TO OCGT
Potential Impact	Proposed Management Objectives / Mitigation Measures
Destruction or damage to heritage sites including graves, buildings older than 60 years, fossils, etc.	<p>1. During construction, if any heritage resources are found (chance finds) the following protocol must be followed:</p> <ul style="list-style-type: none"> a All work must stop in the vicinity of the find b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage. c The MPHRA must be informed & a registered heritage specialist must be appointed to undertake an assessment of the find. d Depending of what is found and the significance thereof, the specialist will advise on the way forward e If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from the MPHRA / SAHRA f Only once the specialist gives the go-ahead can work commence in the area g Under no circumstance can heritage material be destroyed or removed from the site h Should any remains be found that could potentially be human remains then the SAPS must be contacted i If there are chance finds of fossils, a palaeontologist must be called to site in order to assess the fossils and rescue them if necessary (with the suitable MPHRA/SAHRA permit). The fossils must then be housed in a suitable, recognised institution.

	+/- Impact	Reversibility	Cumulative impact	Extent	Magnitude	Duration	Probability	Significance
Before mitigation	-	No	Negligible	Site (1)	Minor (1)	Permanent (5)	Low (2)	14 (low)
After mitigation	-	No		Site (1)	Minor (1)	Permanent (5)	Improbable (1)	7 (low)

The assessment indicated that with the implementation of mitigation measures, most impacts could be reduced to a low-medium rating. These impacts have a limited effect and mitigation measures are both feasible and easily achieved. The impact that remains higher than the other impacts is the removal of the graves if the location of substation site C cannot be altered to avoid the graves found within its current footprint.

9. RECOMMENDATIONS AND CONCLUSION

From a heritage perspective, **substation site B** is the preferred site as it is highly disturbed by maize cultivation and no heritage sites were found on site. Substation site C is located on graves and structures that are over 60 years which means that they are protected by the NHRA and are of heritage significance.

The following is recommended:

- If substation site C is selected as the substation site, it is recommended that location of the site is moved at least 300 m to the north to avoid the graves and structures that are currently situated in the footprint of the substation.
- If the site location cannot be moved, then the graves will have to be exhumed and relocated according to the process provided in Appendix 1 of this report and that of the MPHRA.
- If the location of substation site C cannot be moved, application will have to be made to the MPHRA for permission to destroy the structures found within the substation footprint.
- A buffer of 20 m must be placed around all protected structures and graves situated below or in the servitude of the proposed power lines. The material used for the buffer must be highly visible to construction personnel.
- The bend points close to complex of structures situated under the northern corridor of power lines going to the existing Kriel-Tutuka and Kriel-Zeus power lines should be moved 40 m west to avoid placing bend towers near or on the structures.
- A walk down by a heritage specialist is recommended once the substation site and final power line routes are selected and approved. A palaeontologist is included in the walk down to inspect the very high fossil sensitivity area crossed by the power line routes to the existing Kriel-Tutuka and Kriel-Zeus power lines.

Based on the findings of the HIA, the project can proceed with the provision that the recommendations provided above and throughout the report are implemented and that the mitigation measures provided in Tables 1 to 4 are adhered to where necessary.

10. REFERENCES

Pistorius, J.J. 2015. *A Phase 1 heritage impact assessment (HIA) for the proposed Lake Umuzi South Bank extension in Secunda in the Mpumalanga Province*. Unpublished report.

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