WESTRAND STRENGTHENING PROJECT, SPANNING RANDFONTEIN, KRUGERSDORP & WESTONARIA, WESTRAND DISTRICT MUNICIPALITY, GAUTENG PROVINCE.

Phase 1 – Heritage Impact Assessment

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Declaration of Independence

- I, Ilan Smeyatsky, declare that –
- General declaration:
- I act as the independent heritage practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
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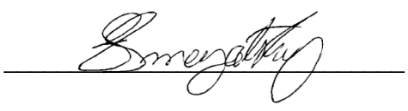
SIGNATURE: 

ACKNOWLEDGEMENT OF RECEIPT

Report Title	***WESTRAND STRENGTHENING PROJECT, SPANNING RANDFONTEIN, KRUGERSDORP & WESTONARIA, WESTRAND DISTRICT MUNICIPALITY, GAUTENG PROVINCE.***		
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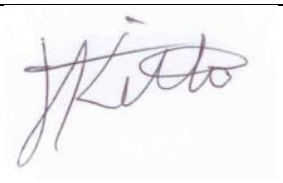
Co-Author	**Jennifer Kitto**		**Heritage Specialist/ PGS Heritage**
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The Heritage Impact Assessment Report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA): Appendix 6 of the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended) requirements for specialist reports as indicated in the table below.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**Relevant section in report**
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii of Report – Contact details and company
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.2 – refer to **Appendix D**
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
(cA) An indication of the quality and age of base data used for the specialist report	
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 3
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.5
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	**Appendix B**
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 5.3
(g) An identification of any areas to be avoided, including buffers	Section 6
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5.3
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3

(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 3.5
(k) Any mitigation measures for inclusion in the EMPr	Section 6
(l) Any conditions for inclusion in the environmental authorisation	Section 6
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 6
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 6
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process was handled as part of the EIA and EMP process.
(p) A summary and copies if any comments that were received during any consultation process	Not applicable. To date not comments regarding heritage resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	No protocols or minimum standards for HIAs or PIAs promulgated through a governmental notice.

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Resolute Environmental Solutions (Pty) Ltd (Resolute) to undertake a Heritage Impact Assessment (HIA) for the new 400-kV Transmission line from the Pluto Substation to the Westgate Substation and for the loop inns/outs connecting the Hera-Westgate 400-kV line. West Rand District Municipality, Gauteng.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. This report focusses specifically on the preferred alternatives Corridor 3 and Corridor 1.

Archaeology

The data analysis has enabled the identification of possible heritage sensitive areas that included:

- Dwellings;
- Clusters of dwellings (homesteads and farmsteads);
- Structures; and
- Graves and burial grounds.

Note that these structures refer to possible heritage sites as listed in **Table 1**.

Table 1 - Tangible Heritage site in the study area

Name	Description	Legislative protection
Dwellings and dwelling clusters	Possibly older than 60 years	NHRA Sect 3 and 34
Historical Structures	Possibly older than 60 years	NHRA Sect 3 and 34
Graves and Burial Grounds	Graves	NHRA Sect 3 and 36

Previous studies conducted in the greater area have shown that the archaeological includes Stone Age and Iron Age sites, as well as historical structures and graves or burial grounds. During this study, 23 heritage sites were identified. These include 12 burial grounds, (of which four are municipal cemeteries (**WTR002, WTR003, WTR004, WTR008, WTR009, WTR013, WTR014, WTR016, WTR020, WTR021, WTR022, WTR023**) and 11 historical structures or dwellings (**WTR001, WTR005, WTR006, WTR007, WTR010, WTR011, WTR012, WTR015, WTR017, WTR018, WTR019**). Refer to **Figure 98** for the locality of heritage resources in relation to the proposed development area.

It should be noted that

It must be considered that the heritage significance of the identified sites plays a role in the evaluation of the impact and must influence the magnitude rating of the impact tables. Thus, a heritage resource with a high heritage significance rating will have a higher impact magnitude rating than a resource with a low or no heritage significance rating. Consequently, mitigation measures will be more extensive for a heritage resource with a high heritage significance than for those with a low heritage significance.

The management and mitigation measures as described in Section 6 of this report have been developed to minimise the project impact on heritage resources.

The impact of the proposed project on the burial grounds is rated as having a HIGH negative significance before mitigation and with the implementation of mitigation measures as having a VERY LOW negative significance

Impacts on Historical sites are rated as being as MODERATE negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to VERY LOW negative.

Palaeontology

The proposed Westrand Strengthening Project Phase II, is underlain by the following geological sediments:

- The Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup
- The Black Reef Formation of the Transvaal Supergroup
- The Klipriviersberg Group of the Ventersdorp Supergroup,
- The Turffontein Subgroup, Central Rand Group of the Witwatersrand Supergroup
- Government and Jeppestown Subgroup, Westrand Group of the Witwatersrand Supergroup

Rock formations of high Palaeontological Sensitivity are present in the study area and thus a field-based assessment by a palaeontologist is required in this formations while rock formations with a zero palaeontological sensitivity are unfossiliferous

It is thus recommended that an EIA level palaeontology report will be conducted to assess the value and occurrence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. This consists of a Phase 1 field-based assessment by a professional palaeontologist. The purpose of the EIA Report is to expand on the issues and potential impacts identified during the scoping phase. This is achieved by site visits and research in the site-specific study area as well as a comprehensive assessment of the impacts identified during the scoping phase.

General

In the event that heritage resources are discovered during site clearance, construction activities must stop, and a qualified archaeologist appointed to evaluate and make recommendations on mitigation measures.

The overall impact of the development on heritage resources is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels.

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TERMINOLOGY AND ABBREVIATIONS

Archaeological resources

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; and
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

Early Stone Age

The archaeology of the Stone Age between 700 000 and 3 300 000 years ago.

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

Holocene

The most recent geological time period which commenced 10 000 years ago.

Late Stone Age

The archaeology of the last 30 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Table 2 – List of abbreviations used in this report

Abbreviations/Acronyms	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Earlier Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LCTs	Large Cutting Tools
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

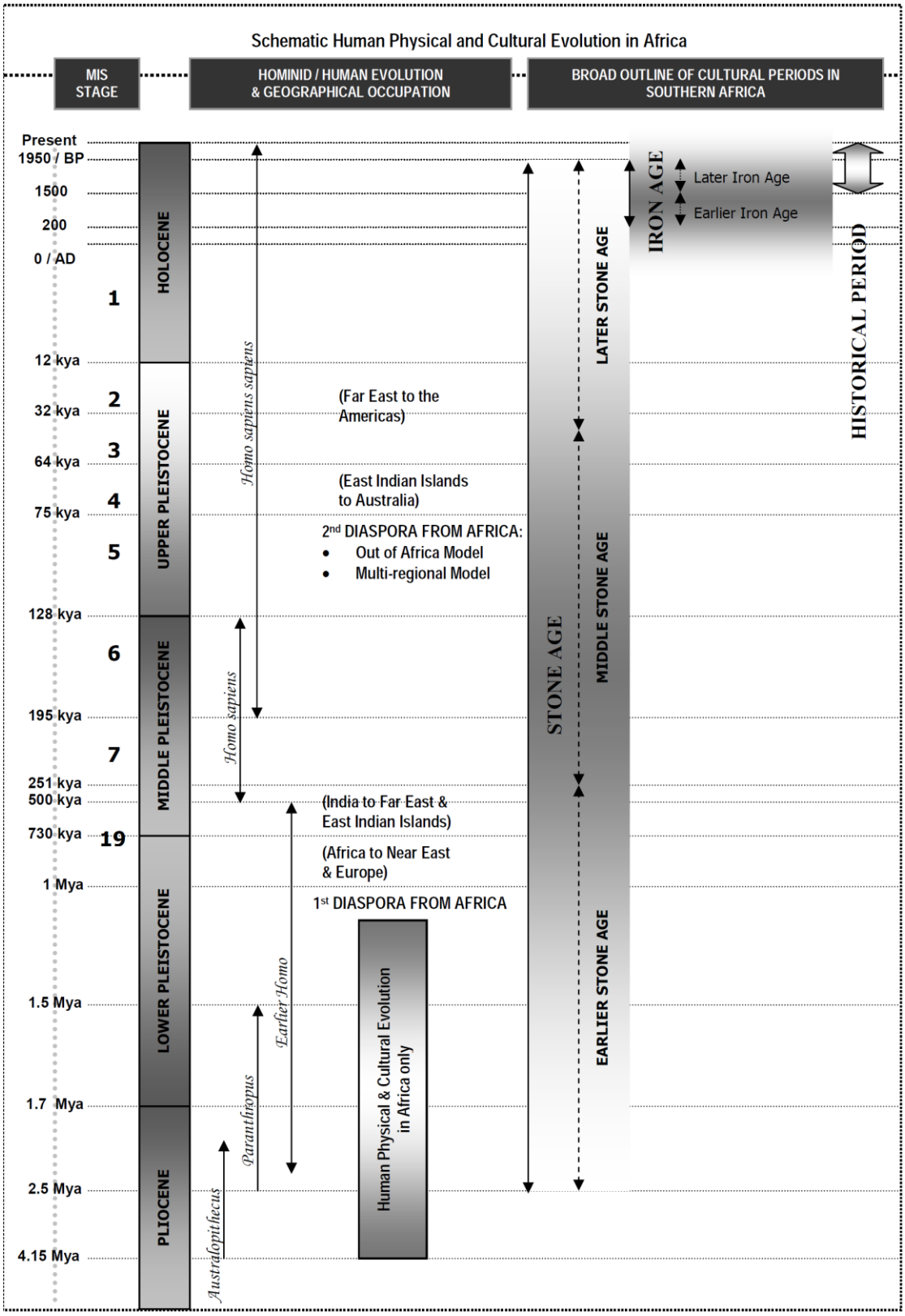


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)

1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Resolute Environmental Solutions (Pty) Ltd (Resolute) to undertake a Heritage Impact Assessment (HIA) for the new 400-kV Transmission line from the Pluto Substation to the Westgate Substation and for the loop inns/outs connecting the Hera-Westgate 400-kV line. West Rand District Municipality, Gauteng.

1.1 Scope of the Study

The aim of the study was to identify possible heritage sites and finds that may occur in the proposed study area. The HIA aims to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

This HIA Report was compiled by PGS.

The staff at PGS has a combined experience of nearly 70 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Mr. Ilan Smeyatsky, author of this report, graduated with his Master's degree (MSc) in Archaeology; is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA) and is accredited as a Field Supervisor.

Miss. Jennifer Kitto, co-author of this report and Heritage Specialist, has 18 years' experience in the heritage sector, a large part of which involved working for a government department responsible for administering the National Heritage Resources Act, No 25 of 1999. She is therefore well-versed in the legislative requirements of heritage management. She holds a BA in Archaeology and Social Anthropology and a BA (Hons) in Social Anthropology.

Mr. Wouter Fourie, the Project Coordinator, is registered with the ASAPA as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA), Act 107 of 1998
- National Heritage Resources Act (NHRA), Act 25 of 1999
- Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- National Environmental Management Act (NEMA) Act 107 of 1998 – Regulation 326 (7 April 2017)
    - Basic Environmental Assessment (BEA) – Appendix 1 s(2)(d)
    - Environmental Scoping Report (ESR) – Appendix 1 s (3)(h)(iv) and Appendix 2 s(2)(g)(iv)
    - Environmental Impact Assessment (EIA) – Appendix 3 s (3)(h)(iv)/
- National Heritage Resources Act (NHRA) Act 25 of 1999
    - Protection of Heritage Resources – Sections 34 to 36; and
    - Heritage Resources Management – Section 38
- Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
    - Section 39(3)

The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA. This study falls under s38(8) and requires comment from the relevant heritage resources authority.

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Locality

The study area is located in Gauteng, between Kagiso and Carletonvilleand is situated approximately 20 kilometres south of Krugersdorp and 17 kilometres north of Carletonville. It falls within the West Rand District Municipality (**Figure 2 to Figure 5**).

The proposed West Rand Strengthening phase 2 entails three phases. however phase one (1) is excluded from the project, as the activities within phase one will be undertaken within Eskom properties. This HIA document is therefore for the new 400-kV Transmission line from the Pluto Substation to the Westgate Substation and for the loop inns/outs connecting the Hera-Westgate 400-kV line.

The project covers the Phase 2 scope of work which includes the establishment of the Pluto – Westgate 400kV power-line. The Pluto substation is an existing substation located approximately 17 km north of Carletonville Township. The Westgate substation is also an existing substation, which is located on the western outskirt of the Kagiso Township. Corridor 3 is the preferred corridor option.

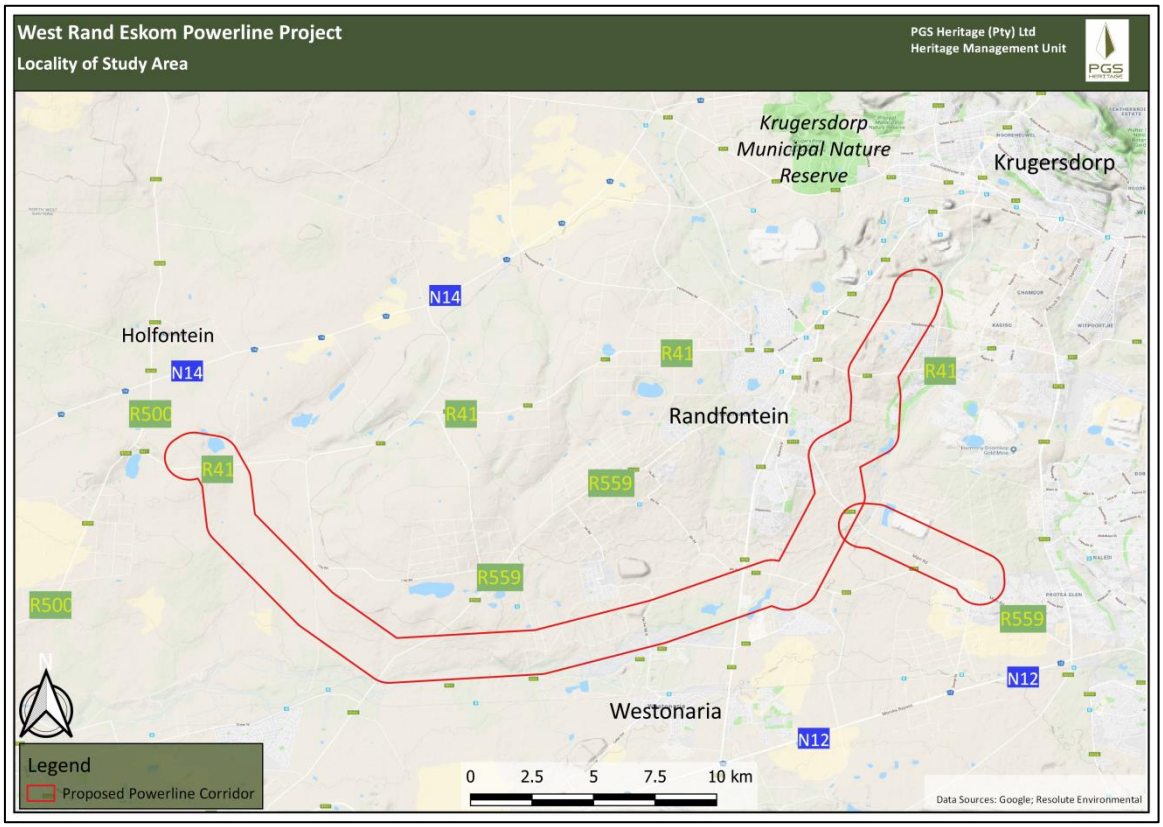


Figure 2 – Locality of study area

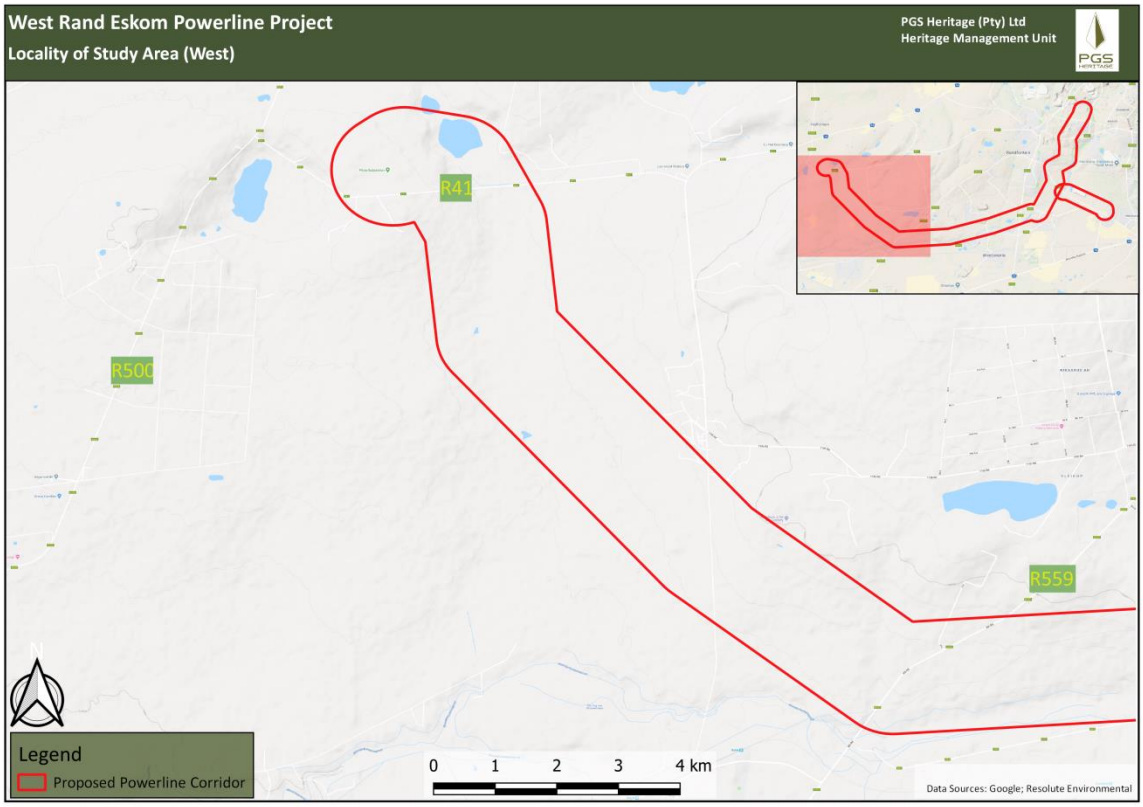


Figure 3 - Locality of Western portion of Corridor 3

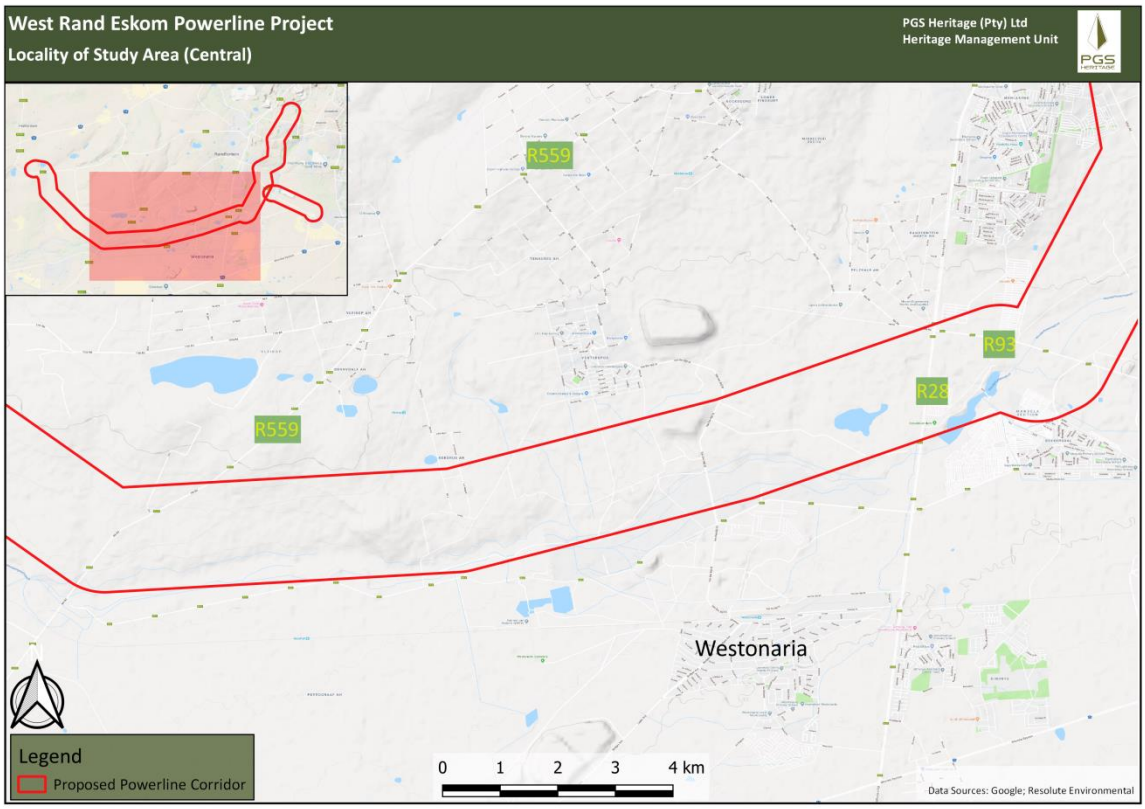


Figure 4 - Location of Central portion of Corridor 3

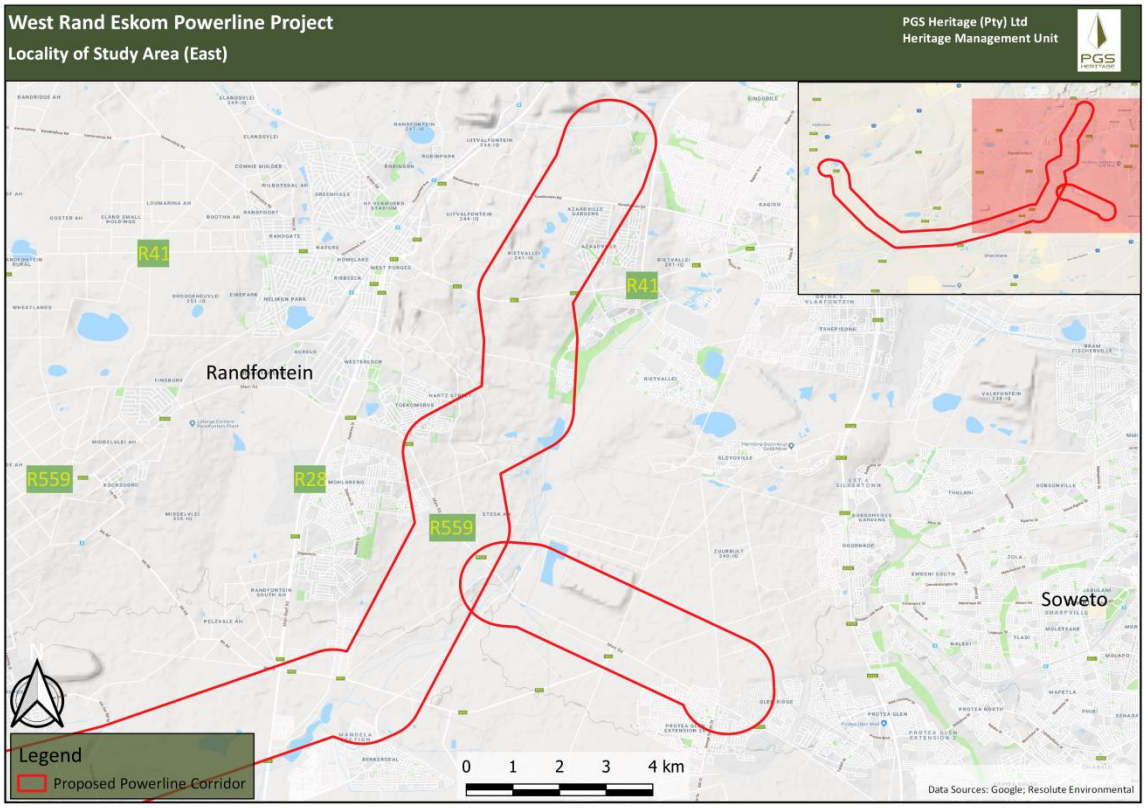


Figure 5 – Locality of Eastern portion of Corridor 3 & Taunus loop Corridor 1

2.2 Technical Project Description

The following brief project description for the project has been supplied by Resolute Environmental Solutions (Pty) Ltd (Resolute 2018):

Eskom wishes to develop a new 400-kV power injection to support the network at Westgate by establishing the Phase 2: Pluto – Westgate 400-kV power-line. At the same time Eskom wishes to strengthen the grid in this area by Looping in the Hera – Westgate 400-kV line into Taunus MTS and upgrading/installing 400/275-kV 800-MVA transformer at Taunus, which is Phase 3. as per the request by Client.

Pluto – Westgate Corridor 3 (the preferred alternative)

- Corridor 3 is the southern corridor that is approximately 45 km long. The first 13 km of the corridor traverses southerly out of Pluto substation. The corridor traverses over agricultural lands and it is parallel to other transmission powerlines for the entire 13 km.
- There is also a vacant servitude along this section of the corridor, however the vacant servitude is on the western side the existing powerlines, while the proposed corridor is on the eastern side of the existing power-lines.
- The middle section of corridor 3 is approximately 25 km long. Along this section, the corridor traverses through grazing areas. There are traces of wetlands and rivers that do not pose major challenges. However, there is a potential flooding risk during the rainy seasons of the section running parallel to the Wonderfontuinspruit for about 16 km. The

current alignment is approximately 400 m away from the river and there is sufficient space to allow for a safe separation distance.

- Westonaria Town, Bekkersdal and Mohlakeng Townships are in close proximity to corridor 3, however these areas seem not to be expanding towards the proposed corridor.
- The last 7 km of Corridor 3 is parallel to the Hera – Westgate 400kV power-line.

Phase 3 scope of work entails the establishment of a loop in and out of the Hera – Westgate 400kV power-line into Taunus substation. Hera substation is an existing substation located approximately 18km north-east of Fochville town, Westgate substation is an existing substation that is located on the western outskirt of Kagiso as explained above and Taunus substation is also an existing substation that is located within the Protea Glen area in Soweto. The Hera – Westgate 400kV power-line is currently a capital project within Transmission and it is at the land acquisition stage. As design of the Hera – Westgate 400kV resumes, it will need to be noted that the line will loop in and out into Taunus substation and therefore be designed accordingly around the looping sections.

Phase 3: Taunus Loop In And Out Corridors

- One corridor is the preferred option for the Hera – Westgate Loop In and out of Taunus substation.
- This corridor is approximately 6 km long and is aligned between the R559 road and the mining area, which is also used for grazing.

3 CURRENT STATUS QUO

3.1 Site Description

Corridor 3 is approximately 45 km long. The first 13 km of the corridor traverses southerly out of Pluto substation. The corridor traverses over agricultural lands and it is parallel to other transmission powerlines for the entire 13 km. There is also a vacant servitude along this section of the corridor, however the vacant servitude is on the western side the existing powerlines, while the proposed corridor is on the eastern side of the existing power-lines.

The middle section of corridor 3 is approximately 25 km long. Along this section, the corridor traverses through grazing areas. There are traces of wetlands and rivers that do not pose major challenges. However, there is a potential flooding risk during the rainy seasons of the section running parallel to the Wonderfontuinspruit for about 16 km. The current alignment is approximately 400 m away from the river and there is sufficient space to allow for a safe separation distance.

Westonaria Town, Bekkersdal and Mohlakeng Townships are in close proximity to corridor 3, however these areas seem not to be expanding towards the proposed corridor.

The last 7 km of Corridor 3 is parallel to the Hera – Westgate 400kV power-line and it is common for both corridor 2 and corridor 3.

It should be noted that since most of the corridor traverses private property, the corridor was accessible only as far as proximity to public roads allowed. Therefore, most of the survey was undertaken by vehicle with identified heritage resources inspected by foot where the heritage resources were located close to the public roads.

Figure 6 – View of harvested maize fields

Figure 7 – blocked road at Elandsfontein

Figure 8 – View along existing railway line

Figure 9 – View of grassland and shrubs

Figure 10 – View of grassland and vlei area

Figure 11 – View of mine tailings dump

3.2 Archival findings

The archival research focused on available information sources that were used to compile a background history of the study area and surrounds. This data then informed the possible heritage resources to be expected during field surveying.

3.2.1 South African Heritage Resources Information System (SAHRIS)

A scan of SAHRIS has revealed the following studies conducted in and around the study area of this report: Due to the large area covered by the route corridor, the previous studies have been separated according to the nearest town.

Randfontein/Krugersdorp area

- BIRKHOLTZ. P. 2003. Cultural Heritage Assessment as part of the Environmental Management Programme Report for the Impafa /Pamodzi Opencast Gold Mine on the farm Middelvlei 255 IQ, Gauteng province, South Africa. **A large number of heritage sites were located in the study area, including four graves/burial grounds, 11 stone structure remains (incl;.stone walls) and 40 historical mine working sites (trenches and excavations with associated stone heaps)**.

- HUFFMAN, TN. 2007. Luipaardsvlei Archaeological Assessment, Randfontein: A Phase 1 report Prepared for Seaton Thompson and Associates by Archaeological Resources Management, University of the Witwatersrand. **No archaeological or historical sites of value were found within the project area. A new cemetery on the south side of Toekomsrus was noted.**

- VAN SCHALKWYK, J. 2008. Heritage Survey Report For The Development Of Water Pipelines For The Droogeheuvel And Middelvlei Townships, Randfontein, Gauteng Province. Prepared for: Synergistics Environmental Services. **Although some sites of cultural significance were noted in the larger region, none were identified in this report.**

- VAN SCHALKWYK, J. 2009. Heritage impact assessment for the Proposed Ridgeview Township Development, Randfontein Local Municipality, Gauteng Province. **No heritage sites were identified**.

- GAIGHER, S. 2014. Heritage Impact Assessment for the Proposed Vogelstruisfontein Sand Mine. Prepared By G&A Heritage Prepared For: Lengeo.. **No sites of heritage importance could be identified**.

Westonaria area

- HUFFMAN TN, HD VAN DER MERWE AND R STEEL. 1994. Archaeological Survey of the East and West Driefontein Mines. Archaeological Resources Management - University of the Witwatersrand, Johannesburg. **Eight sites were found on East Driefontein and eleven on West Driefontein. They ranged from Middle Stone Age through Iron Age to the recent Historic Period**.

- DU PIESANIE, J. 2012. Phase 1 Heritage Impact Assessment of the Proposed Geluksdal Tailings Storage Facility and Pipeline Infrastructure. Gold One International Limited. **A total of eight cultural resources were identified which included five graveyards and three historic built structure sites.**

- VAN SCHALKWYK, J. 2014. Cultural Heritage Assessment for the Libanon 132kv Loop-In Line, Carletonville Region, Westonaria Magisterial District, Gauteng Province. For GIBB Engineering and Architecture. **No sites, features or objects of cultural heritage significance were identified in the development area**.

- DU PIESANIE, J. 2015. Sibanye Gold Limited's West Rand Tailings Retreatment Project - Heritage Scoping Report. Prepared by Digby Wells and Associates (South Africa) (Pty) Ltd for Sibanye Gold Limited. The greater study area included Randfontein, Westonaria and Carletonville. **Nine heritage sites were identified within the study area, including six historical farmsteads and three historical structures. No archaeological sites were identified within the development footprint of the proposed infrastructure for that project.**

- FOURIE, WF AND JA KITTO, 2016. Heritage Impact Assessment: Environmental Impact Assessment Process for the proposed 132 kV Powerlines for the Photovoltaic Energy Facility for Sibanye Gold, West Witwatersrand. Prepared for Aurecon South Africa (Pty) Ltd. **The total number of sites identified was 27. These included: one possible grave site and one definite grave site, fifteen historical residential structures, three historical mine-related structures, one religious site, one isolated prehistoric stone tool, two recent farmsteads and two recent earthwork sites.**

- FOURIE, WF AND JA KITTO. 2016. Heritage Audit: Heritage Management Policy for the Kloof and Driefontein Mining Areas of Sibanye Gold, around Carletonville, West Rand District, Gauteng Province. Prepared for Sibanye Gold. By PGS Heritage (Pty) Ltd. **The Heritage Audit identified 242 resources of heritage significance within that study area. These included archaeological sites (Iron Age stone wall structures and South African War structures), historical structures, graves and burial grounds**.

3.3 Archaeological background

The pre-colonial period is divided broadly into the Stone Age and the Iron Age.

The Stone Age refers to the earliest people of South Africa who relied mainly on stone for their tools and were hunter-gatherers. This period is divided into the Earlier, Middle and Later Stone Age:

- *Earlier Stone Age:* The period from ± 2.5 million yrs. - ± 250 000 yrs. ago. Acheulean stone tools are dominant.
- *Middle Stone Age*: Various stone tool industries in SA dating from ± 250 000 yrs. – 40 000 yrs. before present.
- *Later Stone Age:* The period from ± 40 000 yrs. before present to the period of contact with either Iron Age farmers or European colonists.

The Iron Age as a whole represents the spread of Bantu-speaking people whose way of life was pastoral-agricultural and includes both the Pre-Historic and Historic periods. As indicated by the name, this period is distinguished by the knowledge of extraction and use of various metals, mainly iron. Similarly to the Stone Age, it can also be divided into three periods:

- *The Early Iron Age:* Most of the first millennium AD.
- *The Middle Iron Age*: 10th to 13th centuries AD
- *The Late Iron Age:* 14th century to colonial period.

It is clear from the general archaeological record that the larger Gauteng region has been inhabited by humans since Earlier Stone Age (ESA) times. Early Middle and Later Stone Age sites occur within the immediate vicinity of the Magaliesberg region and the Cradle of Humankind in the greater Krugersdorp/Muldersdrift region.

Although no Stone Age sites are known from the immediate vicinity of the study area, sporadic finds of Early Stone Age material have been recorded to the south-west of the study area around the Waterpan area (pers. comm. – W Fourie). No significant Middle or Later Stone Age sites are known from the immediate vicinity of the study area.

3.3.1 Stone Age Sites

Examples of ESA Oldowan and Acheulian stone tools have been excavated from the sites of Sterkfontein and Coopers D in the 'Cradle of Humankind' and MSA tools have been found at Swartkrans and in the river gravels of the 'Cradle of Humankind' (Hilton-Barber & Berger, 2002). However, the Later Stone Age of the larger Gauteng area has been well researched. Later Stone Age tools have been found in the Magaliesberg area at Jubilee Shelter, James Cave, Silkaatsnek, and Serpent Quarry (Wadley 1987).

3.3.2 Iron Age Sites

The entire Carletonville/Westonaria region, including the Gatsrand range that spans east to west from Orange Farm in the east to Potchefstroom in the west, is scattered with stone-walled complexes associated with the early farming (Late Iron Age) communities. Studies by Fourie (1997) and Vorster (1969, 1983) have shown that the section of the Gatsrand range, specifically between the farms Waterpan and Jachtfontein in the east and the Glenharvie area in the west, was settled by the Bakwena-Bamare-a-Phogole from the 1700s up to the Difaqane.

The basis of the cultural sequence is that of ethnographic research conducted by Vorster and Breutz (1993 and 1954 respectively, as cited in Fourie and vd Walt 2005). The Bakwena-ba Mare-a-Phogole's origins can be traced back to an area close to the current town of Zeerust (Rathateng) where Phogole I, a son of Kwena-a-Malope, lived. From 1470-1500, a large famine drove Phogole I away from the Kwena-a-Malope settlement. Through various movements between the Rustenburg and Free State, the last known major settlement of the Bakwena-ba Mare-a-Phogole was at Kokosi (Losberg) situated in the Fochville area (Fourie and van der Walt 2005).

3.3.3 Historical Background

The first Voortrekker parties began to cross the Vaal River around 1836 (Bergh, 1999). The district of Potchefstroom was also established in 1839 (Bergh, 1999), of which the study area formed part. The period of 1850s – 1860s saw the early establishment of farms by white farmers in the general vicinity of the study area. The archival study has shown that all the farms within the study area were formally inspected by the government of the Zuid-Afrikaansche Republiek during February 1868. This would have resulted in the proclamation of individual farms and the establishment of permanent farmsteads. Features that can typically be associated with early farming history of the area include farm dwellings, sheds, rectangular stone kraals, canals, farm labourer accommodation and cemeteries.

The discovery of gold along the Witwatersrand and the proclamation of public diggings in 1886 on various farms in the area such as Paardekraal, Vogelstruisfontein, Luipaardsvlei, Klipplaat, Heuningklip and Wilgespruit led to the establishment of a stands township on the farm Paardekraal in 1887. On the request of Paardekraal's owner, the town was named after President Paul Kruger. The district town of Krugersdorp was proclaimed in November 1894 (Du Plooy, 2004). The railway from Johannesburg was extended to Krugersdorp in 1891 and the district was surveyed in 1895 (Erasmus 2014).

29 December 1895, a force of approximately 600 raiders led by Dr. L. Starr Jameson and Sir John Willoughby entered the Transvaal from Bechuananland. On 2 January 1896, the raiders were intercepted by ZAR Republican forces at Doornkop, south-west of Krugersdorp and after a brief skirmish, Dr Jameson and his troops surrendered on the farm Vlakfontein west of

Roodepoort, to the Republican forces under the command of Commandants P.A. Cronje, F.J. Potgieter, H.P. Malan And Colonel S.P.E. Trichardt Of The State Artillery (https://www.sahistory.org.za/topic/johannesburg-timeline-1800-1991; Birkholtz 2006). In addition to Dr Jameson, the Raid was closely associated with numerous historical and well-known figures such as Cecil John Rhodes, Sir Percy Fitzpatrick, and President Paul Kruger. The raid seems to have been motivated at least partially as a response to legislation passed by President Kruger between 1890-94 which restricted the franchise rights of foreigners in the Transvaal. It is seen by many historians as one of the key contributing factors in the breakdown of relations between the Zuid-Afrikaansche Republiek and Great Britain, and eventually to the outbreak of the Second South African War of 1899-1902 (Birkholtz 2006).

The Second South African (Anglo-Boer) War

The South African War took place during this time. No evidence for specific battles or skirmishes from within the study area was found during the desktop study, although there is evidence that troops of both the British and the Boer forces were present throughout the general region, including the Carletonville/Westonaria area (van der Bergh, 2009) and the Krugersdorp/Randfontein area.

However, evidence was found for a skirmish that took place on a koppie to the south of Carletonville/Westonaria. This incident was an ambush planned for the morning of 5 September 1900 by Commandant Danie Theron and his scouts and General Liebenberg and members of the Potchefstroom Commando. A large British convoy comprising 1,000 men was expected to be moving from Johannesburg to Potchefstroom. However, the planned attack was derailed due to the unexplained absence of Genl. Liebenberg. Theron was apparently surprised by a British scouting force on a nearby hill. Nevertheless, he killed three of the British soldiers on the hill before firing on the British column apparently as a bluff. The British forces started shelling the summit of the hill with howitzers and Theron was struck by shrapnel was killed. (Malan, 1939; Breytenbach, 1950). The British forces subsequently buried Theron on the border between the farms Buffelsdoorn and Elandsfontein with the three British soldiers who he had killed. Subsequently (In September 1900), Theron's body was exhumed by his men and buried in the Pienaar family cemetery on the farm Elandsfontein. After the war (on 10 March 1903 his men exhumed his body again and buried him next to the grave of his fiancé Hannie Neethling at Eikenhof, south of Johannesburg (Malan, 1939; Breytenbach, 1950).
In 1950 the Danie Theron Monument was unveiled on the summit of the ridge where he died. The monument was built with funds collected by the Voortrekker organisation (http://www.afrikanergeskiedenis.co.za/presidente/monumente-en-erfenisterreine/danie-theron-monument-gatsrand/).

A Refugee Camp for the Boer women, children and elderly was established in Burgershoop, Krugersdorp. The graves of those who died in this camp are buried in the Krugersdorp Burgershoop cemetery. A wall separates the concentration camp graves from the Muslim and

Black sections of the cemetery. Although Krugersdorp also had a concentration camp for black people on the farm Waterval, the exact location of the graves of deceased inhabitants has not been located. The South African War Graves Commission also re-interned the graves of British soldiers who died in the vicinity of Krugersdorp in a separate section in the Krugersdorp cemetery, next to the concentration camp section
(https://www2.lib.uct.ac.za/mss/bccd/Camp/26/Krugersdorp_RC/).

3.4 Archival/historical maps

Historical topographic maps were available for utilisation in the study:

- Topographical map 2627AB – First edition 1938 map. Air photography undertaken in 1938, surveyed in 1954 and drawn in 1958 by the Trigonometrical Survey office (**Figure 12**).
- Topographical map 2627AD – First edition 1958 map. Air photography undertaken in 1948, surveyed in 1958 and drawn in 1959 by the Trigonometrical Survey office (**Figure 13**).
- Topographical map 2627BC – First edition 1943 map. Drawn in 1943 by the Survey Depot S.A.E.C (**Figure 14 & Figure 16**).
- Topographical map 2627BC – Second edition 1957 map. Air photography undertaken in 1952, surveyed in 1957 and drawn in 1961 by the Trigonometrical Survey office (**Figure 15 & Figure 17**).
- Topographical map 2627BA – First edition 1944 map. Surveyed in 1943 and drawn in 1944 by the Survey Depot S.A.E.C office (**Figure 18 & Figure 20**).
- Topographical map 2627BA – Second 1954 map. Air photography undertaken in 1952, surveyed in 1957 and drawn in 1959 by the Trigonometrical Survey office (**Figure 19 & Figure 21**).
- Topographical map 2627BB – First edition 1943 map. Surveyed in 1943 and drawn in 1943 by the Survey Depot S.A.E.C (**Figure 22**).
- Topographical map 2627BB – Second edition 1954 map. Air photography undertaken in 1952, surveyed in 1954 and drawn in 1956 by the Trigonometrical Survey office (**Figure 23**).
- Topographical map 2627BD – First edition 1944 map. Surveyed in 1943 and drawn in 1944 by the Survey Depot S.A.E.C (**Figure 24)**
- Topographical map 2627BD – Second edition 1956 map. Air photography undertaken in 1952, surveyed in 1954 and drawn in 1956 by the Trigonometrical Survey office (**Figure 25**).

The maps were utilised to identify structures that could possibly be older than 60 years and thus protected under Section 34 and 35 of the NHRA. One can see representations of a large number of structures, “stone walling”, “ruins”, “kraals”, “grafte/graves” and “huts” throughout all the historical topographic maps, with more or less of said representations in certain areas, all falling

within the study area footprint. The structures are most likely the original farm buildings of the various farms in those areas as well as old mining infrastructure and housing in certain places. While the “stone walling”, “ruins” & “kraals” most likely represent historically aged settler remains and the “huts” probably represented farm labourer accommodation. These “huts” are of particular importance as it is known for stillborn or infant remains to be buried under the floor of the living area in African tradition. The “grafte/graves” represent burial grounds that are at least 60 years old.

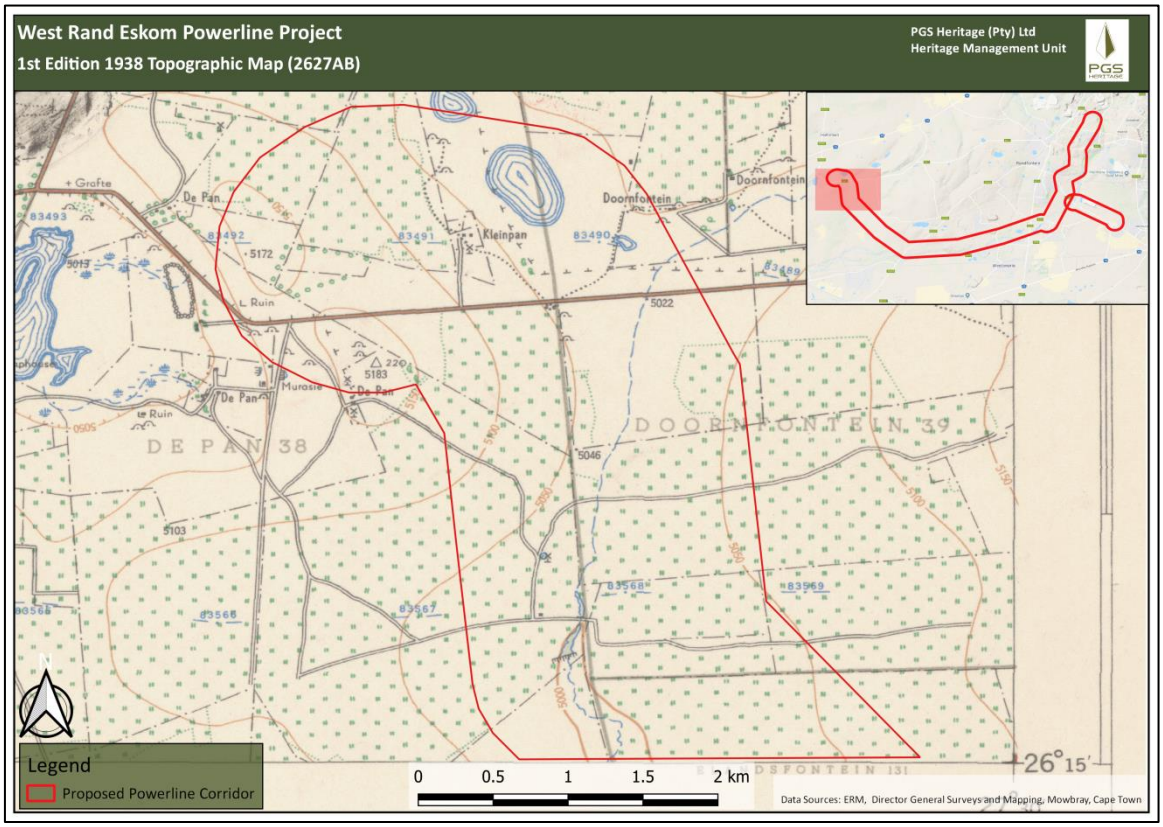


Figure 12 – 1st Edition 1938 Historical Topographic Map (2627AB)

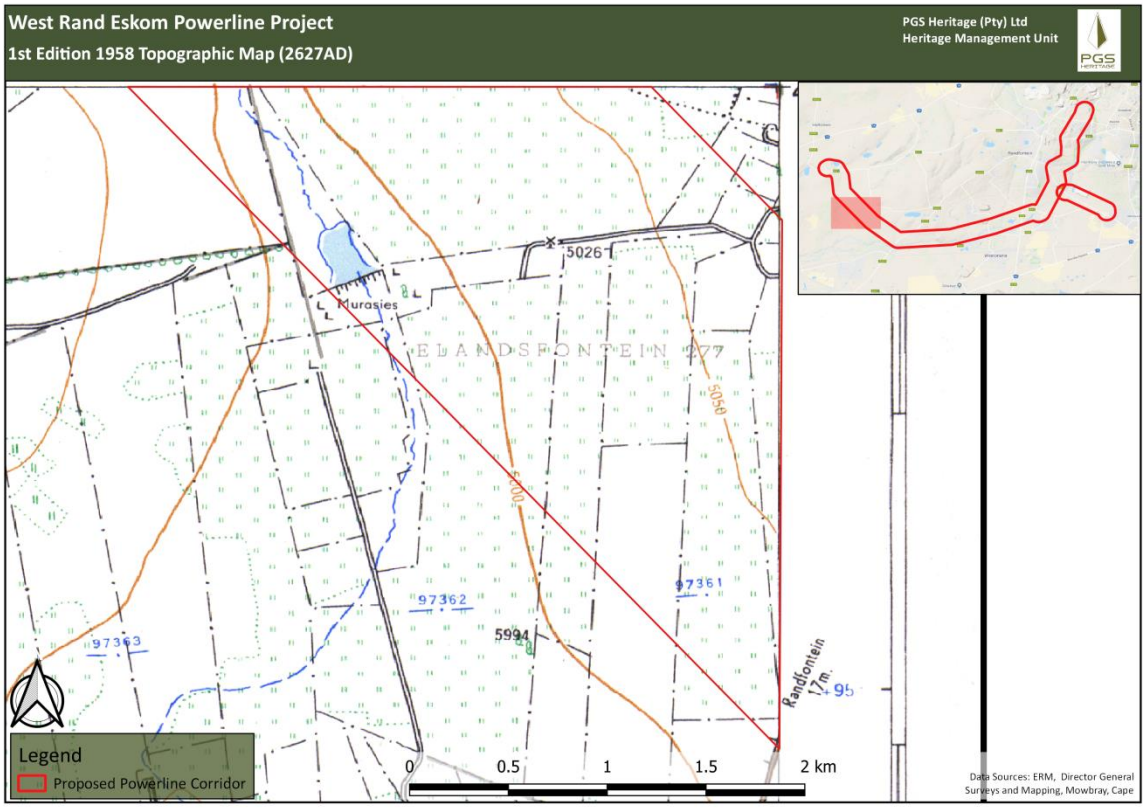


Figure 13 - 1st Edition 1958 Historical Topographic Map (2627AD)

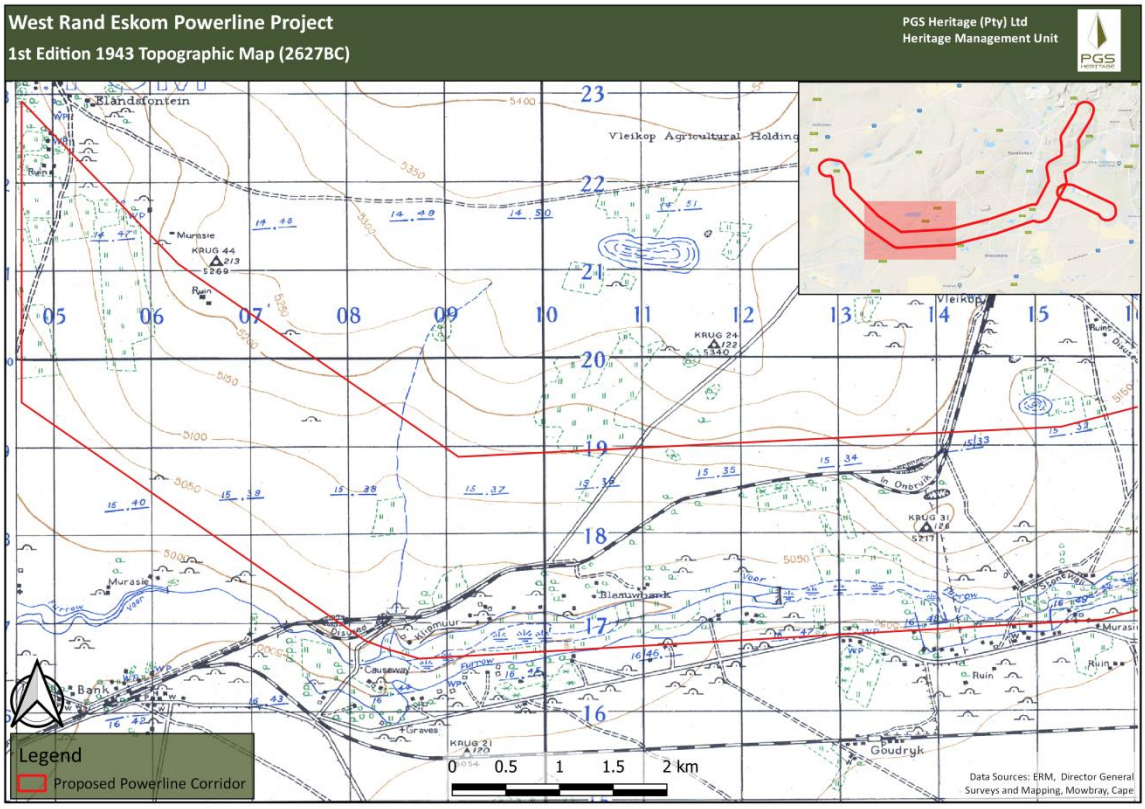


Figure 14 - 1st Edition 1943 Historical Topographic Map (2627BC)

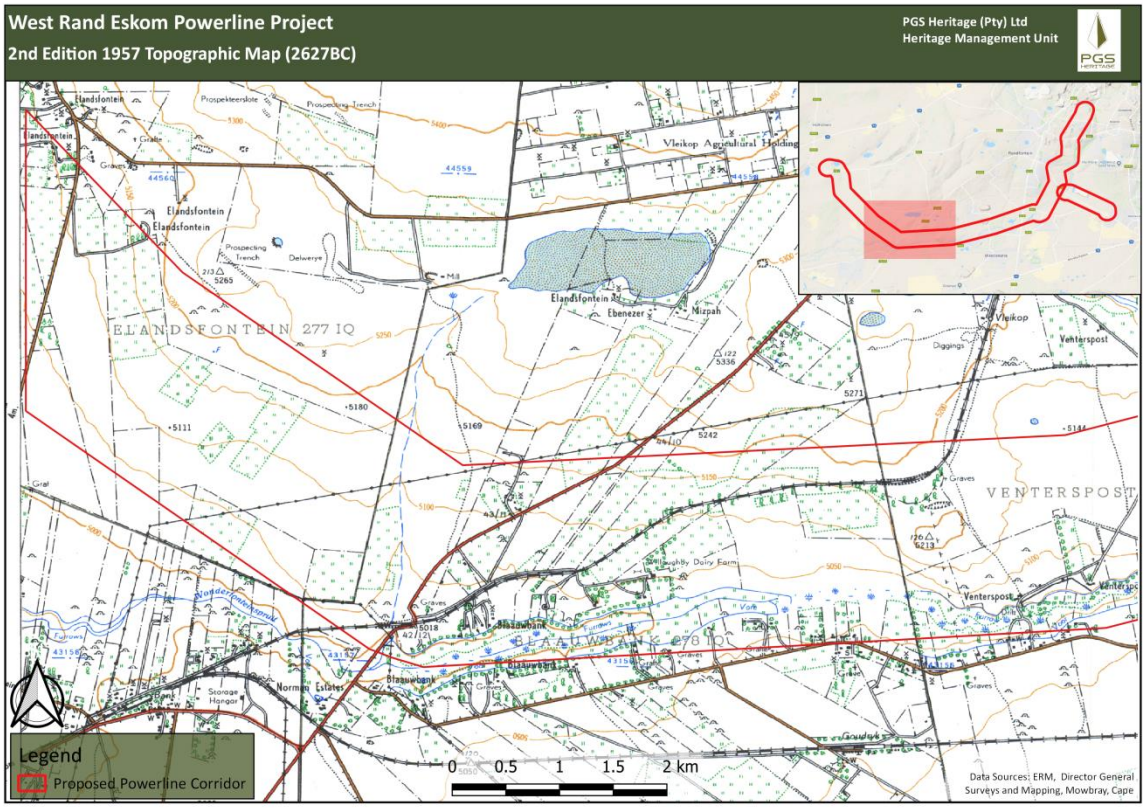


Figure 15 – 2nd Edition 1957 Historical Topographic Map (2627BC)

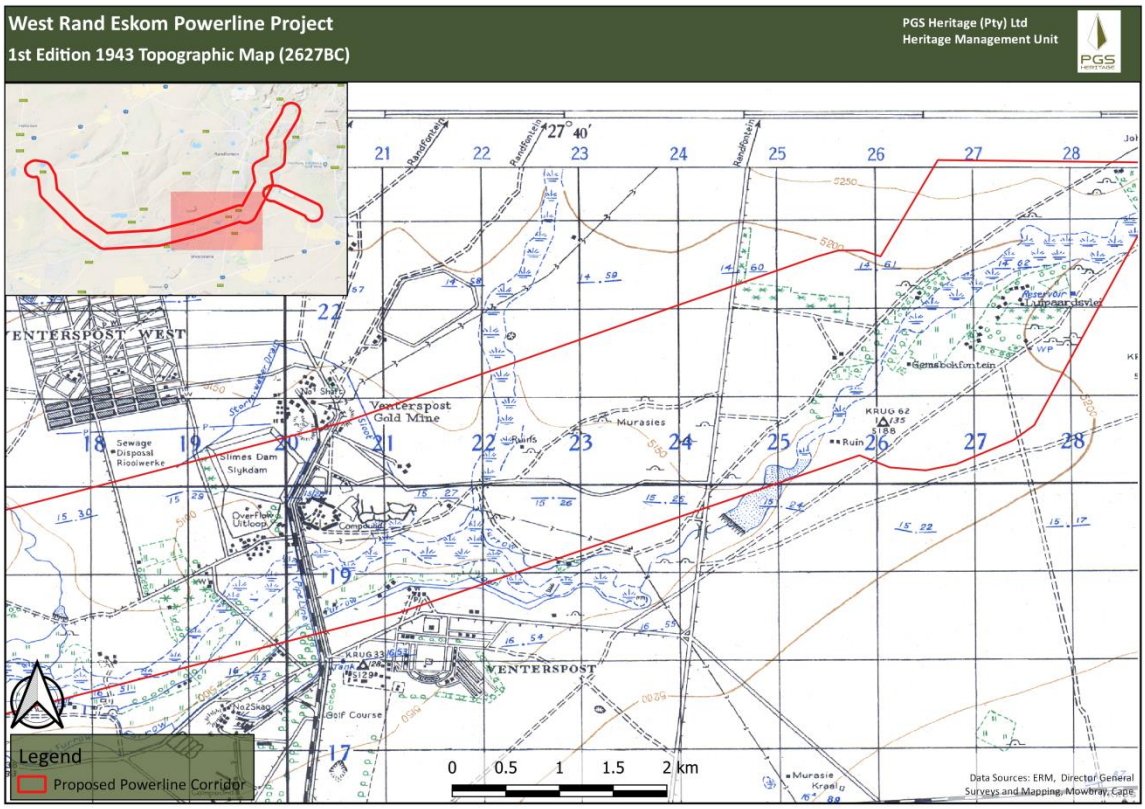


Figure 16 - 1st Edition 1943 Historical Topographic Map (2627BC)

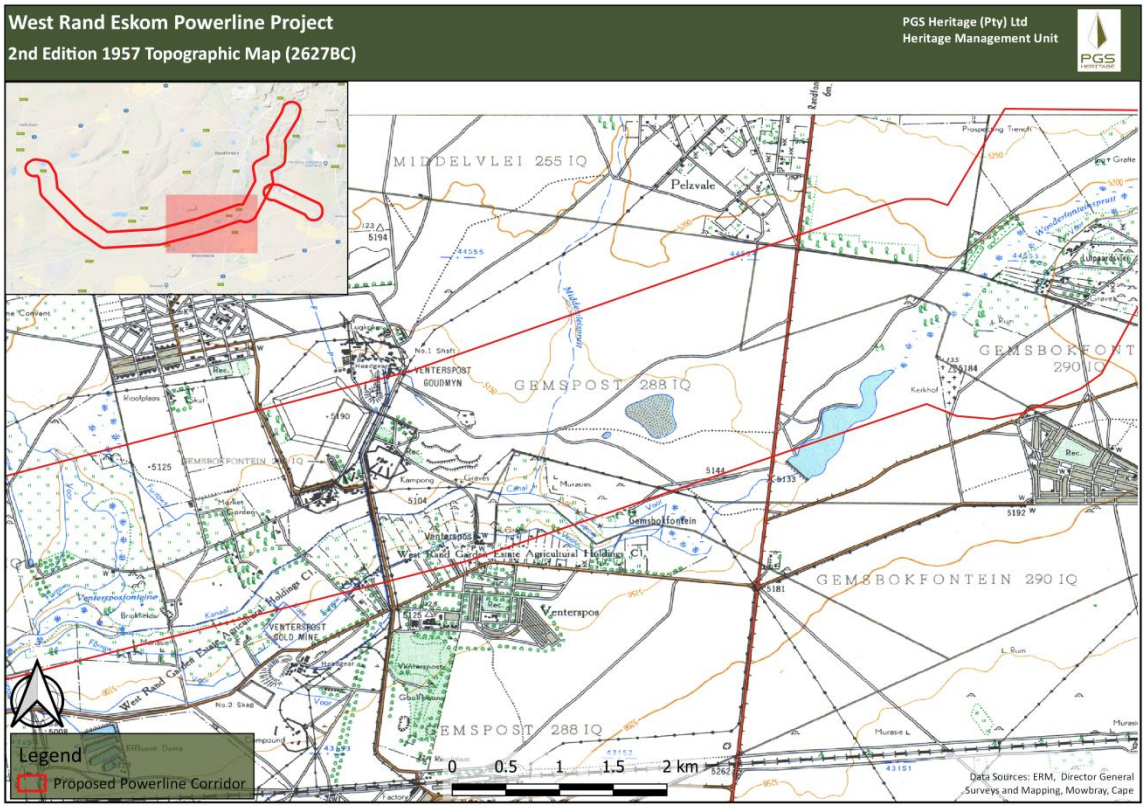


Figure 17 – 2nd Edition 1957 Historical Topographic Map (2627BC)

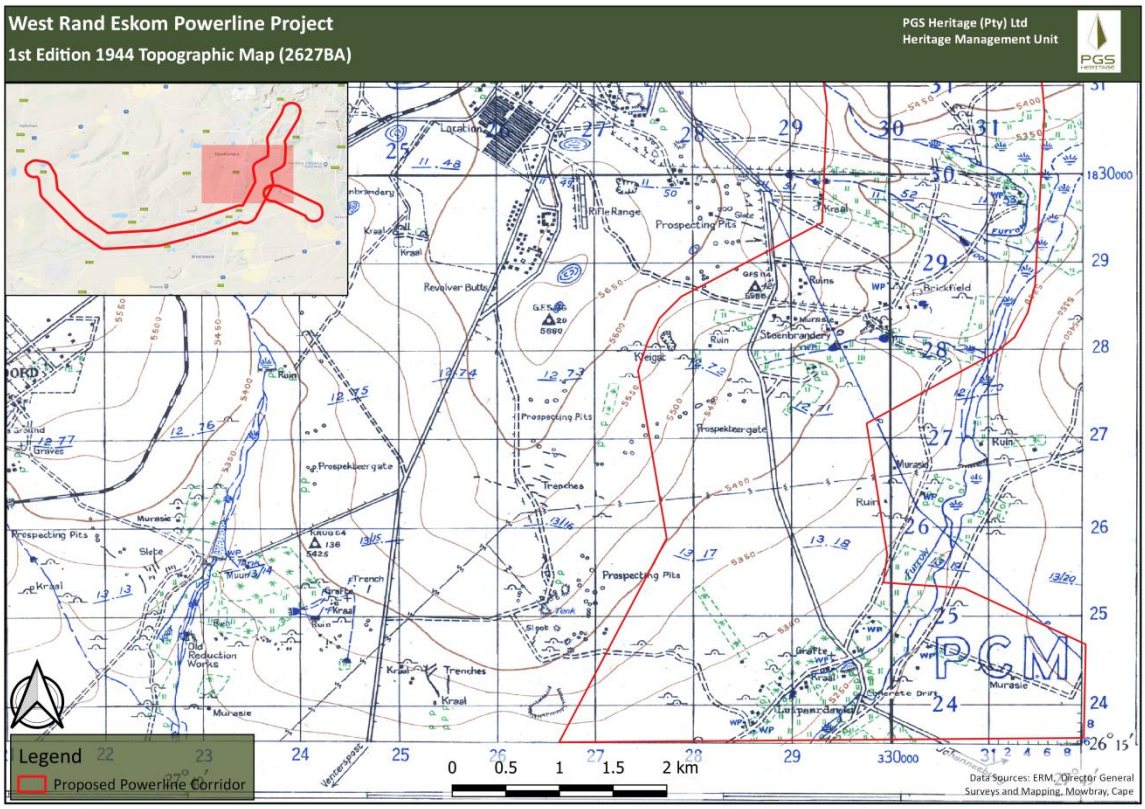


Figure 18 - 1st Edition 1944 Historical Topographic Map (2627BA)

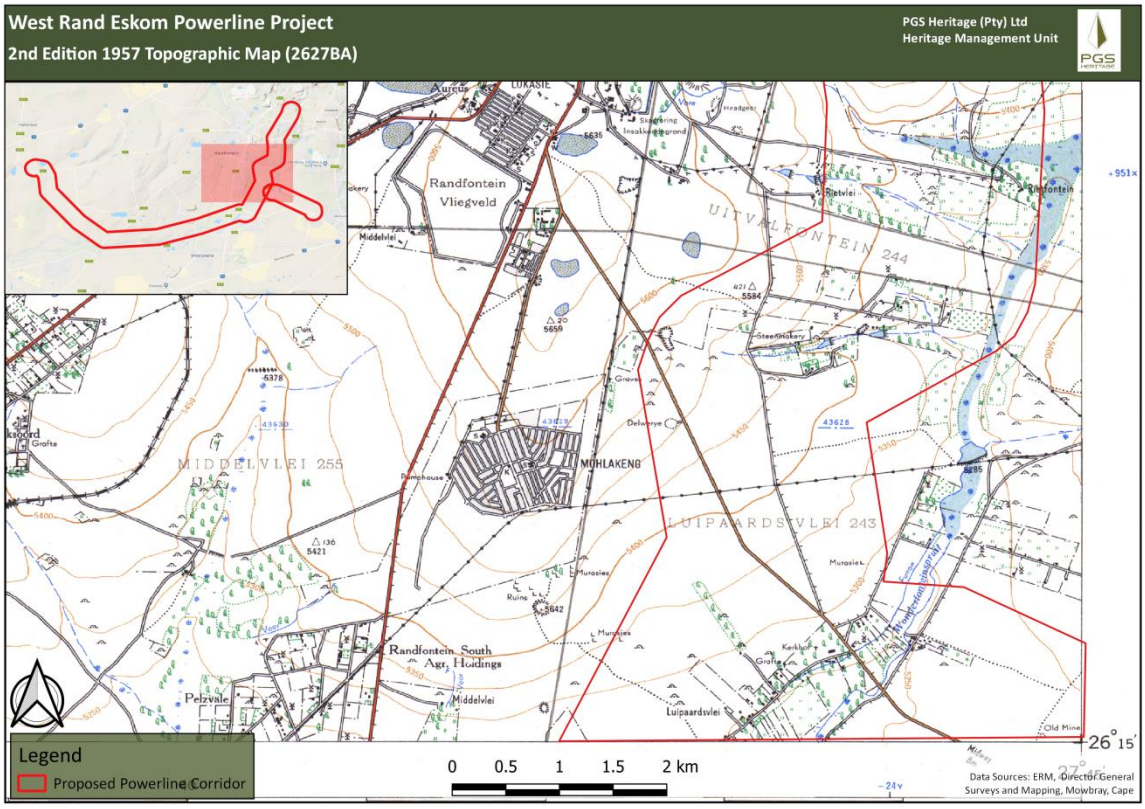


Figure 19 – 2nd Edition 1957 Historical Topographic Map (2627BA)

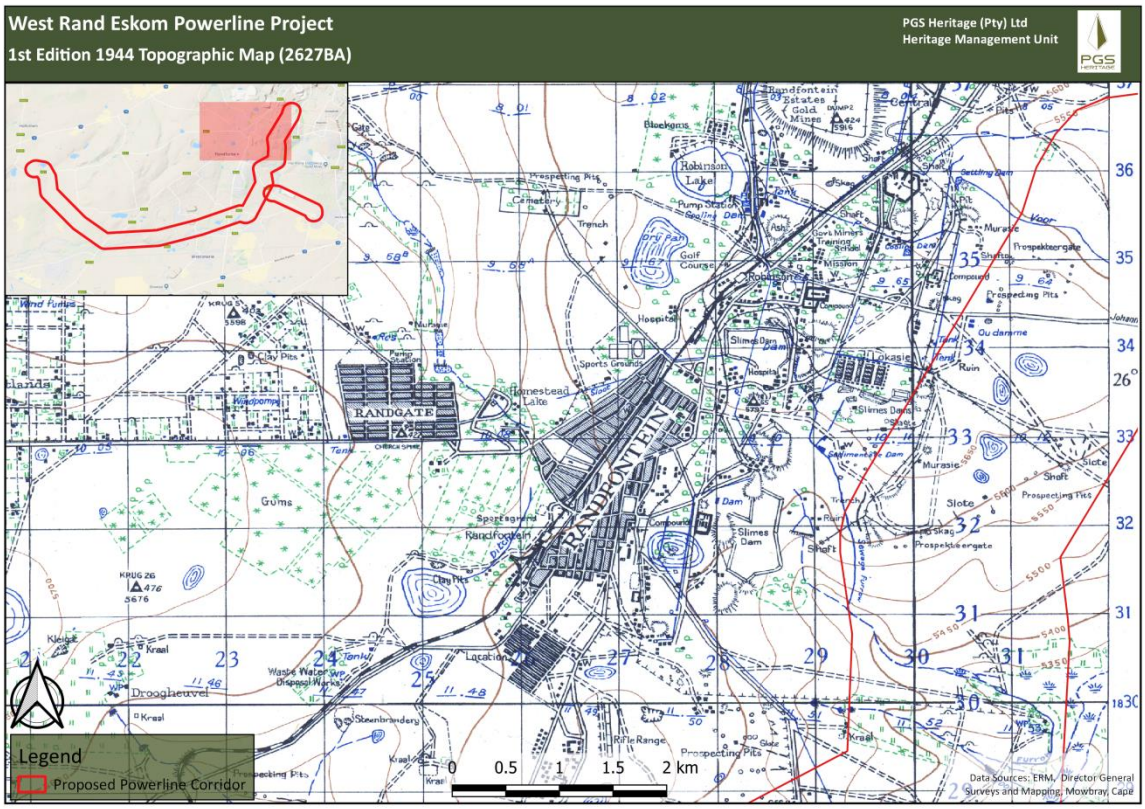


Figure 20 - 1st Edition 1944 Historical Topographic Map (2627BA)

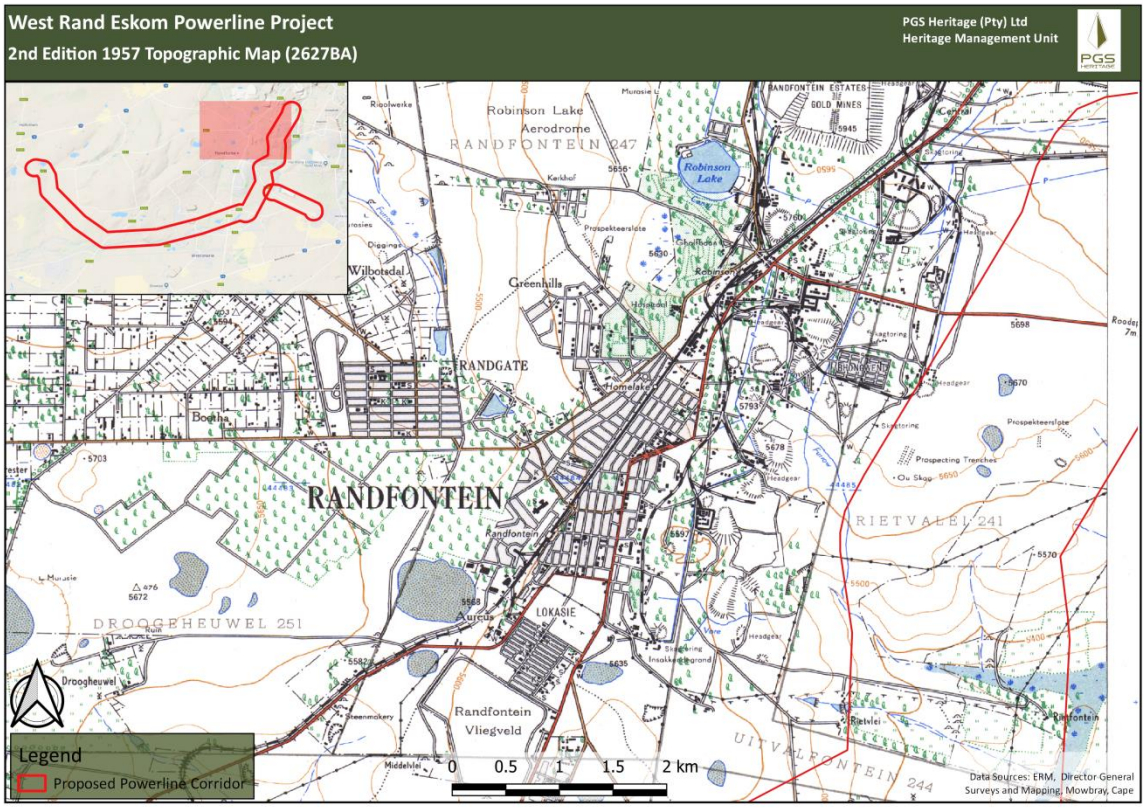


Figure 21 – 2nd Edition 1957 Historical Topographic Map (2627BA)

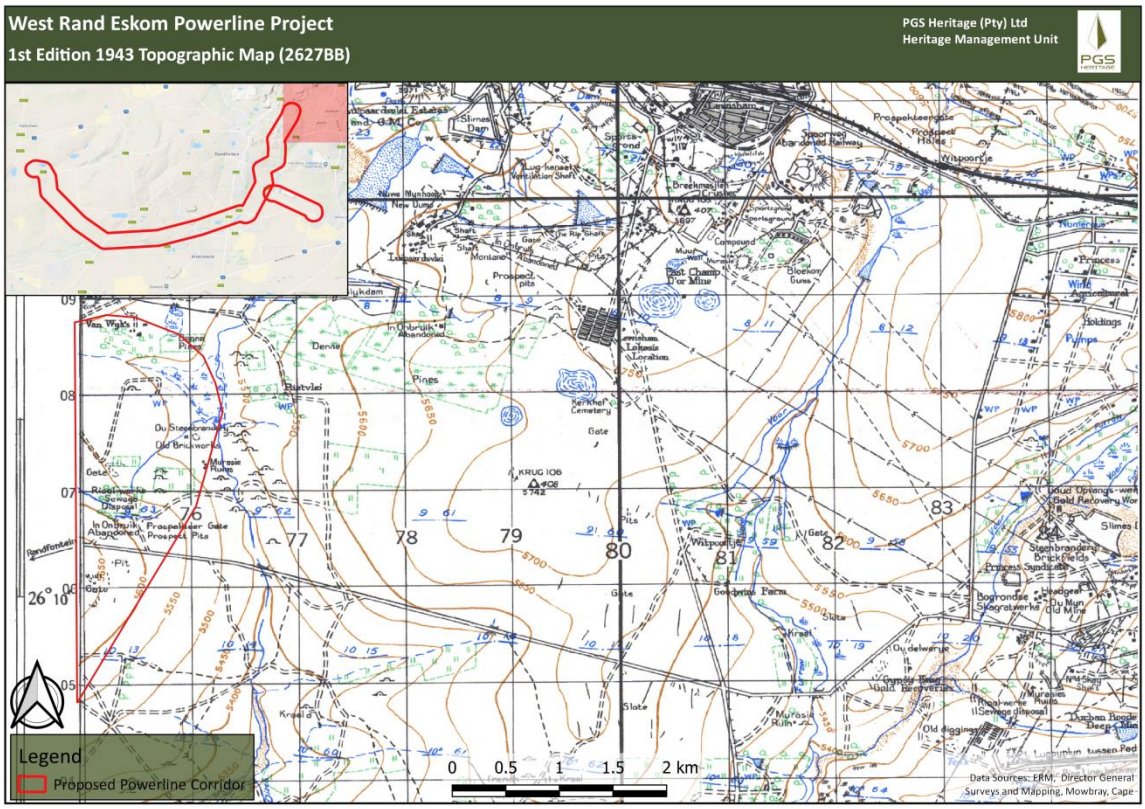


Figure 22 - 1st Edition 1943 Historical Topographic Map (2627BB)

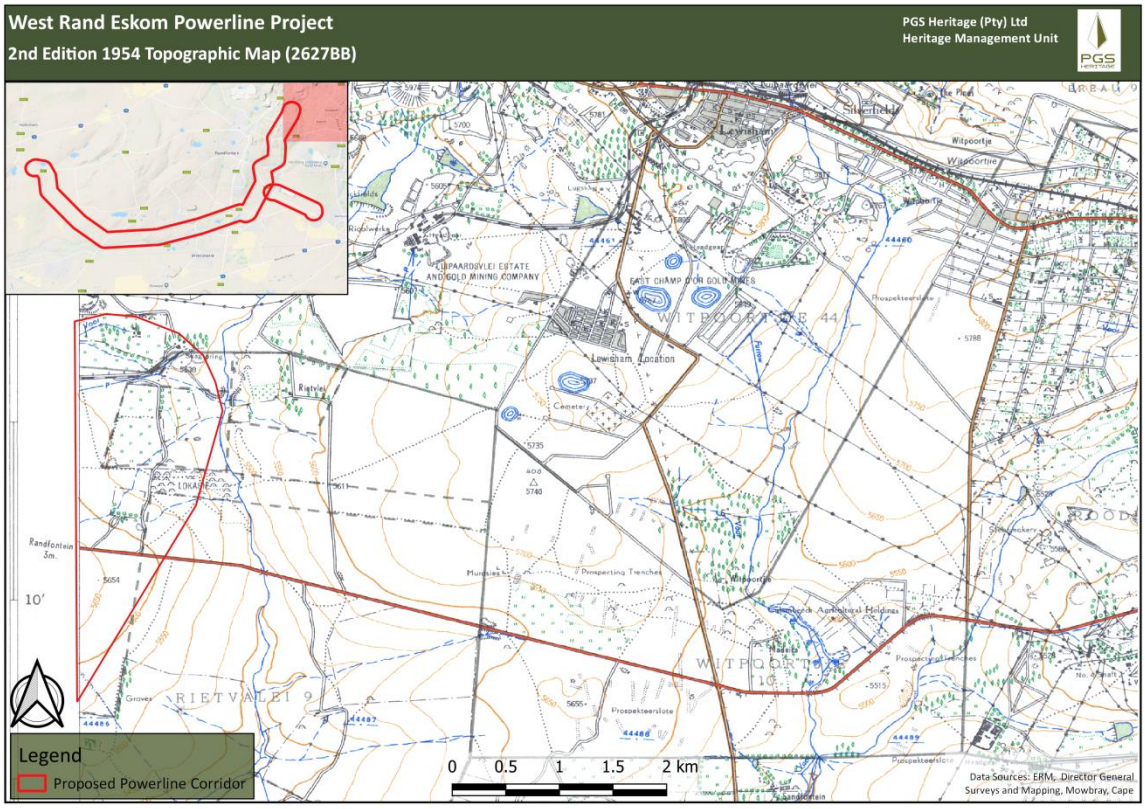


Figure 23 – 2nd Edition 1954 Historical Topographic Map (2627BB)

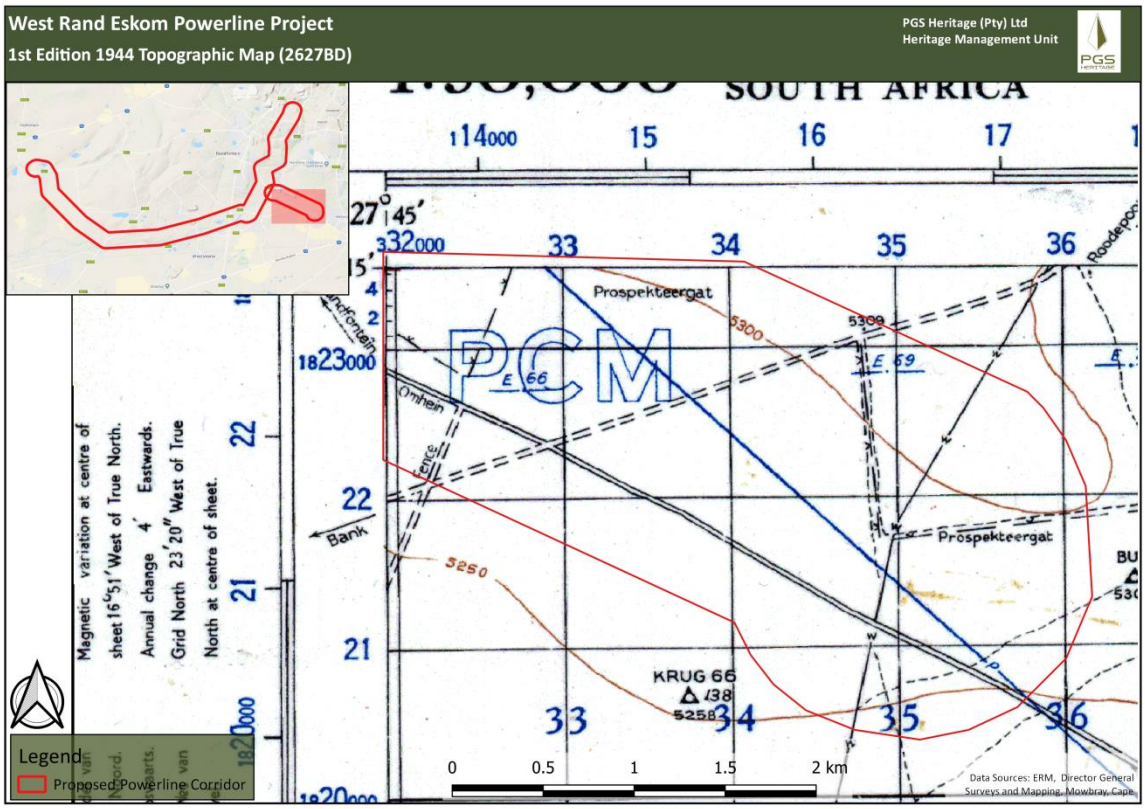


Figure 24 – 1st Edition 1944 Historical Topographic Map (2627BD)

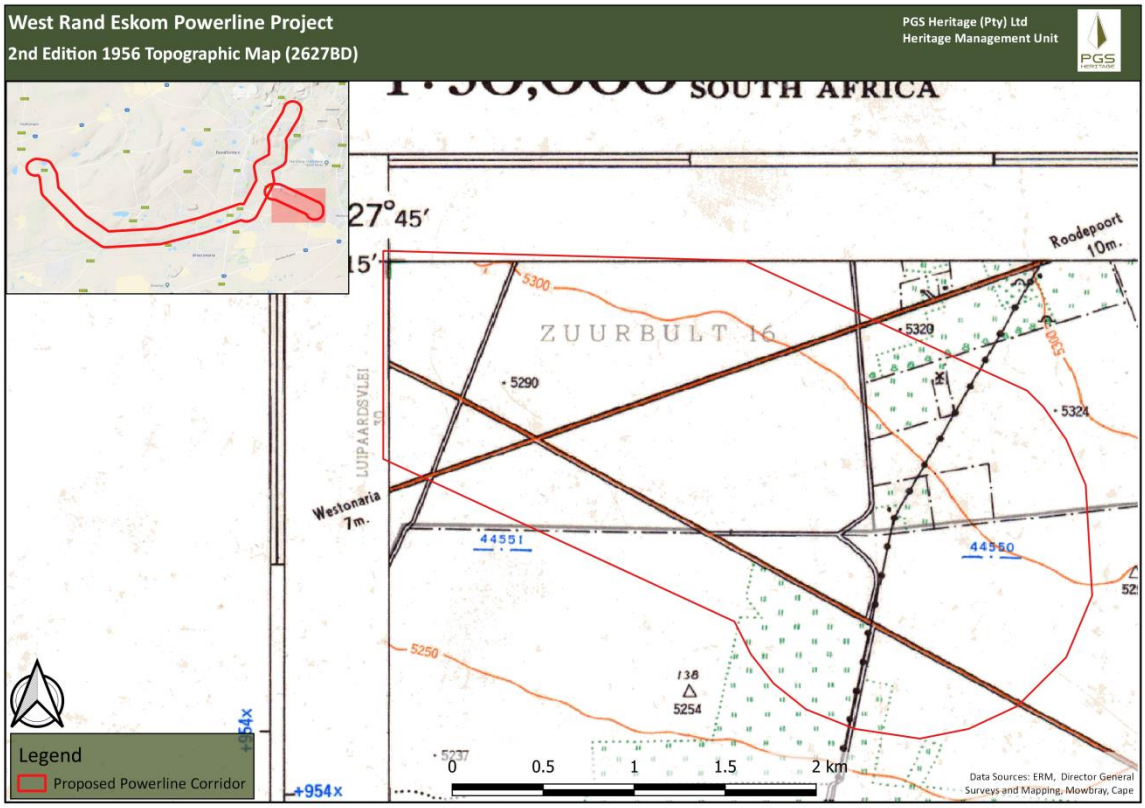


Figure 25 – 2nd Edition 1956 Historical Topographic Map (2627BD)

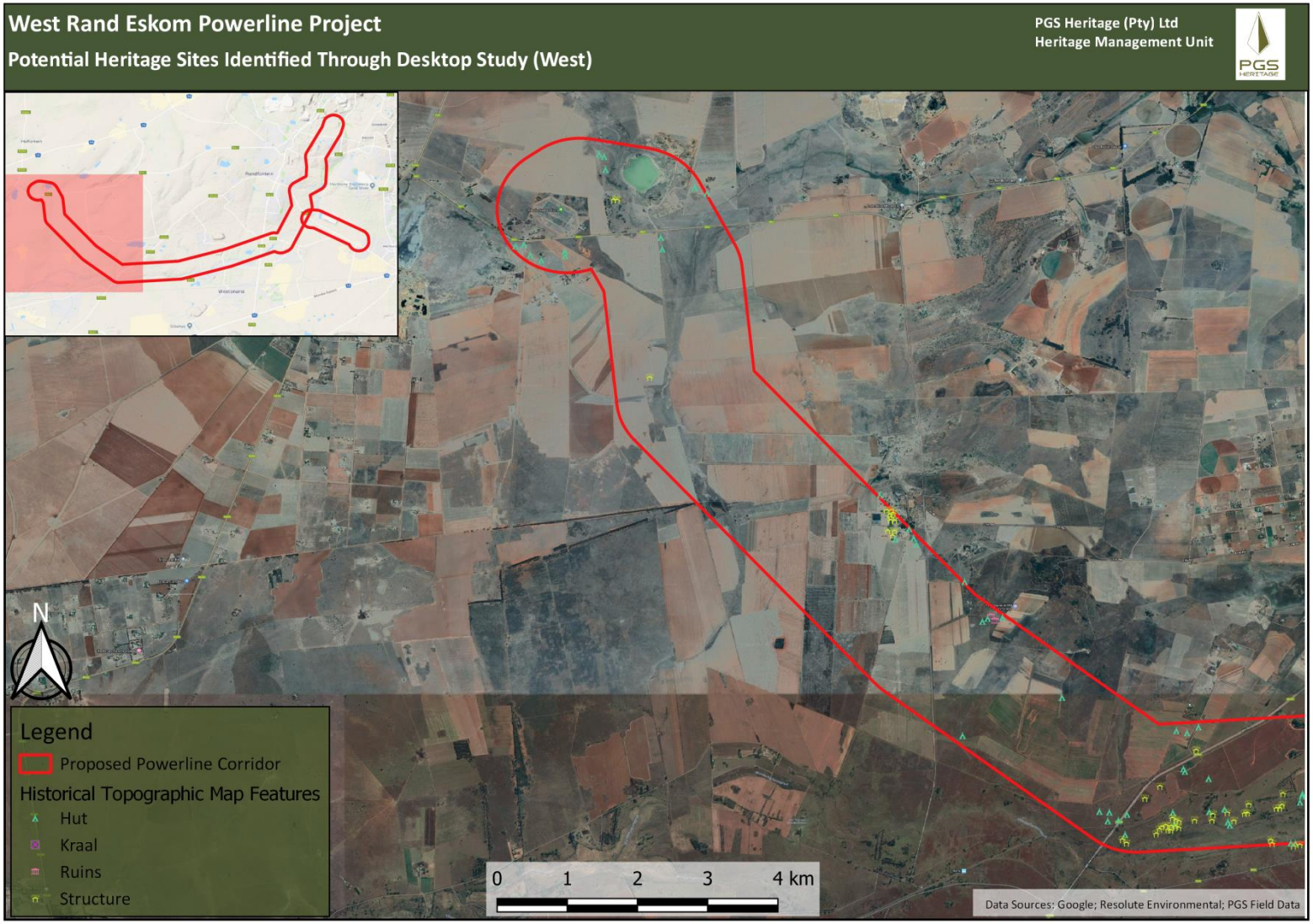


Figure 26 – Map showing all the possible heritage features identified on the 1st & 2nd Ed Topographic Maps (West)

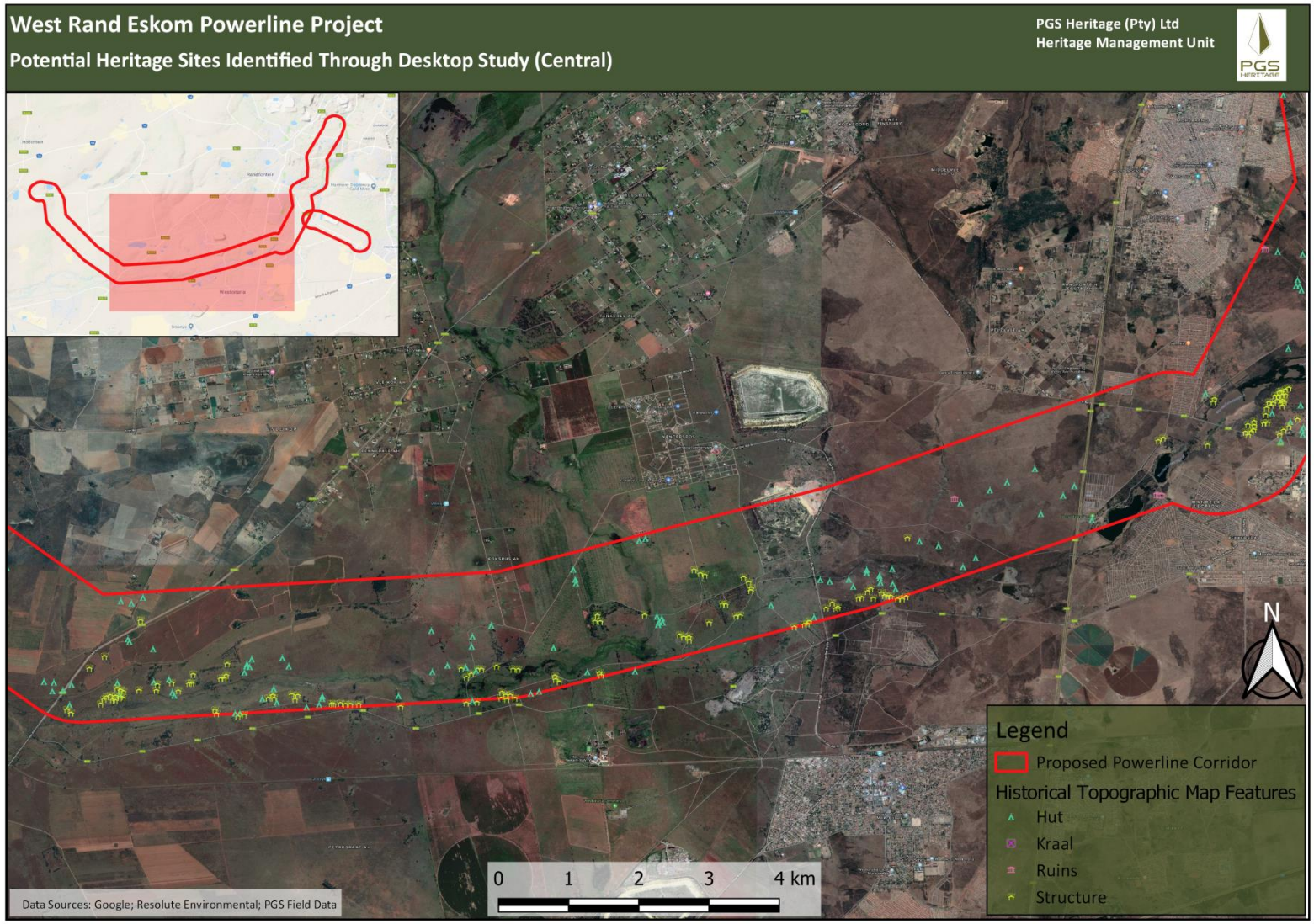


Figure 27 - Map showing all the possible heritage features identified on the 1st & 2nd Ed Topographic Maps (Central)

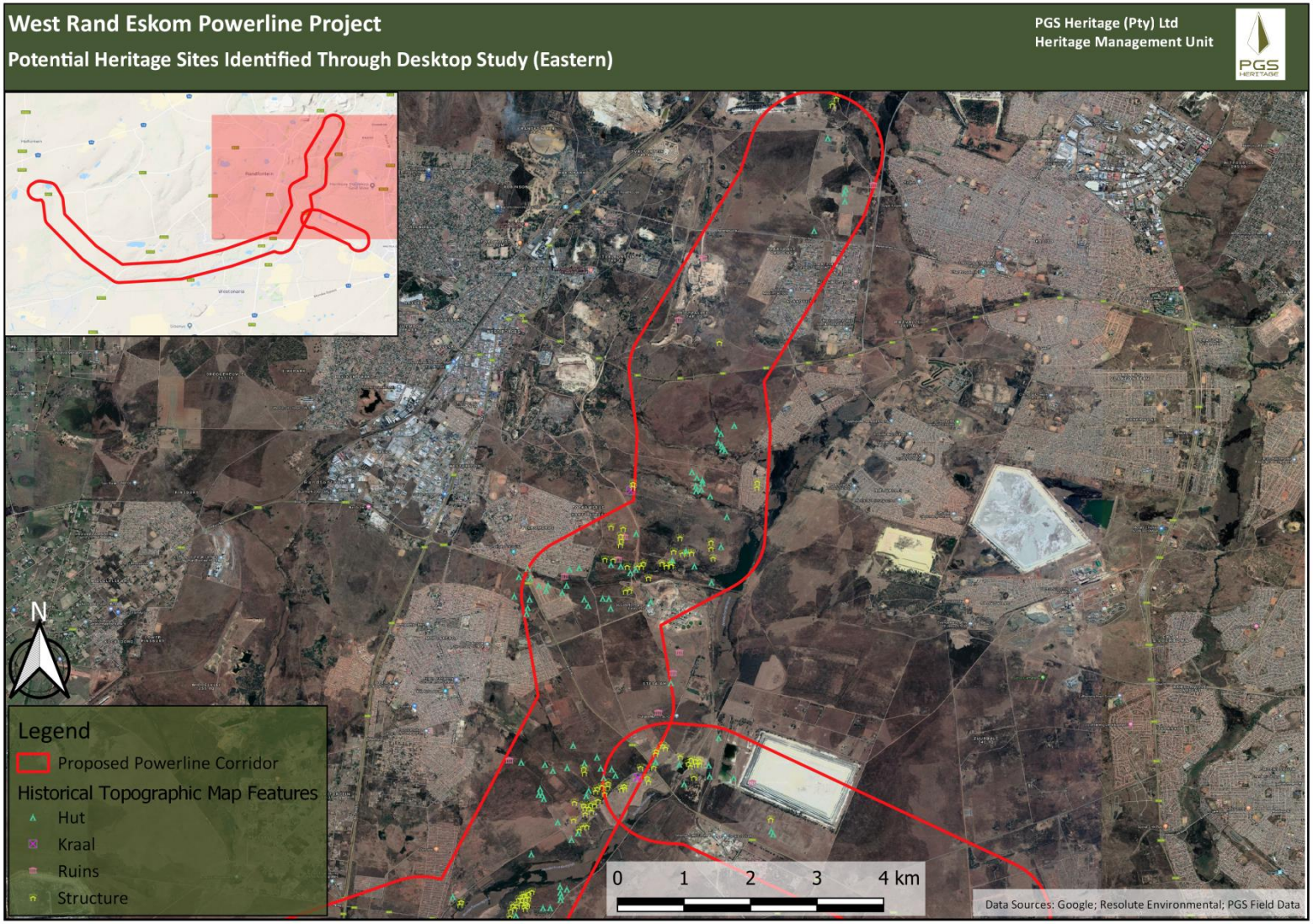


Figure 28 - Map showing all the possible heritage features identified on the 1st & 2nd Ed Topographic Maps (East)

3.5 Fieldwork and Findings

A controlled scoping survey was conducted on foot and vehicle over a period of two days by one archaeologist and one heritage specialist from PGS. Access to properties affected by the route corridor was limited due to the stage of the project at time of the survey, thus the majority of the survey was done by vehicle on public tar and gravel roads. The fieldwork was conducted on the 10th to 11th December 2018. The track logs (in orange) for the survey are indicated in **Figure 29 & Figure 31**, while the track logs (in cyan) indicate legacy work done in the area by PGS (**Figure 30** & **Figure 31**).

Heritage resources identified during the fieldwork component of this HIA (23 sites) are described in **Table 3** and their positions shown in **Figure 98, Figure 99, Figure 100, Figure 101, Figure 103, Figure 104 & Figure 105.** Heritage resources identified during legacy fieldwork conducted by PGS in 2016 (17 sites) are described in Appendix D and their positions shown in **Figure 102, Figure 103, Figure 104 & Figure 105**.

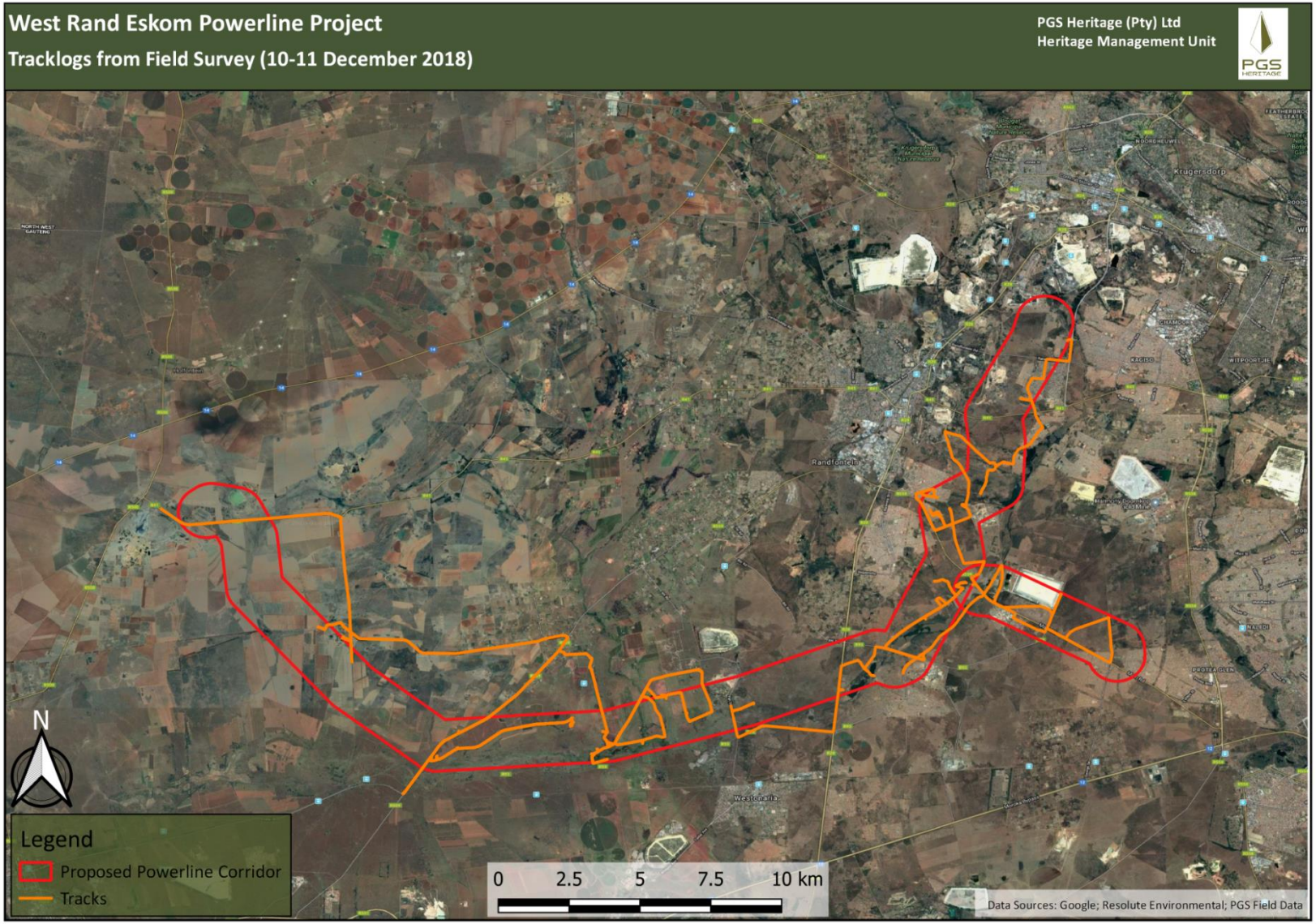


Figure 29 – Track log recordings from field survey (10th – 11th December 2018)

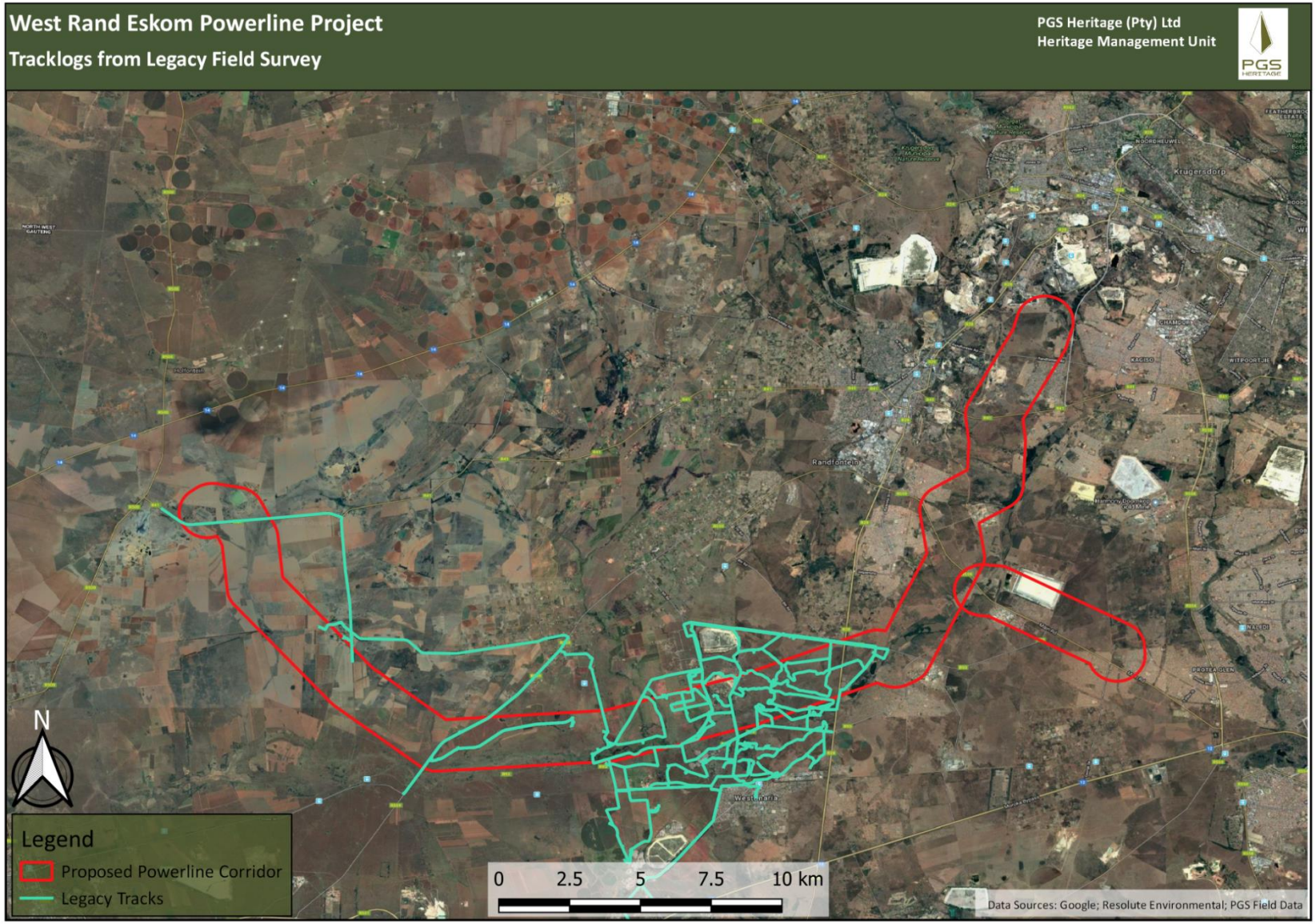


Figure 30 – Track log for previous survey conducted by PGS Heritage n 2016

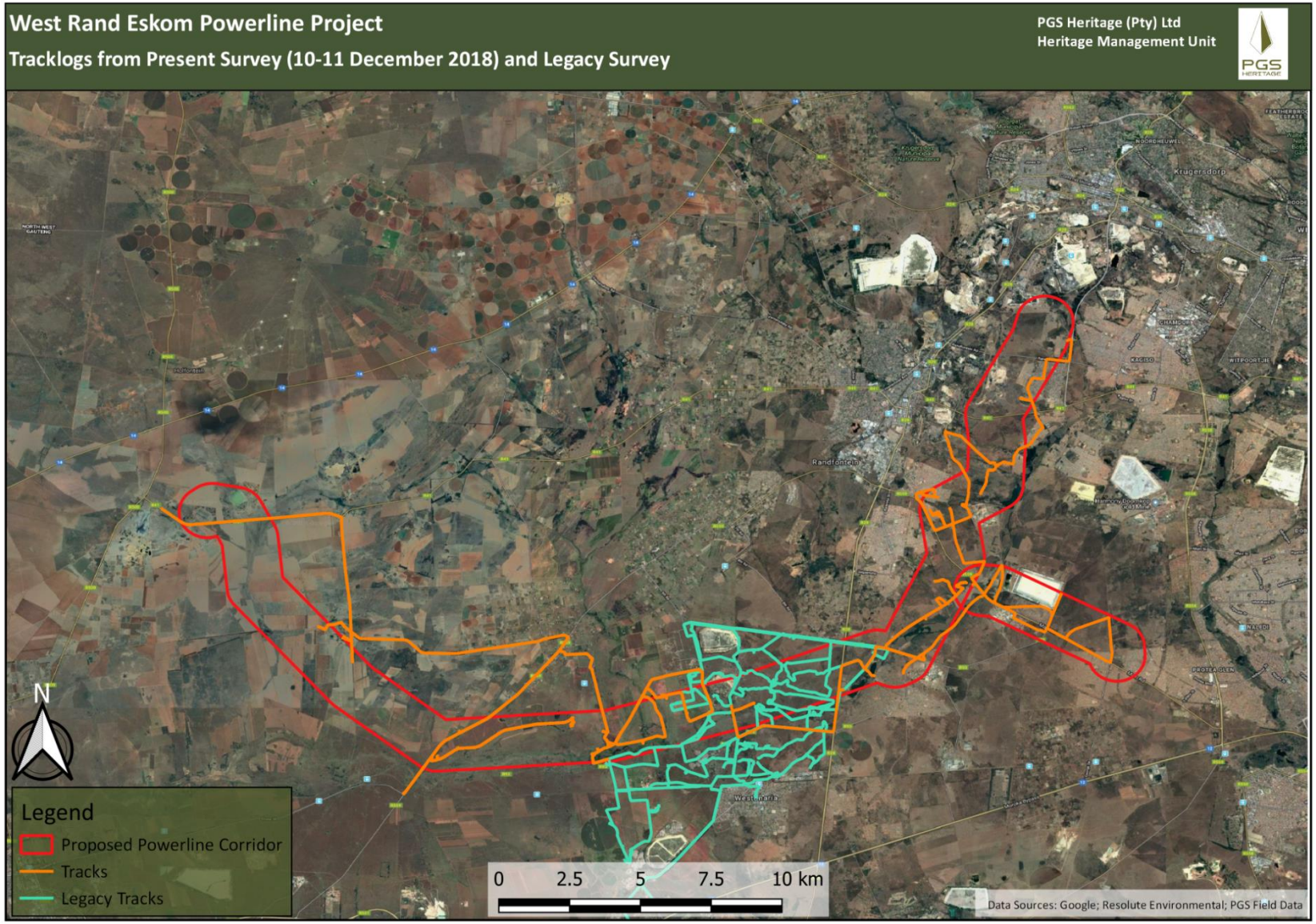


Figure 31 – Track log recordings for both the current project and past work done in the area

Table 3 - Sites identified during heritage survey

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR001	S26.29377°	E27.54612°	The site comprises of the remains of a brick built dam. This structure appears to date from the historic to recent past due to its design and the construction materials employed as well as its representation on the Historical Topographic maps. **The structure measures 10m x 10m.**	Low	GP.C

Figure 32 – Remains of old brick dam

[1] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[2] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR002	S26.30399°	E27.53780°	The site comprises an informal burial ground. The graves are stone packed with a few possessing stone grave markers. The burial ground is poorly maintained and does not have any form of fencing or demarcation. It is unclear if the graves are still being visited. None of the grave markers contain any inscriptions however, judging by the state of the graves, they could be fairly old. In total, the burial ground consists of approximately 17 graves. **The site measures 50m x 30m.**	High	GP.A

Figure 33 – View of part of the burial ground, note the characteristic stone packing of the graves

Figure 34 – More stone packed graves

[2] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 35 – Stone packed grave with stone head marker

Site[3] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR003	S26.29119°	E27.58608°	The site comprises a possible informal burial ground. Consisting of at least two stone-packed features which could be unconfirmed graves, the site is situated in a location where graves are represented on the historical topographic maps. The site has been ploughed through (possibly recently) by a tractor pulled plough, leaving only the surface remains what may be two graves. However, it is also possible that the ploughing has disturbed more graves that what can be identified on the surface. Due to their representation on the 2nd Edition 1957 Topographic Map, the possible graves would be over 60 years old. The posible graves are facing west to east. **The site measures 40m x 20m.**	High	GP.A

Figure 36 – Perpendicular view of one the stone packed features

Figure 37 – The same feature but at a different angle, take note of the plough lines

[3] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[1] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 *Figure 38 – The secondary stone-packed feature*			 *Figure 39 – The same feature and associated plough lines*		

Site[4] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR004	S26.29874°	E27.59958°	The site comprises a burial ground. The vast majority of the graves are simply stone packed without any form of markers or headstones (approximately 31). The remaining graves (approximately 9) possess variations of brick and concrete grave dressings (with some being stone-packed) with engraved granite (and one marble) headstones. These 9 graves most likely belonged to the white farm owners who possibly lived at site WTR006. The headstone of possibly the oldest grave of the 9 historically aged graves is made of marble as its inscription is written in old Dutch. The burial ground is poorly maintained with no fencing and the grass is overgrown, indicating that they are not being visited. Additionally, one double grave and one single grave has been desecrated, with several of the headstones having either been knocked over or have fallen over by themselves. The oldest identified grave with a headstone was dated to 1884, the rest ranging in age up until the 1960s. In total, the burial ground consists of approximately 40 graves. **The site measures 40m x 30m.**	High	GPA

Figure 40 – Frontal view of burial ground at WTR004

Figure 41 – Anterior view of WRT004

[4] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[4] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 *Figure 42 – Some unmarked stone-packed graves*			 *Figure 43 – Side of another set of stone packed graves*		

Site[4] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 44 – Grave dating to 1884

Figure 45 – Grave with marble headstone and Dutch inscription

Site[4] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					
Figure 46 – Single desecrated grave with toppled headstone					
					
Figure 47 – Desecrated double grave					

Site[5] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR005	S26.30261°	E27.59350°	The site comprises the remains of old stone walling. Presumably forming part of the farming compound at WTR006, the wall varies in height between 0.5m and 1.5m high, and is approximately 100m long with a small stone-built pen at its westernmost end, it was most likely used contain cattle. The wall is dry packed and in a relatively good state of repair. **The site measures 150m in length.**	Low	GP.C

Figure 48 – View of the stone walling at WTR005

Figure 49 – Higher portion of the stone walling in the foreground, with site WTR006 in the background

[5] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[6] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR006	S26.30238°	E27.59296°	The site comprises two structures, the remains of an old farmhouse and its associated utility building (wagon shed). The farmhouse is a large multi-room house constructed of different types of bricks on a stone foundation. The bricks vary from mudbricks, through red bricks to relatively modern blue bricks. The 'header and stretcher' brick laying technique observed in its construction indicates an age older than 60 years. The remains of a verandah are visible along one side. Interestingly, there is also an outside oven built with bricks and standing on a concrete (and brick) plinth. This type of outdoor oven is known historically to be associated with the Voertrekkers, thus the likelihood of this farmstead being older than 100 years is quite high. The utility building is made of wattle, daub and stone, with two rooms. The lower part of the shed wall is constructed of stone, with mud bricks at the top. There is a door in the one side and the one end is completely open but this is probably due to weather damage. The structure was most likely used as a wagon shed. **The overall site measures 80m x 40m. The main farmhouse measures 35mx15m and the utility building measures 18mx10m.**	Low	GP.B

[6] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Figure 50 – View of the whole of WTR006

Figure 51 – View of remains of the farmstead at WTR006

Figure 52 – Alternate view of farmstead

Figure 53 – Remains of the verandah of the farmstead

Figure 54 – Outdoor oven

Figure 55 – Outdoor oven, alternate angle

Figure 56 – View of utility building at WTR006

Figure 57 – One can see the 'header-stretcher' bricklaying technique

Site[7] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR007	S26.28798°	E27.62622°	The site comprises old farming infrastructure, consisting of several reservoirs and the foundations of 3-4 unknown structures. The reservoirs are constructed out of brick, stone and concrete and are connected with a spillway. These structures are shown on the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The structure measures 65m x 25m.**	Low	GP.C

Figure 58 – Overall view of reservoirs and spillway at WTR007

Figure 59 – Circular reservoir and upper portion of spillway

[7] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[7] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 *Figure 60 – Lower portion of spillway and remains of lower rectangular reservoir*			 *Figure 61 – Foundational remains of unknown structure next to spillway*		

Site[8] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR008	S26.28463°	E27.64977°	The site comprises an informal burial ground. The vast majority of the graves are simply stone packed without any form of markers or headstones, with only a handful of the graves possessing concrete headstones. The burial ground is situated in between a pipeline and sinkholes/illegal mining excavations. The presence of several illegal miners was observed thus a full account of the exact number of graves and the potential inscriptions of headstones was not taken due to security concerns. The burial ground is poorly maintained with no fencing however, the grass is being cut on some of the graves and the presence of a woman on the day of our visit was observed, indicating that they are still being visited. The oldest identified grave with a headstone was dated to 1952. In total, the burial ground consists of at least 100 graves. The graves are facing east to west. **The site measures 95m x 35m.**	High	GP.A

[8] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[7] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 *Figure 62 – View of the burial ground in the foreground, with sinkholes/illegal mining activity in background*			 *Figure 63 – Secondary view of burial ground*		

Site[7] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 64 – View of some of the graves with concrete headstones

Figure 65 – View of some of the stone-packed graves

Site[9] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR009	S26.25472°	E27.71082°	The site comprises an informal burial ground. The vast majority of the graves are simply stone packed without any form of markers or headstones, with only 4 of the graves possessing brick and concrete dressing together with concrete headstones without any inscriptions. The burial ground is poorly maintained with no fencing. Additionally, there is not enough evidence to indicate that the graves are still being visited. There are approximately 18 graves. The graves are at least 60 years old considering the fact that there are large trees growing out of some the graves and that the graves are represented on the 2nd Edition 1957 Topographic Map, **The site measures 35m x 30m.**	High	GP.A

[9] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[9] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 *Figure 66 – View of stone packed graves at WTR009, take note of the large trees growing out of some the graves*			 *Figure 67 – View of graves with concrete dressings*		

Site[10] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR010	S26.24839°	E27.71794°	The site comprises an old house that is currently occupied and associated outbuildings. It is at least 60 years old as indicated by the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The site measures 100m x 60m.**	Low	GP.C

Figure 68 – View of structure and one of the outbuildings

Figure 69 – View of another one of the outbuildings

[10] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR011	S26.24599°	E27.72098°	The site comprises an old house that is currently occupied and associated outbuildings. It is at least 60 years old as indicated by the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The site measures 15m x 15m.**	Low	GP.C

Figure 70 – View of structure at WTR011

Site[12] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

[11] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR012	S26.24444°	E27.72159°	The site comprises an old house that is currently occupied and associated outbuildings. It is at least 60 years old as indicated by the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The site measures 15m x 15m.**	Low	GP.C

Figure 71 – View of the structure at WTR012

[12] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[13] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR013	S26.24232°	E27.72329°	The site comprises an informal burial ground. The majority of the graves are simply stone packed without any form of markers or headstones, with some of the graves possessing brick, concrete and granite dressings together with concrete and granite headstones. The burial ground is poorly maintained with no fencing however, the grass is being cut on some of the graves and the presence of grave goods on top of some of the graves indicates that they are still being visited. There are over 100 graves. The oldest known grave was buried in 1940 and the youngest buried in 2011. The burial ground at least 60 years old considering the fact that the graves are represented on the 1st Edition 1944 Topographic Map, **The site measures 100m x 100m.**	High	GP.A

[13] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 72 – View of some of the stone packed graves at WTR013

Figure 73 – View of other stone packed graves

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

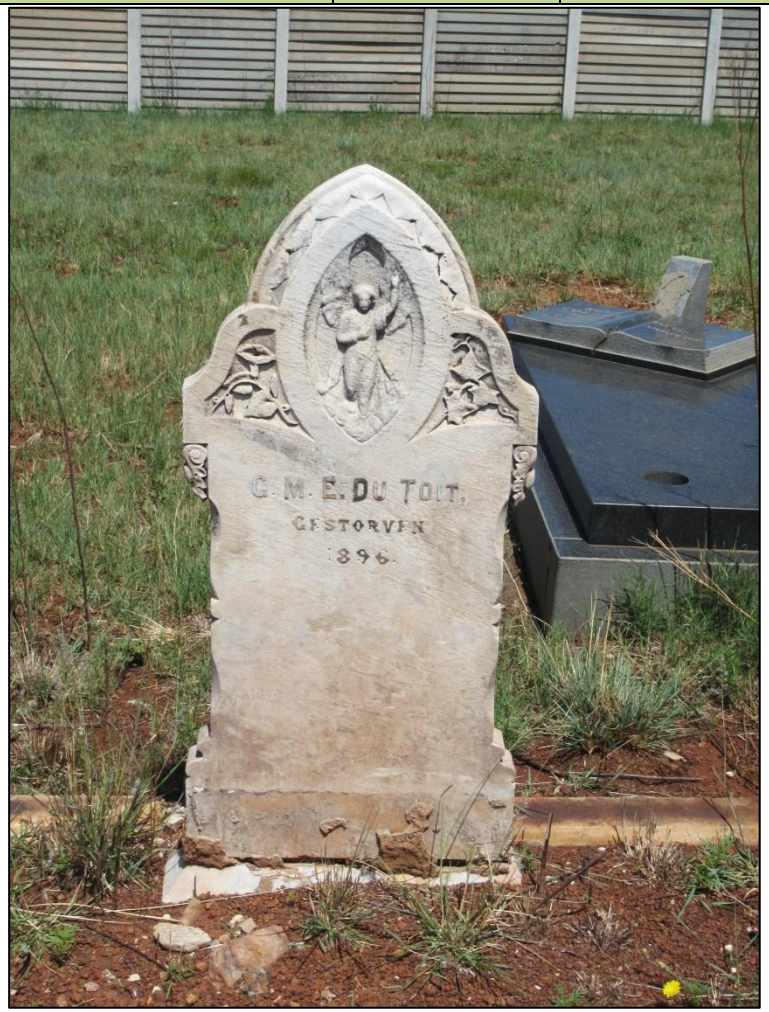
Figure 74 – Grave dating to 2011

Figure 75 – Set of graves with granite dressings and headstones

Site[14] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR014	S26.24174°	E27.72476°	The site comprises a formal burial ground. The majority of the graves are white graves that possess intricately designed dressings and headstones made of variations of granite, sandstone, slate and concrete, while there are only a handful of stone packed graves The burial ground is relatively well maintained with concrete palisade fencing that is only partially damaged however, there is no obvious environmental evidence that the graves are being visited. The youngest grave, having been buried in 2013, should be enough to propose that the burial ground is currently in use and that the graves are being visited. There are approximately 80 graves. The oldest known grave was buried in 1896 and the youngest buried in 2013. Some of the oldest graves are original Dutch graves. Are large portion of the graves were buried in the 1940s and later. The burial ground at least 60 years old considering the fact that the graves are represented on the 1st Edition 1944 Topographic Map, Additionally, the identification of *Kirkness* bricks being used in the construction of some of the grave dressings indicates that those particular graves were set in the early 1900s. **The site measures 45m x 35m.**	High	GP.A

[14] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					
Figure 76 – View of burial ground at site WTR014					
					
Figure 77 – View of the only stone packed graves in the entire burial ground					

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 *Figure 78 – The oldest graves in the burial ground, take note of the intricate design motifs*			 *Figure 79 – The oldest grave buried in 1896*		

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 80 – The youngest grave buried in 2013

Figure 81 – Example of a Kirkness brick identified on site

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 82 – View showing the variation in design motifs

Site[15] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR015	S26.24230°	E27.71787°	The site comprises the remains of an old house. It is at least 60 years old as indicated by the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The site measures 25m x 10m.**	Low	GP.C

Figure 83 – View of structure and one of the outbuildings

Site[16] number	Lat	Lon	Description	Heritage Significance	Heritage Rating

[15] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[11] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR016	S26.27552°	E27.69517°	The site comprises a large municipal cemetery. There is a fair distribution of graves that are simply stone packed and that at least possess some form of grave marker, together with graves possessing brick, concrete and granite dressings together with headstones of the same raw materials. The burial ground is fairly well maintained with partially damaged concrete palisade fencing. There are several thousand graves. Some of the graves are at least 60 years old considering the fact that the graves are represented on the 2nd Edition 1957 Topographic Map, **The site measures 500m x 550m x 700m x 300m**	High	GP.A

Figure 84 – View of municipal cemetery at site WTR016

Figure 85 – View of concrete palisade fencing at WTR016

[16] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[17] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR017	S26.25129°	E27.71817°	The site comprises the remains of an old house. It is at least 60 years old as indicated by the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The site measures 25m x 10m.**	Low	GP.C

Figure 86 – View of the structural remains at WTR017

[17] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[18] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR018	S26.24155°	E27.73526°	The site comprises an old house that is currently occupied and associated outbuildings. It is at least 60 years old as indicated by the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The site measures 100m x 100m.**	Low	GP.C

Figure 87 – View of structure and one of the outbuildings

[18] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[19] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR019	S26.24161°	E27.72844°	The site comprises the remains of an old set of shops. It is at least 60 years old as indicated by the historical topographic maps. In addition, this structure appears to date from the historic to recent past due to its design and the construction materials employed. **The site measures 100m x 60m.**	Low	GP.C

Figure 88 – View of structure and one of the outbuildings

[19] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[20] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR020	S26.21252°	E27.71599°	The site comprises a large municipal cemetery. There is a fair distribution of graves that are simply stone packed and that at least possess some form of grave marker, together with graves possessing brick, concrete and granite dressings together with headstones of the same raw materials. The burial ground is fairly well maintained with concrete palisade fencing. There are several thousand graves. **The site measures 430m x 115m.**	High	GP.A

Figure 89 – View of the graves at WTR020

Figure 90 – Alternate view of the graves

[20] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[21] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR021	S26.21003°	E27.73012°	The site comprises a possible informal burial ground. Consisting of 3-4 stone-packed features which could be unconfirmed graves, the site is situated nearby an area of active mining activity and is directly adjacent to a public dirt road. It is likely that when the graded that stone-packed features could have been disturbed. A piece of ceramic was identified right next to one of the features which could be the remains of grave goods, thus may be an indication that the stone packed features could be graves. **The site measures 15m x 15m.**	High	GP.A

Figure 91 – View of stone packed feature at WTR021

Figure 92 – View of alternate stone packed feature

[21] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[20] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 *Figure 93 - View of alternate stone packed feature*			 *Figure 94 – Piece of ceramic identified near stone packed features, this may be evidence of grave goods thus indicating that the features could be graves*		

Site[22] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR022	S26.17668°	E27.74425°	The site comprises the Azaadville municipal cemetery. There is a fair distribution of graves that are simply stone packed and that at least possess some form of grave marker, together with graves possessing brick, concrete and granite dressings together with headstones of the same raw materials. The burial ground is fairly well maintained with concrete palisade fencing. There are several thousand graves. **The site measures 250m x 50m x 260m x 135m**	High	GP.A

Figure 95 – View of the graves at WTR022

Figure 96 – Alternate view of the graves

[22] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

Site[23] number	Lat	Lon	Description	Heritage Significance	Heritage Rating
WTR023	S26.15627°	E27.76085°	The site comprises the Kagiso municipal cemetery. There is a fair distribution of graves that are simply stone packed and that at least possess some form of grave marker, together with graves possessing brick, concrete and granite dressings together with headstones of the same raw materials. The burial ground is fairly well maintained with concrete palisade fencing. There are several thousand graves. **The site measures 250m x 50m x 260m x 135m**	High	GP.A

Figure 97 – View of the entry point to Kagiso Municipal Cemetery

[23] *Site in this context refers to a place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.*

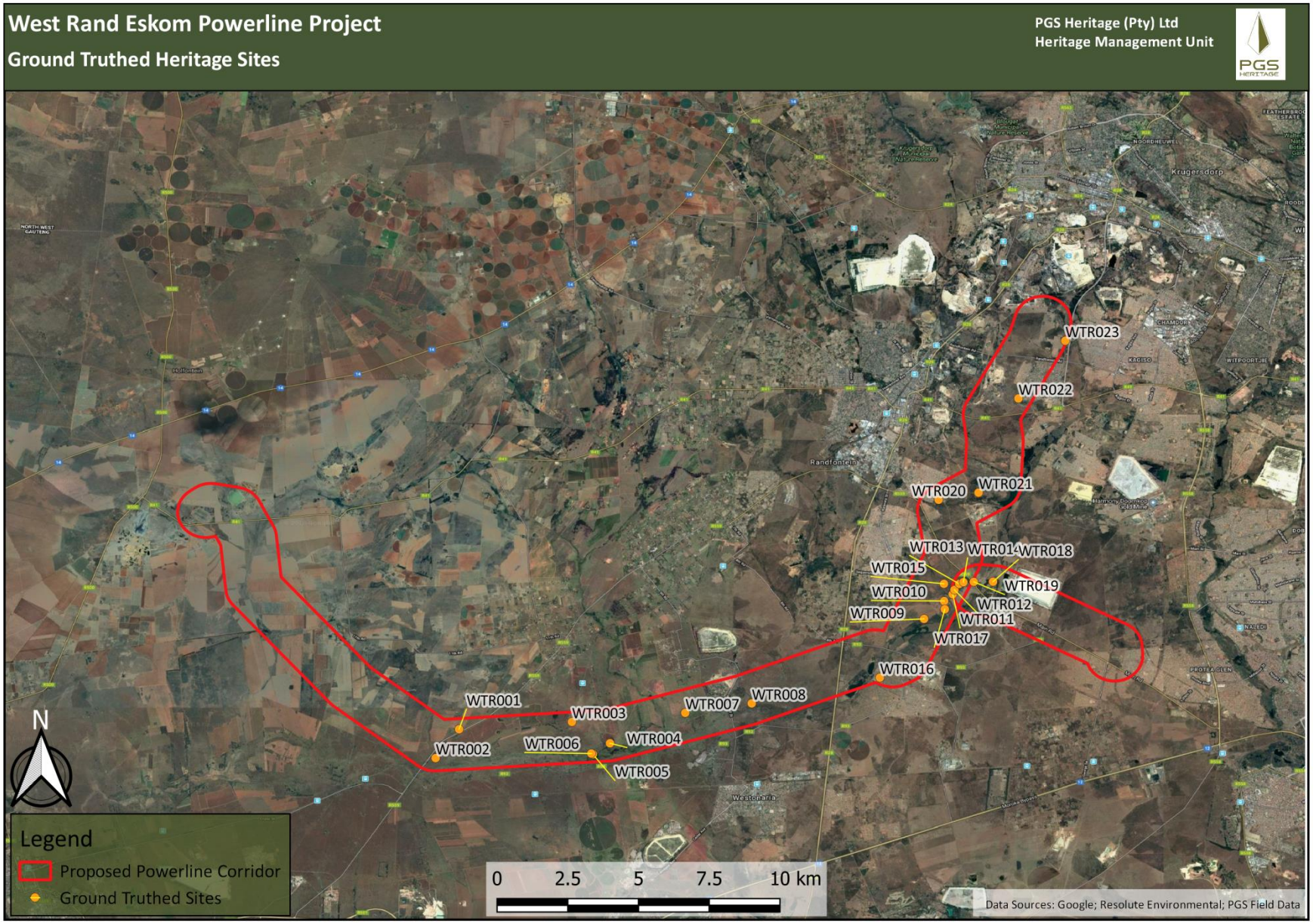


Figure 98 - Heritage sites identified during field survey

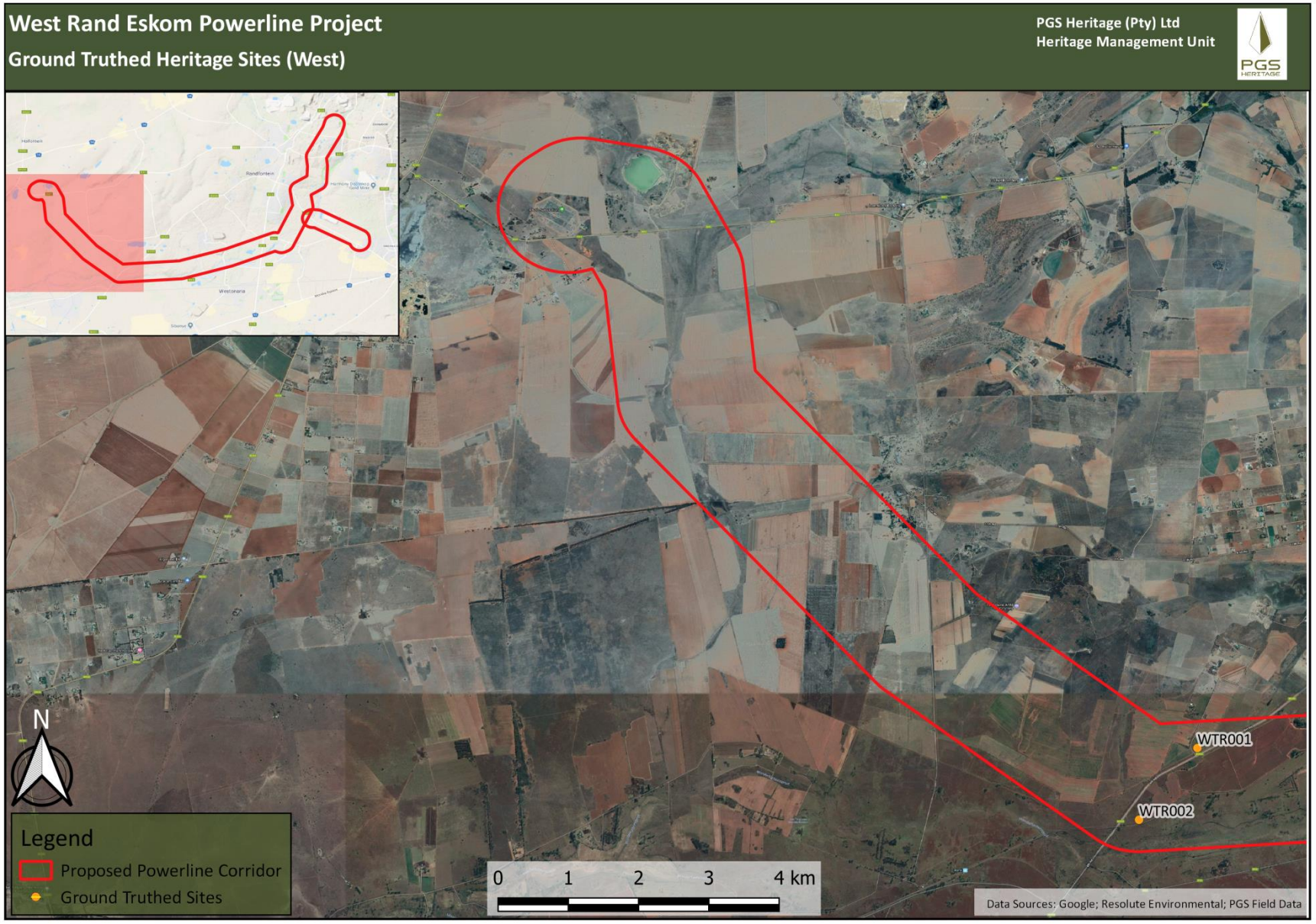


Figure 99 - Heritage sites identified during field survey (Western Portion)

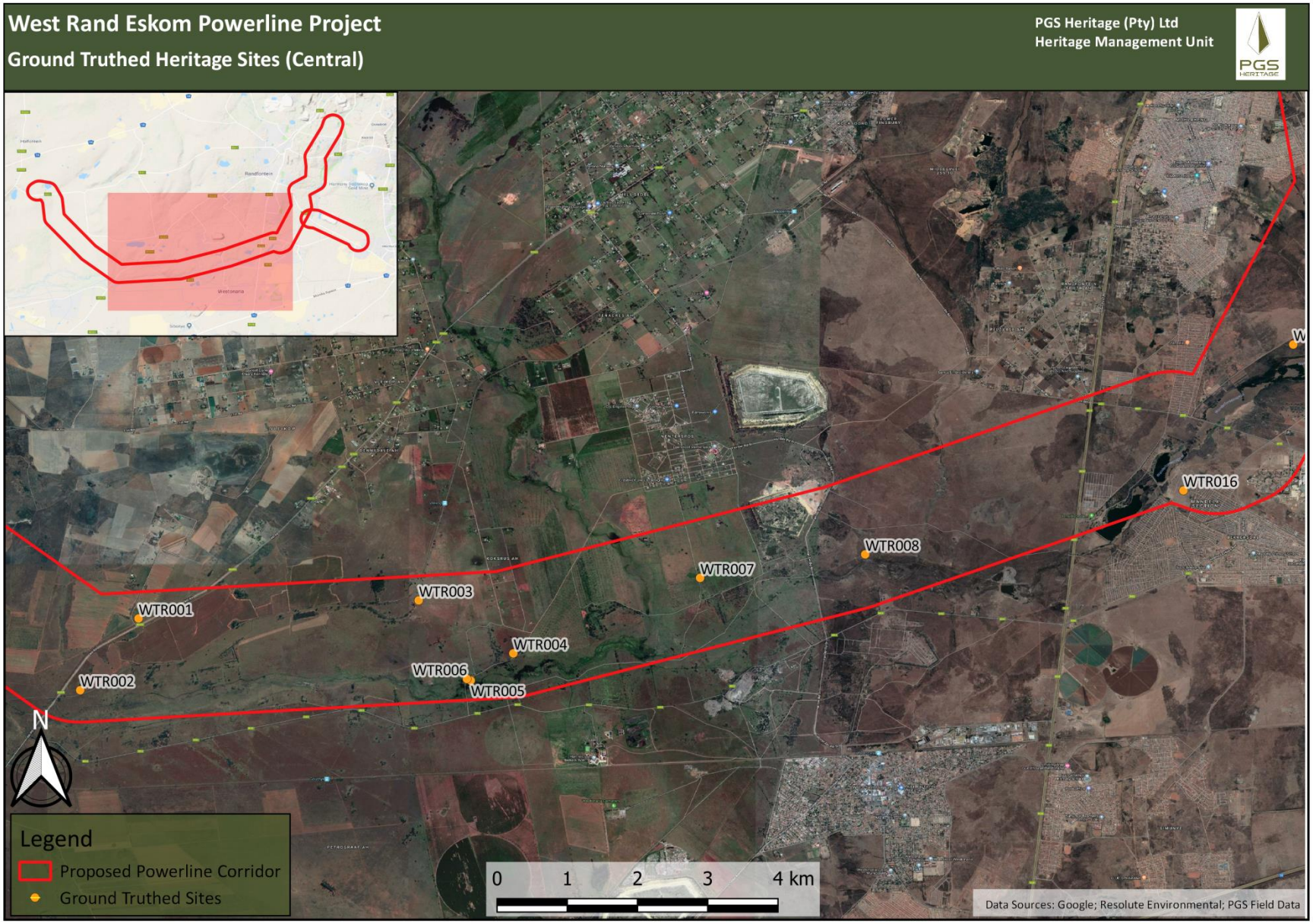


Figure 100 - Heritage sites identified during field survey (Central Portion)

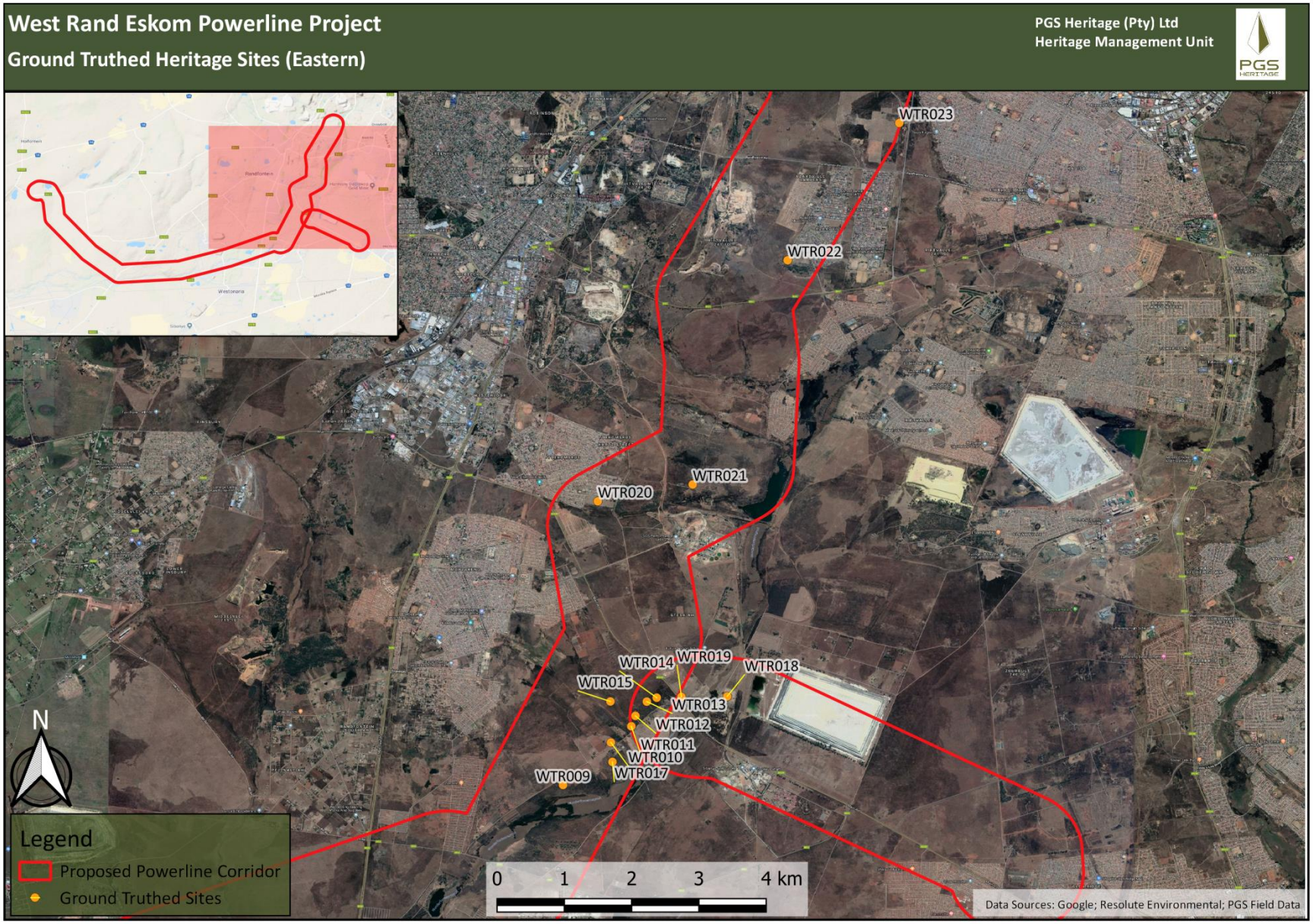


Figure 101 - Heritage sites identified during field survey (Eastern Portion)

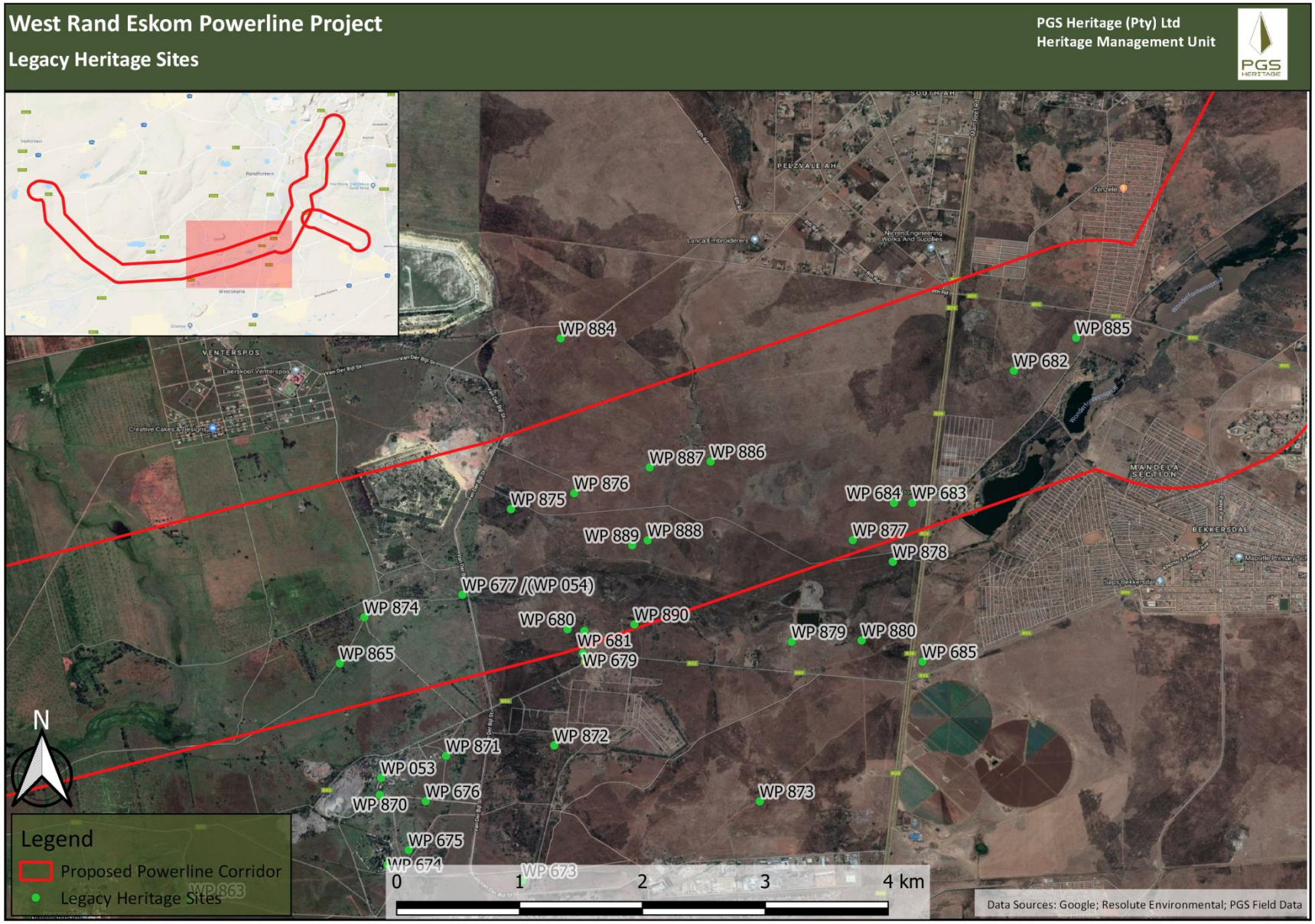


Figure 102 – Heritage sites identified in a previous PGS Heritage survey for another project in 2016

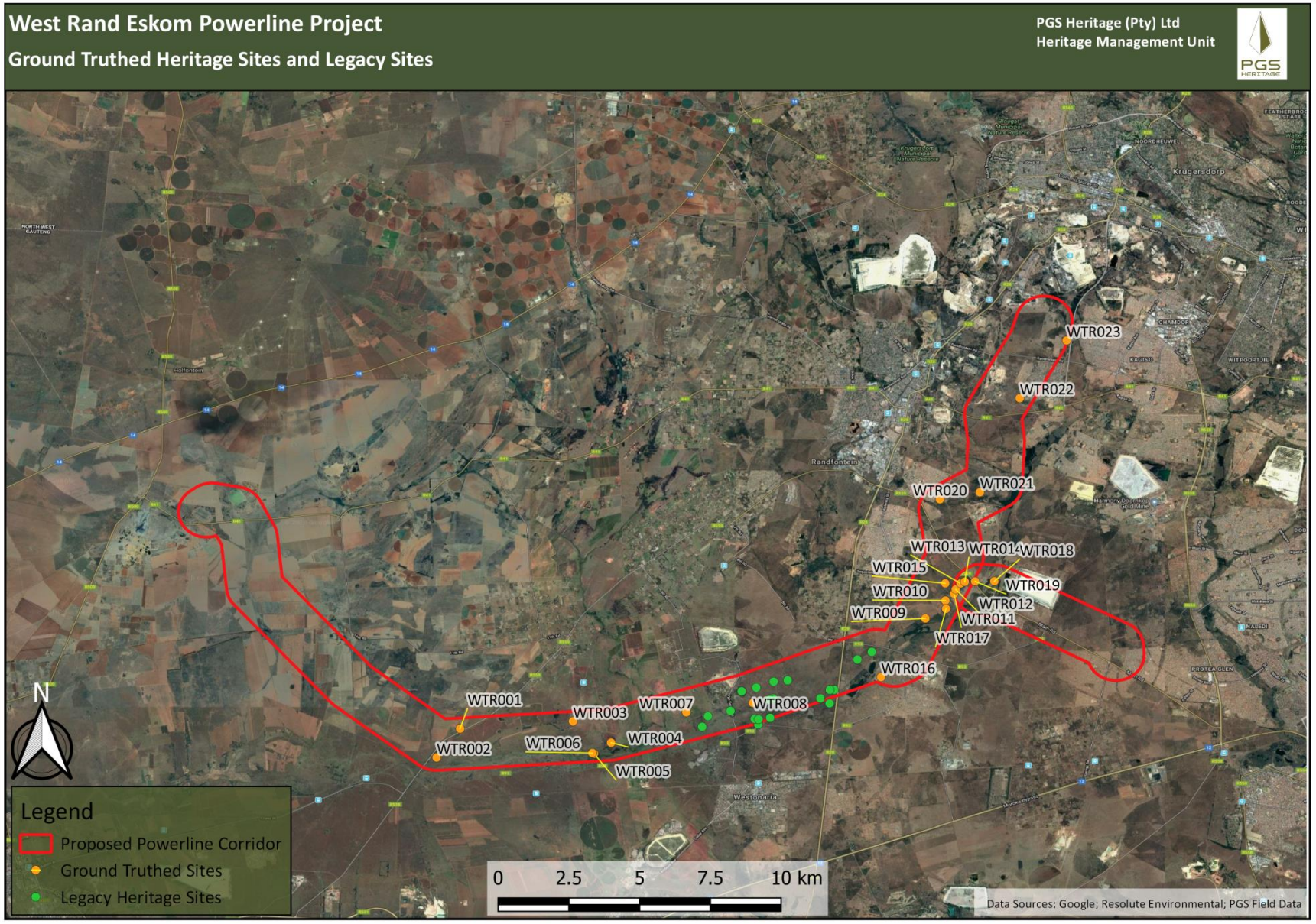


Figure 103 – Sites identified during the current project combined with legacy sites identified in a previous project

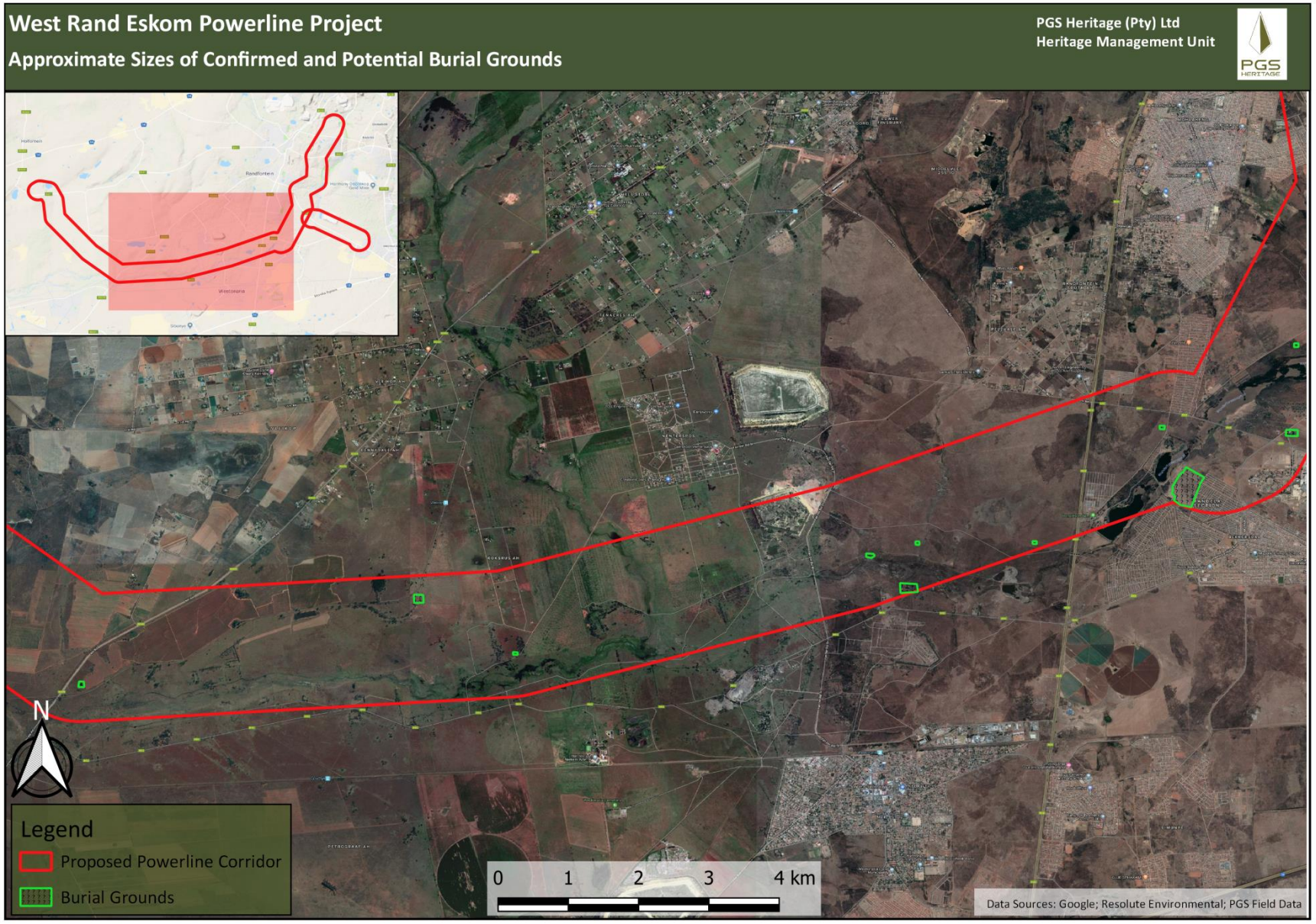


Figure 104 – Polygons representing approximate sizes of potential burial grounds and those identified during the field survey

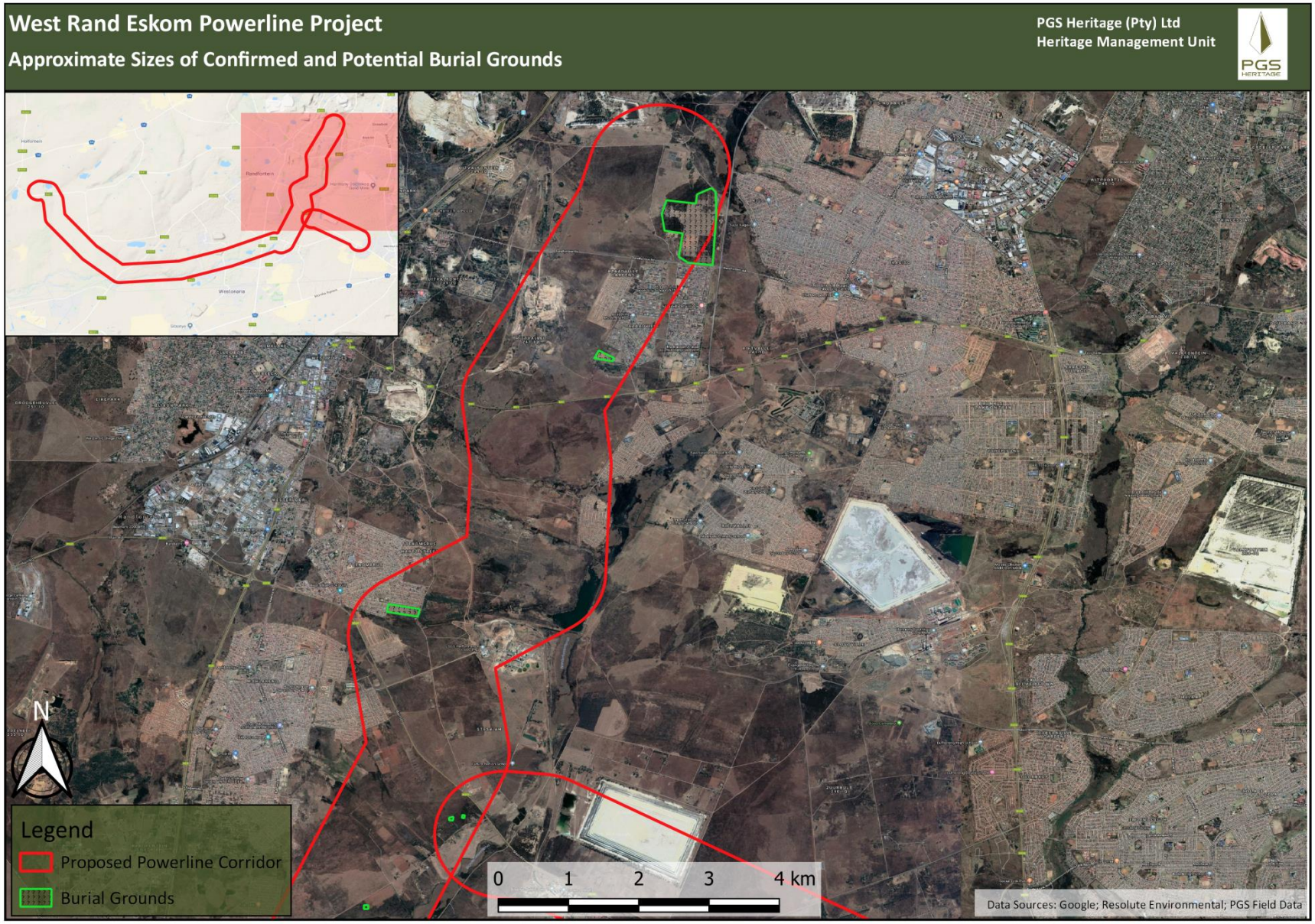


Figure 105 - Polygons representing approximate sizes of potential burial grounds and those identified during the field survey

4 PALAEONTOLOGY

Banzai Environmental was appointed to do a Palaeontological Desktop Assessment and found that:

The proposed Westrand Strengthening Project Phase II, is underlain by the following geological sediments:

- The Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup
- The Black Reef Formation of the Transvaal Supergroup
- The Klipriviersberg Group of the Ventersdorp Supergroup,
- The Turffontein Subgroup, Central Rand Group of the Witwatersrand Supergroup
- Government and Jeppestown Subgroup, Westrand Group of the Witwatersrand Supergroup

Rock formations of high Palaeontological Sensitivity are present in the study area and thus a field-based assessment by a palaeontologist is required in this formations while rock formations with a zero palaeontological sensitivity are unfossiliferous

Supergroup	**Group**	**Subgroup**	**Formation**	**Palaeontological Sensitivity**	**Fossil Heritage**
Quaternary					Bones, horn corns and mammalian teeth; reptile skeletons fragments of ostrich eggs. Microfossils, non- marine mollusc shells and freshwater stromatolites. Plant material as well as trace fossils like

					vertebrate tracks, burrows, termitaria and rhizoliths
Transvaal Supergroup	Chuniespoort Group	Malmani		High	Stromatolites
Transvaal Supergroup			Black Reef	High	Stromatolitic carbonates
Ventersdorp	Klipriviersberg			Insignificant or Zero	
Witwatersrand	Central Rand	Turffontein		Insignificant or Zero	
Witwatersrand	Central Rand	Johannesburg		Insignificant or Zero	
Witwatersrand	West Rand	Jeppestown		Insignificant or Zero	
Witwatersrand	West Rand	Government		Insignificant or Zero	

It is thus recommended that an EIA level palaeontology report will be conducted to assess the value and occurrence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. This consists of a Phase 1 field-based assessment by a professional palaeontologist. The purpose of the EIA Report is to expand on the issues and potential impacts identified during the scoping phase. This is achieved by site visits and research in the site-specific study area as well as a comprehensive assessment of the impacts identified during the scoping phase.

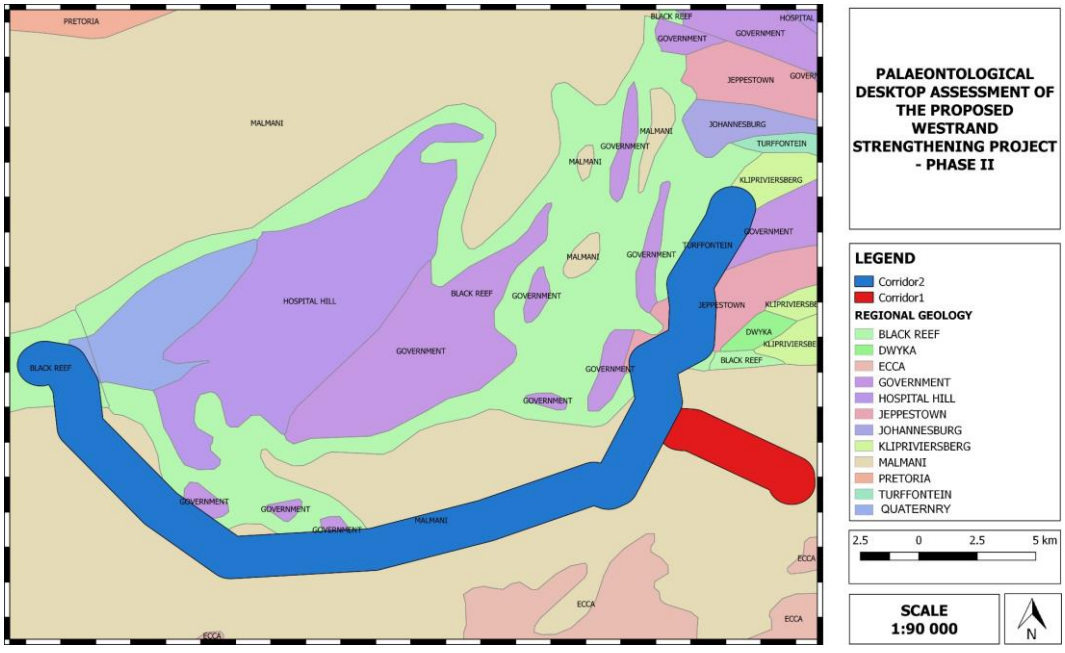


Figure 106: Figure 107. Surface geology of the West Rand Strengthening Project Phase II. The proposed development is underlain by the Transvaal, Ventersdorp and Witwatersrand Supergroups. Map drawn by QGIS Desktop 2.18.18

5 IMPACT ASSESSMENT

The aim of the impact evaluation is to determine the extent of the impact of the proposed project on the identified heritage resources and predict possible impacts on unidentified heritage resources.

During the field assessment, a total of 23 heritage sites were identified. These include twelve (12) burial grounds (**WTR002, WTR003, WTR004, WTR008, WTR009, WTR013, WTR014, WTR016, WTR020, WTR021, WTR022 & WTR023**) and eleven (11) historical sites (**WTR001, WTR005, WTR006, WTR007, WTR010, WTR011, WTR012, WTR015, WTR017, WTR018 & WTR019**). Refer to **Figure 98** for the locality of heritage resources in relation to the proposed development area.

It must be considered that the heritage significance of the identified sites plays a role in the evaluation of the impact and must influence the magnitude rating of the impact tables. Thus, a heritage resource with a high heritage significance rating will have a higher impact magnitude rating than a resource with a low or no heritage significance rating. Consequently, mitigation measures will be more extensive for a heritage resource with a high heritage significance than for those with a low heritage significance.

All the impacts are envisaged to happen during construction activities.

5.1 Status Quo and "No Go" option

5.1.1 Status Quo

No fatal flaws were identified from a cultural, historical, archaeological and paleontological perspective

5.1.2 "No go" Option

No such option is contemplated.

5.2 Project Impact

5.2.1 Heritage resources and sensitivity

The identified heritage resources are allocated a sensitivity buffer based on the recognised management buffers accepted by SAHRA in the past few years. No regulations in the NHRA provide guidelines on buffer zones. In the case of heritage sensitivity, a buffer of 20 – 50 meters is proposed based on the type of heritage resource. In the case of burial grounds and graves

(BGG) a buffer of 50 meters is generally proposed and 20 meters for a heritage structure such as ruins and other built structure.

5.2.2 Impact on burial grounds

Twelve (12) burial grounds were identified during the field work. Due to the social and cultural significance of burial grounds and graves, a high heritage significance is given to such sites.

The impact of the proposed project on the burial grounds is rated as having a HIGH negative significance before mitigation and with the implementation of mitigation measures as having a VERY LOW negative significance.

Table 4 - Assessment of impact of Development on burial grounds

Impact Name	**Impact on burial grounds**				
Alternative	**0**				
Phase	**Construction**				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Intensity of Impact	-4	-1	Consequence of Impact	-6	-3
Extent of Impact	0	0	Probability of Impact	3	0
Duration of Impact	2	2	Significance	-4	0
Significance (Pre-mitigation)					-4.00
Mitigation Measures					
Demarcate the site with a 50-meter buffer and avoid it. If the site cannot be avoided a grave relocation process will need to take place.					
Significance (Post-mitigation)					0.00

In the event of any heritage resources being uncovered, SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on mitigation.

5.2.3 Impact on Historical Structures

The impact of the proposed project on the historic heritage resources is rated as MODERATE negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to VERY LOW negative.

Table 5 – Assessment of impact on Destruction of heritage structures

Impact Name	**Destruction of Heritage structures**				
Alternative	**0**				
Phase	**Construction**				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Intensity of Impact	-2	0	Consequence of Impact	-4	-2
Extent of Impact	0	0	Probability of Impact	3	0
Duration of Impact	2	2	Significance	-2	0
Significance (Pre-mitigation)					-2.00
Mitigation Measures					
The sites should be avoided with at least a 20 m buffer if activities should occur near them. If the sites will be affected directly, they will need to be documented before a destruction permit can be applied for at the provincial heritage resources authority. In the event that any other heritage resources are uncovered SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on mitigation					
Significance (Post-mitigation)					0,00

5.2.4 Impact on Potential Stillborn Graves

While none of these sites were identified during the field work, their representation on the Historical Topographic maps marks their possible existence as a real concern. Due to the social and cultural significance of burial grounds and graves, a high heritage significance is given to such sites.

The impact of the proposed project on potential stillborn graves is rated as having a HIGH negative significance before mitigation and with the implementation of mitigation measures as having a VERY LOW negative significance.

Table 6 - Assessment of impact of Development on potential stillborn graves

Impact Name	**Impact on potential stillborn graves**				
Alternative	**0**				
Phase	**Construction**				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Intensity of Impact	-4	-1	Consequence of Impact	-6	-3

Extent of Impact	0	0	Probability of Impact	3	0
Duration of Impact	2	2	Significance	-4	0
Significance (Pre-mitigation)					-4.00
Mitigation Measures					
Demarcate the site with a 50-meter buffer and avoid it. If the site cannot be avoided a grave relocation process will need to take place.					
Significance (Post-mitigation)					0.00

5.2.5 Impact on Palaeontological Resources

The impact of the development will only occur on the site but most probably the fossil heritage will be negatively impacted on. When fossil heritage is destroyed the impact will be irreversible. The impact will be long term to permanent and the magnitude and probability of the impact will be high.

The impact of the proposed project on the Palaeontology is rated as having a HIGH negative significance before mitigation and with the implementation of mitigation measures as having a VERY LOW negative significance.

Table 7 – Impacts on Palaeontological Resources

Impact Name	**Loss of fossil heritage**				
Alternative	**0**				
Phase	**Construction**				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Intensity of impact	-3	-1	Consequence of Impact	-5	2
Extent of Impact	0	0	Probability of Impact	3	1
Duration of Impact	2	2	Significance	-3	1
Significance (Pre-mitigation)					-3.00
Mitigation Measures					
It is recommended that an EIA level palaeontology report will be conducted to assess the value and occurrence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. This consists of a Phase 1 field-based assessment by a professional palaeontologist.					
Significance (Post-mitigation)					0.00

5.3 Heritage Sensitivity Mapping

The following maps show the heritage sensitivity of the proposed study area as informed by the desktop research and the current known field data for the project.

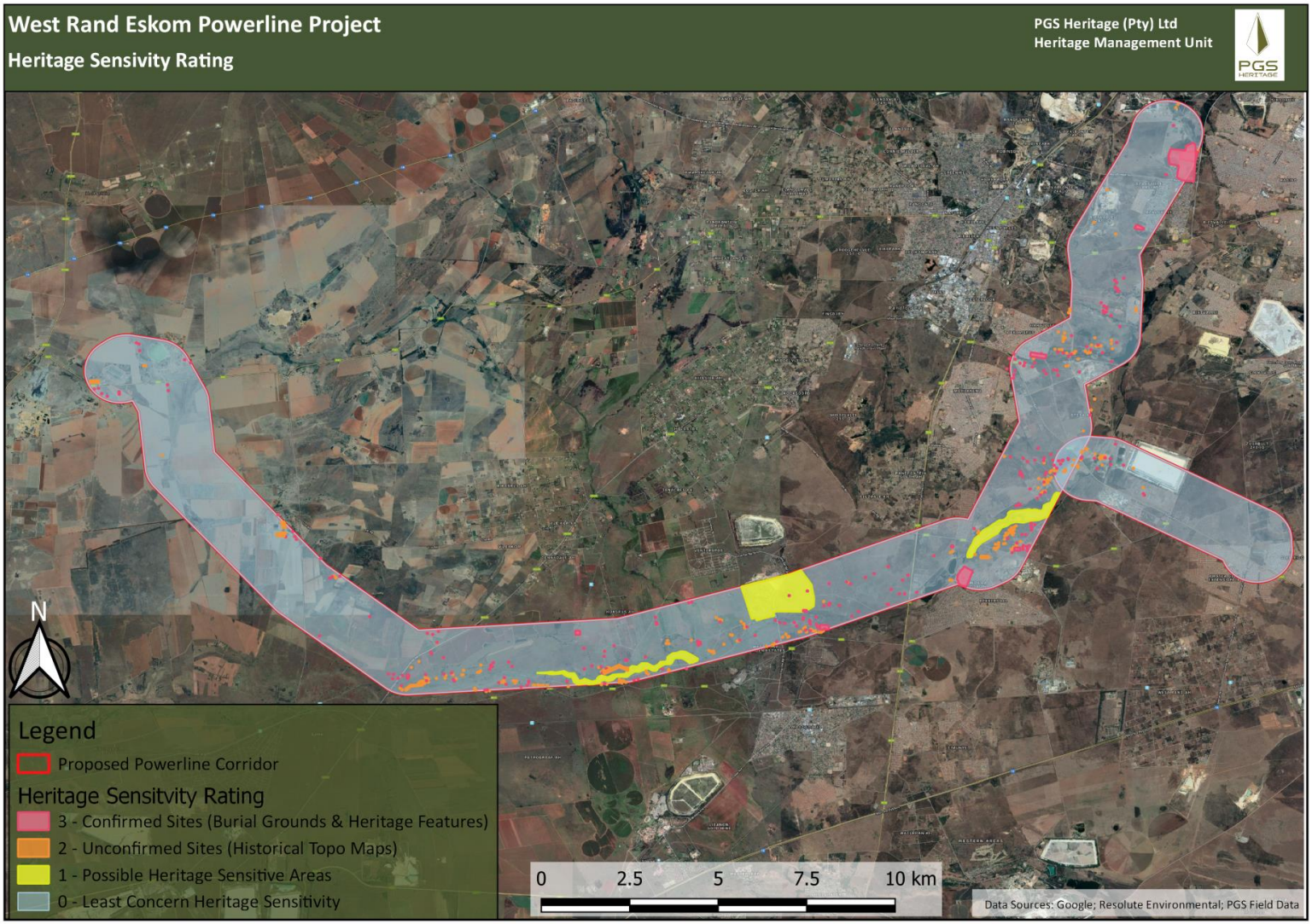


Figure 108 – Heritage sensitivity rating of the proposed corridor footprint

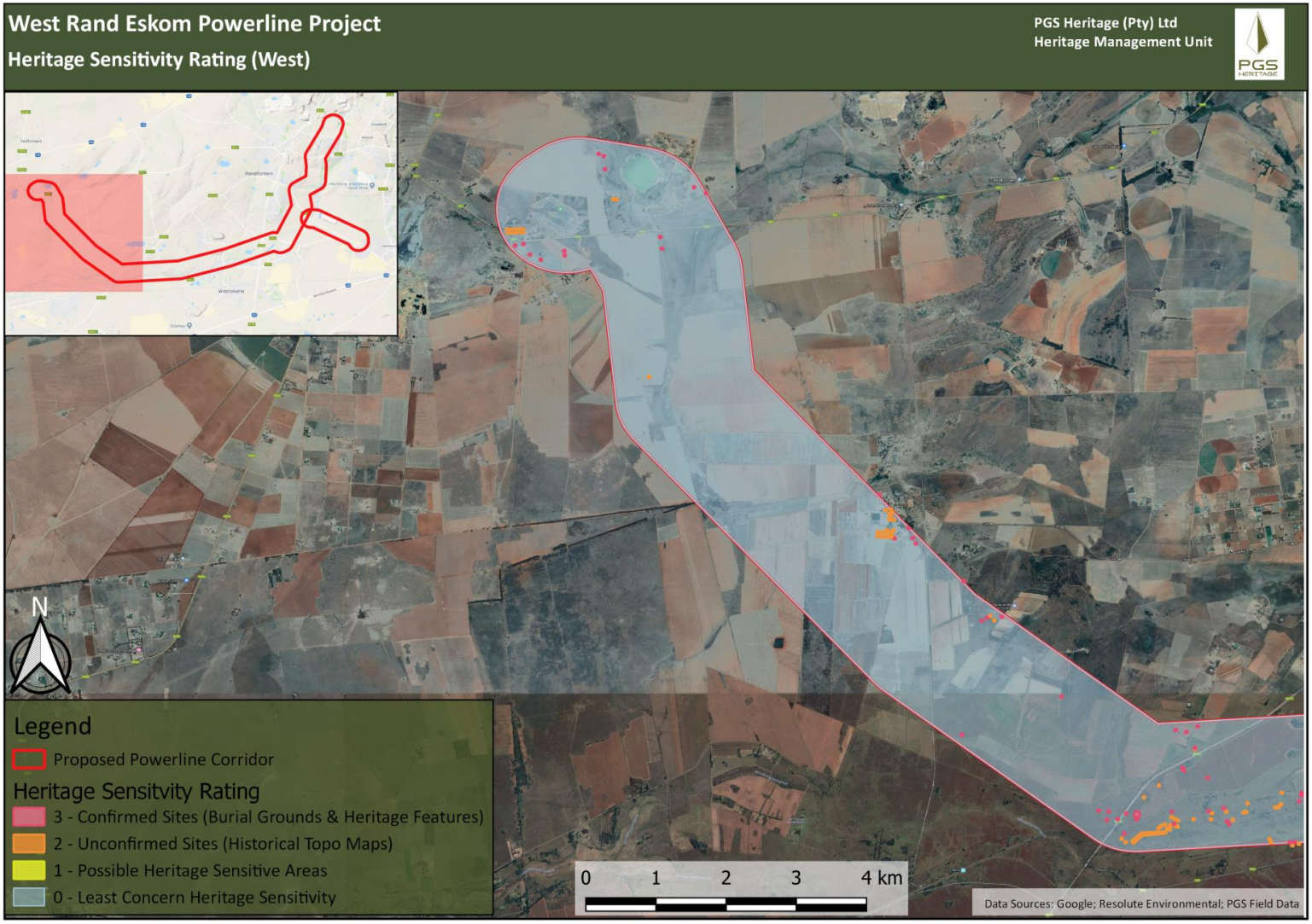


Figure 109 - Heritage sensitivity rating of the proposed corridor footprint (Western)

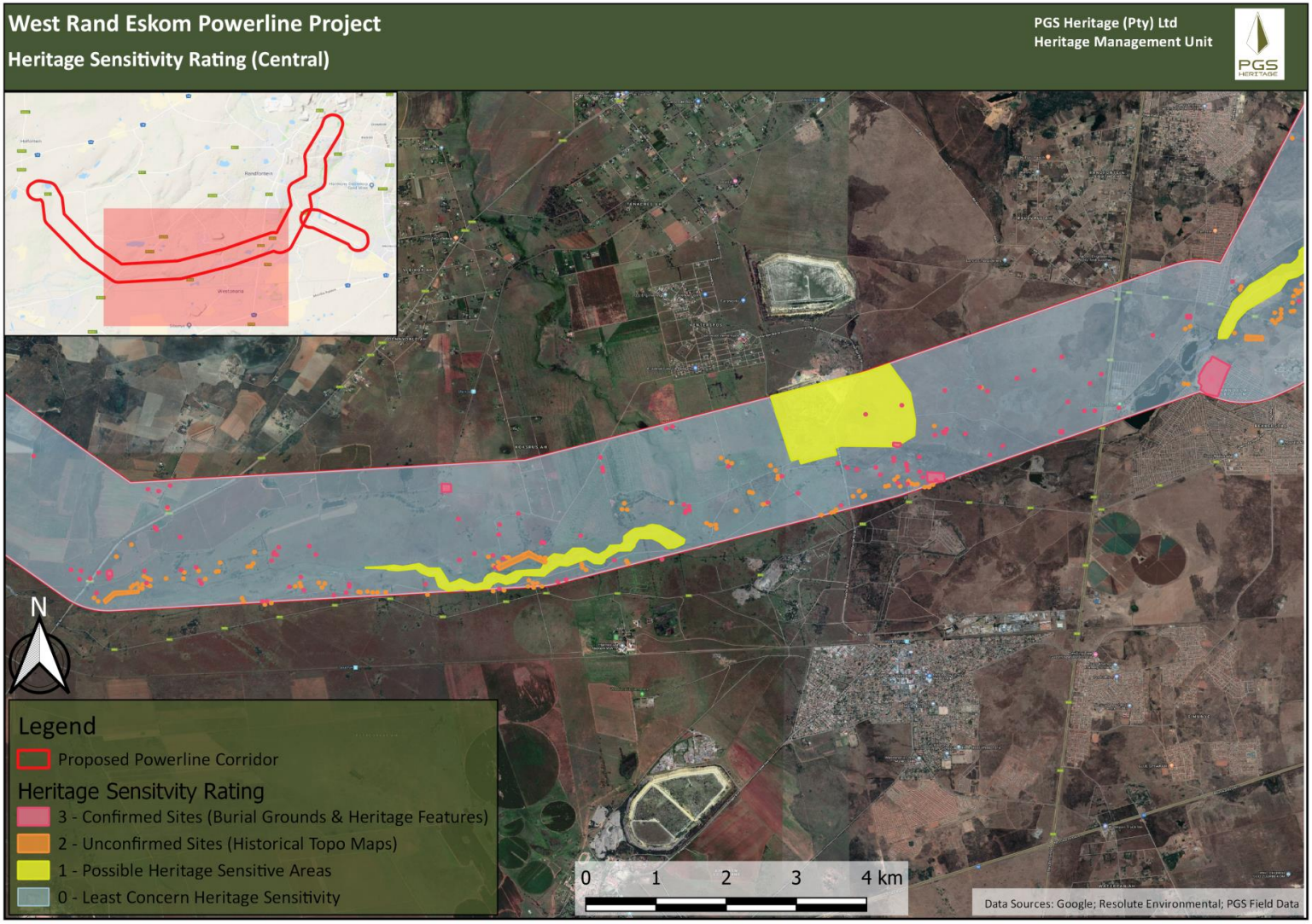


Figure 110 - Heritage sensitivity rating of the proposed corridor footprint (Central)

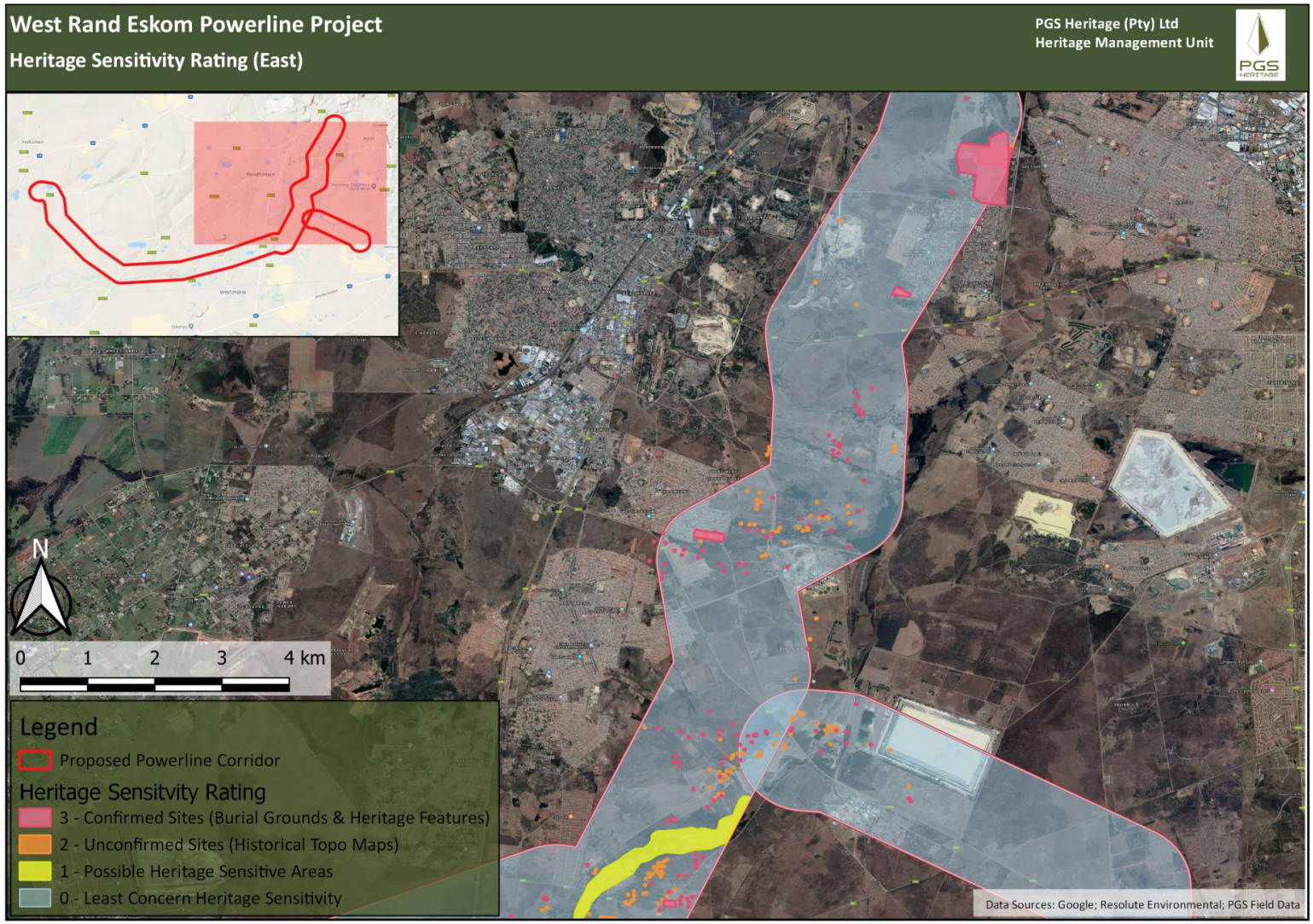


Figure 111 - Heritage sensitivity rating of the proposed corridor footprint (Eastern)

6 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

6.1 Construction phase

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

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure, such as construction camps and laydown areas, is often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure is implemented.

6.2 Chance find procedure

- A heritage practitioner should be appointed to develop a heritage induction program and conduct training for the ECO, as well as team leaders, in the identification of heritage resources and artefacts.
- An appropriately qualified archaeologist must be identified to be called upon in the event that any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities be halted.
- The qualified archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the archaeologist.

6.3 Possible finds during construction

The study area occurs within a greater archaeological site as identified during the fieldwork and scoping phase. Excavations of foundations and soil clearance can uncover the following:

- stone foundations;
- ash middens associated with the farmsteads and homesteads that can contain bone, glass and clay ceramics, ash, metal objects such as spoons, forks, and knives.
- possible infant burials

6.4 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 8** gives guidelines for lead times on permitting.

Table 8: Lead times for permitting and mobilisation

ACTION	RESPONSIBILITY	TIMEFRAME
Preparation for field monitoring and finalisation of contracts	The contractor and service provide	1 months
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	1 month
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and SAHRA	2 weeks
Relocation of burial ground or graves in the way of construction	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

6.5 Heritage Management Plan for EMPr implementation

NO.	MITIGATION MEASURES	PHASE	TIMEFRAME	RESPONSIBLE PARTY FOR IMPLEMENTATION	MONITORING PARTY (FREQUENCY)	TARGET	PERFORMANCE INDICATORS (MONITORING TOOL)	COST
			Possible finds					
A	Implement chance find procedures in case where possible heritage finds area made	Construction	During construction	Applicant ECO Heritage Specialist	ECO (weekly)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Monthly Checklist/Report	**R10 000**
Known sites								
Burial Grounds	Demarcate sites with a 50-meter buffer and avoid them. Stakeholder engagement will need to be implemented If this is not possible a detailed grave relocation process must be implemented as required under the NHRA and National Health Act regulations.	Construction	During construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report	**Relocation graves – R 10-15 mil**
Historical structures	The sites should be avoided with at least a 20 m buffer if activities should occur near them. If the sites will be affected directly, they will need to be documented before a destruction permit can be applied for at the provincial heritage resource	Construction	Construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34 and 38 of NHRA	ECO Monthly Checklist/Report	**R100 000**

NO.	MITIGATION MEASURES	PHASE	TIMEFRAME	RESPONSIBLE PARTY FOR IMPLEMENTATION	MONITORING PARTY (FREQUENCY)	TARGET	PERFORMANCE INDICATORS (MONITORING TOOL)	COST
	authority (Gauteng) If any other heritage resources are uncovered SAHRA should be contacted and a qualified archaeologist appointed to evaluate the finds and make appropriate recommendation on							
Palaeontology	• Phase I field-based assessment is recommended. This report will be conducted during deep excavation to assess the value and occurrence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. The purpose of the Phase I field-bases assessment is to expand on the issues and potential impacts identified during the desktop assessment. This is achieved by site visits and research in the site-specific study area as well as a comprehensive assessment of the impacts identified during the scoping phase. • The EAP and ECO must be notified that the whole study area has a Very High Palaeontological Sensitivity.	Construction	Construction	Applicant ECO Palaeontologist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA	ECO Monthly Checklist/Report	**R80 000**

NO.	MITIGATION MEASURES	PHASE	TIMEFRAME	RESPONSIBLE PARTY FOR IMPLEMENTATION	MONITORING PARTY (FREQUENCY)	TARGET	PERFORMANCE INDICATORS (MONITORING TOOL)	COST
	A Phase 1 PIA study and "Chance Find Protocol" must be completed during the first month of excavation. • The developer must apply for a collection and destruction permit for plant fossils encountered during the mining operation. • A palaeontologist must be employed to visit the mining operations at regular intervals (to be determined by the mine and palaeontologist) to record any extraordinarily well preserved fossils and collect representative samples of these fossils for further study at an accredited institution. These fossils may be placed on a stockpile where the palaeontologist may examine them. • These recommendations must be incorporated in the EMPr of this project.							

7 CONCLUSIONS AND RECOMMENDATIONS

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant.

7.1 Archaeology

The data analysis has enabled the identification of possible heritage sensitive areas that included:

- Dwellings;
- Clusters of dwellings (homesteads and farmsteads);
- Historical structures; and
- Graves and burial grounds.

Note that these structures refer to possible heritage sites as listed in **Table 9**.

Table 9 - Tangible Heritage site in the study area

Name	Description	Legislative protection
Dwellings and dwelling clusters	Possibly older than 60 years	NHRA Sect 3 and 34
Historical Structures	Possibly older than 60 years	NHRA Sect 3 and 34
Graves and Burial Grounds	Graves	NHRA Sect 3 and 36

Previous studies conducted in the greater area have shown that the archaeological includes Stone Age and Iron Age sites, as well as historical structures and graves or burial grounds.

During this study, 23 heritage sites were identified. These include 12 burial grounds, (of which four are municipal cemeteries (**WTR002, WTR003, WTR004, WTR008, WTR009, WTR013, WTR014, WTR016, WTR020, WTR021, WTR022, WTR023**) and 11 historical structures or dwellings (**WTR001, WTR005, WTR006, WTR007, WTR010, WTR011, WTR012, WTR015, WTR017, WTR018, WTR019**). Refer to **Figure 98** for the locality of heritage resources in relation to the proposed development area.

It should be noted that Heritage resources were identified previously within the study area during legacy fieldwork conducted by PGS in 2016 (17 sites). These sites are described in **Appendix D** and their positions shown in **Figure 102 & Figure 103**.

It must be considered that the heritage significance of the identified sites plays a role in the evaluation of the impact and must influence the magnitude rating of the impact tables. Thus, a heritage resource with a high heritage significance rating will have a higher impact magnitude rating than a resource with a low or no heritage significance rating. Consequently, mitigation measures will

be more extensive for a heritage resource with a high heritage significance than for those with a low heritage significance.

The management and mitigation measures as described in Section 6 of this report have been developed to minimise the project impact on heritage resources.

The impact of the proposed project on the burial grounds is rated as having a HIGH negative significance before mitigation and with the implementation of mitigation measures as having a VERY LOW negative significance

Impacts on Historical sites are rated as being as MODERATE negative significance before mitigation and with the implementation of the mitigation measures the impact significance is reduced to VERY LOW negative.

7.2 Palaeontology

Banzai Environmental was appointed to do a Palaeontological Desktop Assessment and found that:

The proposed Westrand Strengthening Project Phase II, is underlain by the following geological sediments:

- The Malmani Subgroup, Chuniespoort Group of the Transvaal Supergroup
- The Black Reef Formation of the Transvaal Supergroup
- The Klipriviersberg Group of the Ventersdorp Supergroup,
- The Turffontein Subgroup, Central Rand Group of the Witwatersrand Supergroup
- Government and Jeppestown Subgroup, Westrand Group of the Witwatersrand Supergroup

Rock formations of high Palaeontological Sensitivity are present in the study area and thus a field-based assessment by a palaeontologist is required in this formations while rock formations with a zero palaeontological sensitivity are unfossiliferous.

It is thus recommended that an EIA level palaeontology report will be conducted to assess the value and occurrence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. This consists of a Phase 1 field-based assessment by a professional palaeontologist. The purpose of the EIA Report is to expand on the issues and potential impacts identified during the scoping phase. This is achieved by site visits and research in the site-specific study area as well as a comprehensive assessment of the impacts identified during the scoping phase.

7.3 General

In the event that heritage resources are discovered during site clearance, construction activities must stop and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.

The overall impact of the development, on the heritage resources identified during this report, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.

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Appendix A

Heritage Assessment Methodology

The applicable maps, tables and figures are included, as stipulated in the NHRA (Act No 25 of 1999) and NEMA (Act No 107 of 1998). The HIA process consisted of three steps;

Step I – Literature Review - The background information to the field survey relies greatly on the Heritage Background Research.

Step II – Physical Survey - A physical survey was conducted predominantly by foot within the proposed areas by two qualified archaeologists, which aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

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

The significance of identified heritage sites are based on four main criteria -

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
    - Low - <10/50m2
    - Medium/High - 10-50/50m2
    - High - >50/50m2
- Uniqueness; and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows -

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate development activity position;
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site.

Impacts on these sites by the development will be evaluated as follows -

Site Significance

Site significance classification standards prescribed by the SAHRA (2006) and approved by the ASAPA for the Southern African Development Community (SADC) region, were used for the purpose of this report (**Table 10**).

Table 10 - Site significance classification standards as prescribed by SAHRA.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1		Conservation; National Site nomination
Provincial Significance (PS)	Grade 2		Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)		High / Medium/High Significance	Mitigation before destruction
Generally Protected B (GP.B)		Medium/High Significance	Recording before destruction
Generally Protected C (GP.C)		Low Significance	Destruction

Appendix B

The Significance Rating Scales for the Proposed Construction Activities on Heritage Resources

The assessment of the significance of impacts for a proposed development is by its nature, a matter of judgement. To deal with the uncertainty associated with judgement and ensure repeatable results, impacts are rated using a standardised recognised methodology adhering to NEMA and ISO 14001.

CONSEQUENCE CRITERIA

For each predicted impact, criteria are applied to establish the significance of the impact based on likelihood and consequence, both without mitigation being applied and with the most effective mitigation measure(s) in place:

The criteria that contribute to the consequence of the impact are intensity (the degree to which pre- development conditions are changed), which also includes the type of impact (being either a positive or negative impact); the duration (length of time that the impact will continue); and the extent (spatial scale) of the impact. The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence by appropriately adjusting the thresholds or scales of the intensity, duration and extent criteria, based on expert knowledge. For each impact, the specialist applies professional judgement to ascribe a numerical rating for each criterion according to the examples provided in **Table 11**, **Table 12** *&* **Table 13**

Table 11 - Definition of Intensity ratings

Criteria	Negative impacts (-)	Positive impacts (+)
Very high (-/+ 4)	Very high degree of damage to natural or social systems or resources. These processes or resources may restore to their pre-project condition over very long periods of time (more than a typical human life time).	Great improvement to ecosystem or social processes and services or resources.
High (-/+ 3)	High degree damage to natural or social system components, species or resources.	Intense positive benefits for natural or social systems or resources.
Moderate (-/+ 2)	Moderate damage to natural or social	Average, on-going positive benefits for

	system components, species or resources	natural or social systems or resources.
Low (-/+ 1)	Minor damage to natural or social system components, species or resources. Likely to recover over time. Ecosystems and valuable social processes not affected.	Low positive impacts on natural or social systems or resources
Negligible (0)	Negligible damage to individual components of natural or social systems or resources, such that it is hardly noticeable.	Limited low-level benefits to natural or social systems or resources.

Table 12 - Definition of Duration ratings

Rating	Criteria
2	Long-term: The impact will continue for 6-15 years.
1	Medium-term: The impact will continue for 2-5 years.
0	Short-term: The impact will continue for between 1 month and 2 years.

Table 13 - Definition of Extent ratings

Rating	Criteria
2	Regional: The impact will affect the entire region
1	Local: The impact will extend across the site and to nearby properties.
0	Site specific: The impact will be limited to the site or immediate area.

The consequence is then established using the formula:

Consequence = type x (intensity + duration + extent)

Depending on the numerical result, the impact's consequence would be defined as either extremely, highly, moderately or slightly detrimental; or neutral; or slightly, moderately, highly or extremely beneficial. These categories are provided in

Table 14**.**

Table 14 - Application of Consequence ratings

Rating	Significance rating
-8	Extremely detrimental
-7 to -6	Highly detrimental
-5 to -4	Moderately detrimental
-3 to -2	Slightly detrimental
-1 to 1	Negligible
2 to 3	Slightly beneficial
4 to 5	Moderately beneficial
6 to 7	Highly beneficial
8	Extremely beneficial

Significance criteria

To determine the significance of an impact, the probability (or likelihood) of that impact occurring is also taken into account. In assigning probability the specialist takes into account the likelihood of occurrence but also takes cognisance of uncertainty and detectability of the impact. The most suitable numerical rating for probability is selected from Table 8.

Table 15 - Definition of Probability ratings

Rating	Significance Rating
4	Certain/ Definite: There are sound scientific reasons to expect that the impact will definitely occur.
3	Very likely: It is most likely that the impact will occur.
2	Fairly likely: This impact has occurred numerous times here or elsewhere in a similar environment and with a similar type of development and could very conceivably
1	Unlikely: This impact has not happened yet but could happen.
0	Very unlikely: The impact is expected never to happen or has a very low chance of occurring.

The significance is then established using the following equation:

Significance = consequence[1] x probability

Depending on the numerical result of this calculation, the impact would fall into a significance category of negligible, minor, moderate or major, and the type would be either positive or negative. Examples of these categories are provided in Table 9.

Table 16 - Application of significance ratings

Rating	Significance rating
-4	Very high - negative
-3	High - negative
-2	Moderate - negative
-1	Low - negative
0	Very low
1	Low - positive
2	Moderate - positive
3	High - positive
4	Very high - positive

Confidence rating

Once the significance of an impact occurring without mitigation has been established, the same impacts will be assigned ratings after the proposed mitigation has been implemented.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts. The specialists appointed to contribute to this impact assessment have empirical knowledge of their respective fields and are thus able to comment on the confidence they have in their findings based on the availability of data and the certainty of their findings. As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard “degree of certainty” scale (Table 10). The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 17 - Definition of Confidence ratings

Rating	Criteria
Low	Judgement is based on intuition and there some major assumptions used in assessing the impact may prove to be untrue.
Medium	Determination is based on common sense and general knowledge. The assumptionsmade, whilst having a degree of uncertainty, are fairly robust.
High	Substantive supportive data or evidence exists to verify the assessment.

Mitigation of Potential and Residual Impacts

The significance of the impacts identified during the scoping phase will be assessed during the impact assessment phase. The specialists will recommend measures to mitigate the impacts.

The implementation of the mitigation measures is ensured through the EMP. The EMP will be used to enforce the mitigation measures and ensure that the impacts of all phases of the proposed project are properly managed and addressed. The EMP will meet all the requirements of NEMA.

Appendix C

Project team CV's

ILAN SMEYATSKY

Professional Archaeologist

Personal Details

- **Name:** Ilan
- **Surname:** Smeyatsky
- **Identity Number:** 9109275072080
- **Date of Birth:** 27-09-1991
- **Citizenship:** South African
- **Gender:** Male
- **Marital Status:** Single
- **Languages Spoken**: English

Education History

2010-2013: **BSc Bachelors Degree**

University of the Witwatersrand, Johannesburg, South Africa

- Archaeology
- Psychology
- Statistics
- Research Design and Analysis
- 67% Pass (**2:1 Qualification**)

2014: **BSc (Hons) in Archaeology**

AWARDS:

- Received the 2014 Center of Excellence in Palaeoscience award - **Bursary to the value of ZAR 30000 ≈ $2500**
- Received the Post-Graduate Merit Award in 2015 for academic merit for my Honours academic results - **Bursary to the value of ZAR 25000 ≈ $1800**

University of the Witwatersrand, Johannesburg, South Africa

- Archaeology
- Excavation techniques
- Theory
- 69% Pass (**2:1 Qualification**)
- **Distinction** received for thesis entitled: "Stylistic variation in Later Stone Age tanged arrowheads: a pilot study using geometric morphometrics"

2015-2017: **MSc by Research (Archaeology)**

University of the Witwatersrand, Johannesburg, South Africa

- Archaeology
- Statistical analysis
- GIS (Geographic Information Systems)
- Thesis entitled: "Discerning and explaining shape variations in Later Stone Age tanged arrowheads, South Africa"

Aug 2016 –
Jan 2017: **Semester of Archaeology Masters**

AWARD: Received the 2016 AESOP+ full Masters scholarship to study at Uppsala University, Uppsala, Sweden – **Scholarship to the value of ZAR 160,000 ≈ $11,000**
Uppsala University, Uppsala, Sweden

- Archaeological theory
- GIS (Geographic Information Systems)
- Invitational research

Employment History
Part time employment as a student:

- **2009-2013**: Part-Time Electrician Apprentice: Assisting in home electrical repair jobs.
- **2014-2015:** Lab Research Assistant: Analysing and classifying lithic artefacts, Data capturing, Mentoring trainee research assistants.

Experience in the field of archaeology:

- **2013-2015: Fieldwork/Excavator - Responsibilities:** Feature detection, excavation, sieving, sorting, analysis, soil sampling, field documentation, 'dumpy' operation , Total Station operation, DGPS operation, rock art tracing and photography, engraving tracing and photography.
    - South African excavations:
        - Early Stone Age excavation at Maropeng World Heritage Site in Gauteng (1 Week – August 2015)
        - Pig cadaver exhumation as part of forensic experiment near Pretoria, Gauteng (1 Week – December 2014) - Praised for having the determination of returning for each subsequent excavation day as it was performed on a purely volunteer basis and the work conditions were particularly strenuous - Dr. Coen Nienaber

        - Iron Age excavation at Komati Gorge, Mpumalanga (1 Week – August 2014) - Praised for being exceptionally “methodical and proficient” with my excavation techniques – Dr. Alex Schoeman
        - Rock art fieldwork at Komati Gorge, Mpumalanga (1 Week – August 2014)
        - Underwater archaeology site mapping Komati Gorge, Mpumalanga (1 Week – August 2014)
        - Early Stone Age excavation at Maropeng World Heritage Site in Gauteng (2 Weeks - September 2013) - Personally uncovered some of the only stone tools (~1.8 million years old) found during that digging season.
- **2016: Excavation Supervisor - Responsibilities:** Supervision of two junior excavators, site detection, decision of excavation grid placement, excavation, sieving, sorting, soil sampling, field documentation.
        - Historical (farm site) excavation at Graaff-Reinet, Eastern Cape, South Africa (2 Weeks)
        - Completed dig 1 week ahead of schedule aided by my efficient direction, drive and support to the excavators under my supervision.
- **April 2017 – April 2018:** Intern Archaeologist – PGS Heritage: Heritage Impact assessments, background research, report writing, permit applications, collections management, stakeholder engagement and grave relocation.
- **April 2018 – PRESENT:** Archaeologist – PGS Heritage: Heritage Impact assessments, background research, report writing, permit applications, collections management, stakeholder engagement and grave relocation.

Professional Body Membership:

- Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member
- CRM Accreditation (ASAPA) -
    - Field Supervisor – Stone Age, Iron Age & Grave Relocations

PROFESSIONAL CURRICULUM

JENNIFER KITTO

Name:	Jennifer Kitto
Profession:	Heritage Specialist
Date of Birth:	1966-09-11
Parent Firm:	PGS Heritage (Pty) Ltd
Position in Firm:	Heritage Consultant
Years with Firm:	7 Years
Years experience:	20
Nationality:	South African
HDI Status:	White Female

EDUCATION:

Name of University or Institution:	Dorset Institute for Higher Education (now Bournemouth University), Poole, United Kingdom
Degree obtained:	**:**Higher National Diploma: Practical Archaeology
Year	**:**1989

Name of University or Institution	**:** University of the Witwatersrand
Degree obtained	**:** BA
Major subjects	**:**Archaeology and Social Anthropology
Year	**:**1993

Name of University or Institution	**:**University of the Witwatersrand
Degree obtained	**:** BA [Hons]
Major subjects	**:**Social Anthropology
Year	**:** 1994

Professional Qualifications:

Member - Association of Southern African Professional Archaeologists – Technical Member No. 444

Languages:

English First Language

Afrikaans - Speaking (Fair) Reading (Fair), Writing (Fair**)**

KEY QUALIFICATIONS

Cultural Resource Management and Heritage Impact Assessment Management, Historical and Archival Research, Archaeology, Anthropology, Applicable survey methods, Fieldwork and Project Management.

SUMMARY OF EXPERIENCE

Specialised expertise in Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, including *inter alia* -

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Heritage Audits and subsequent Compilation of Heritage Management Policy for various projects

HERITAGE ASSESSMENT PROJECTS

Below a selected list of Heritage Impact Assessments (HIA) and Heritage Audit and Management Projects completed:

- Heritage Screening Reports for Various Road Routes: Bronkhorstspruit, Carletonville and Randfontein and Eikenhof-Vaal Dam regions, Gauteng Department of Roads and Transport, Gauteng Province
- Heritage Audit and Management Policy, Sibanye Gold, Beatrix Mining area, Lejweleputswa District Municipality, Free State Province
- Heritage Audit and Management Policy, Sibanye Gold, Kloof and Driefontein Mining areas, West Rand District Municipality, Gauteng Province
- HIA Report, Dolos-Giraffe Substation, Hopefield-Bultfontein, Free State Province
- HIA Report and Phase 2 Mitigation Report, AEL Mining Services, Decontamination of AEL Detonator Campus, Modderfontein Factory, Modderfontein, City of Johannesburg Metropolitan Municipality, Gauteng
- HIA Report, Old Rand Leases Hostel redevelopment, Fleurhof Ext 10, Roodepoort, City of Johannesburg Metropolitan Municipality, Gauteng
- HIA Report, Watershed Substation, North-West Province
- HIA Report, Solid Waste Landfill Facility, Rhodes Village, Eastern Cape
- HIA Report, Solid Waste Landfill Facility, Rossouw, Eastern Cape
- Phase 2 Mitigation Report, Cass Farmstead, Optimum Colliery, Mpumalanga
- HIA Report, Kusile Ash Disposal Facility, Witbank, Mpumalanga
- Report on Rand Steam Laundries Background History, City of Johannesburg Metropolitan Municipality, Gauteng
- New Cemetery, Barkly East, Senqu Municipality, Eastern Cape (desktop/archival research for HIA report)
- Lady Slipper Country Estates, Nelson Mandela Metro Municipality, Eastern Cape (desktop/archival research for HIA report)

- Exxaro Resources Paardeplaats Project, Belfast, Mpumalanga (field survey and archival research for HIA report)
- Copperleaf Mixed Use Development, Farm Knoppieslaagte 385/Knopjeslaagte 140, Centurion, Gauteng (field survey and archival research for HIA report)
- Isundu-Mbewu Transmission Line Project, Pietermaritzburg, Kwazulu Natal (Initial Heritage Scan (survey) for Corridor 3 Alternative 1)

GRAVE RELOCATION PROJECTS

Below, a selection of grave relocation projects involvement:

- Mitigation Report on previous Grave Relocation and Permit applications for Test Excavation of two possible graves, Nkomati Mine, Mpumalanga
- Relocation of two graves Olievenhoutbosch, Tshwane, Gauteng (applications to SAHRA, Gauteng Dept. of Health and Local Authorities for relevant permits)
- Relocation of graves HL Hall Family, Nelspruit, Mpumalanga (applications to SAHRA, Mpumalanga Department of Health and Local Authorities for relevant permits)
- Relocation of two possible graves Noordwyk Ext 63, Midrand, Johannesburg, Gauteng (applications to SAHRA, Gauteng Dept. of Health and Local Authorities for relevant permits)
- Relocation of informal cemetery (50+) and additional unknown graves (50+) at Fleurhof Extension 5, Roodepoort, Gauteng (desktop research and applications to SAHRA, Gauteng Health Department and Local Government for relevant permits in terms of the applicable legislation)
- Relocation of informal graves (9) at Tselentis Colliery, Breyten, Mpumalanga (applications to SAHRA, Mpumalanga Department of Health and Local Authorities for relevant permits)
- Relocation of various informal cemeteries at New Largo Mine, Balmoral, Mpumalanga (as above)
- Relocation of graves at Mookodi Power Station, Vryburg, North-West Province (initial social consultation)
- Relocation of graves at Hendrina Power Station, Hendrina, Mpumalanga (social consultation, permit applications, etc)

EMPLOYMENT SUMMARY:

Positions Held

- 2011 – to date: Heritage Specialist - PGS Heritage (Pty) Ltd
- 2008 – 2011: Cultural Heritage Officer (National), Burial Grounds and Graves Unit: South African Heritage Resources Agency (SAHRA)
- 1998 – 2008: Cultural Heritage Officer (Provincial), Provincial Office – Gauteng: SAHRA

WOUTER FOURIE

Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage

Summary of Experience

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave "rescue" excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
    - Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
    - Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

Key Qualifications

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

Key Work Experience

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mauritius, Malawi, Mozambique and the Democratic Republic of the Congo

Appendix D

Legacy Site Information

WP NO.	SITE NO.	SITE DESCRIPTION	COORD (S)	COORD (E)	GRADE CODE	SITE TYPE	MNGMNT CODE	NHRA SEC	AREA	NOTES
WP 677 /(WP 054)	37	Three large concrete support structures and remains of square/rectangular structure with drainage/weir? feature.	-26.287504	27.641850	GP. C	3B	D	S. 34	Kloof - Venters-post	*A railway bridge is shown on 1943 map.* This structure seems to be similar to a modern structure identified in the detailed survey in Kloof area (Site 71/WP 707).

WP 680	40	Stone and cement rectangular kraal, with several enclosures. Stone and cement building adjacent to kraal (same materials). Associated remains of 3-4 other structures.	-26.290317	27.650418	GP. C	3C	D	S.34	Kloof - Venters-post	*Three buildings are shown on 1943 map, but not kraal. Possibility of infant graves. NB: small fenced sinkhole in vicinity.*
WP 681	41	Multi-structure complex that seems to be old shopping centre (from materials – brick, wooden frames, columns). Could be 60+ years. Used as dwelling, did not access the inside. Known as "Malawi Stores", by the mining staff. Separate old store building located	-26.290460	27.651791	GP.A	3A	B	S.34	Kloof - Venters-post	**Site located just outside audit study area.** *Four buildings are shown on 1943 map, marked as Winkel and Post Office.* ***Letter from law firm for SG that confirms this building is 60+ years and protected.*** *Estimated date c. 1915-1935*

		behind the shopping centre, with foundation remains. Also foundation remains located few meters E of the Malawi Stores.								
WP 682	42	Large area (100m x 100m) with foundation remains of approx. 10 structures, some parts of walls remain. Mostly concrete or brick and concrete. Overgrown with long grass.	-26.269242	27.686802	GP. C or D	3C	D	S.34	Kloof - Venters-post	*No buildings indicated on 1943 map.*

WP 683	43	Concrete foundation remains, three small structures/rooms. One foundation had a small brick pile with a candle placed on it.	-26.280009	27.678523	D	3C	E	S.34	Kloof - Venters-post	*Nothing indicated on 1943 map. Possibility of infant graves*
WP 684	44	Religious site – stone circle with several associated stone arcs and medium oval / long heaps of stones.	-26.280022	27.677029	E	5	D	S.3	Kloof - Venters-post	A second associated stone circle was identified in the detailed survey. Nothing indicated on 1943 map.

WP 865	181	Ruins of animal farm stalls and dipping structure. Dipping structure made from stone, animal stalls made from plastered brick.	-26.29310	27.63185	GP. C	3C	D1	S.34	Kloof - Block 9/10 Venters-post	. *Not on 1943 map*
WP 874	190	Foundation remains of at least three ruined buildings: one made from concrete, one from stone with a cement "stoep" and collapsed brick walls, one made with stone and bricks. Very overgrown with grass and surrounded by trees, the vegetation was recently burnt.	-26.28935	27.63386	GP. C	3C	D2	S.34	Kloof - Block 9/10 Venters-post	*Three structures shown on 1943 map, one marked 'Winkel'. Possibility of infant graves.*

WP 875	191	Ruins of an old farmstead, approx. seven buildings, most completely demolished/collapsed. Most made from plastered and painted bricks.	-26.28052	27.64581	GP. C	3C	D2	S.34	Kloof - Block 9/10 Venters-post	*One structure with a wall shown on 1943 map. Possibility of infant graves.*
WP 876	192	Three old concrete bunkers situated within earth berms. No other buildings or remains are associated with them.	-26.27923	27.65097	GP. C	3C	D1	S.34	Kloof - Block 9/10 Venters-post	*Three structures shown on 1943 map, in area of 'Venterspost Gold Mine'.*

WP 877	193	Three visible stone packed graves, no headstones, overgrown with grass.	-26.28305	27.67367	GP. A	1	A	S.36	Kloof - Block 9/10 Venters-post	*Not on 1943 map*
WP 885	198	Seven informal stone packed graves, only one of which had a headstone but with no inscription. The graves have been cleaned recently so the family still visits them. The graves are fenced with a new fence.	-26.266553	27.691876	GP. A	1	A	S.36	Kloof - Block 10 - Venters-post	*No graves marked on 1943 map but two buildings are shown nearby.*

WP 886	199	Rectangular stone (quartz) foundation walls. Probably remains of homestead.	-26.276647	27.662080	GP. C	3C	D2	S.34	Kloof - Block 10 - Venters-post	*1943 map shows one building, one hut and 'ruins' at this position. Possibility of infant graves.*
WP 887	200	Two visible rectangular stone (quartz) foundation walls, one small and one large. Situated under a double powerline. Probably remains of homestead.	-26.277124	27.657115	GP. C	3C	D2	S.34	Kloof - Block 10 - Venters-post	*Not indicated on 1943 map. Possibility of infant graves.*

WP 888	201	Informal graveyard containing approx. 26 graves, stone packed, in three (?) discrete groups within a cleared area of about 50m radius. Some headstones, no inscriptions. The site is located close to the bank of a nearby river.	-26.283069	27.656950	GP. A	1	A	S.36	Kloof - Block 10 - Venters-post	*Not on 1943 map but one building nearby.*
WP 889	202	The stone foundation wall remains of a rectangular two-roomed building. Probably remains of homestead.	-26.283474	27.655695	GP. C	3C	D2	S.34	Kloof - Block 10 - Venters-post	*Not on 1943 map. Possibility of infant graves*

WP 890	203	A cemetery containing approx. 15 visible graves, which are very overgrown with grass and bushes. Two graves have headstones with inscriptions that indicate European names and are inscribed in Dutch (Booysens, etc). The Dutch headstone has a date of death of 1908. Several headstones are illegible.	-26.289929	27.655871	GP. A	1	A	S.36	Kloof - Block 10 - Venters-post	**The cemetery is located just outside the Block 10 study area, however, due to the age of the graves and the presence of several sinkholes it was recorded.** . *Not on 1943 map.*