HIA for Springfield Project

Springfield Mining Project situated between Vereeniging and Meyerton, in the Sedibeng District Municipality, Gauteng Province.

Heritage Impact Assessment

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Declaration of Independence

- I, Wouter Fourie, 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;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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SIGNATURE: 

ACKNOWLEDGEMENT OF RECEIPT

Report Title	*HIA for Springfield Project situated between Vereeniging and Meyerton, in the Sedibeng District Municipality, Gauteng Province.*		
Control	**Name**	**Signature**	**Designation**
Reviewer	**W Fourie**		**PGS Heritage -Project Manager/Archaeologist**
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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, 2017) 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 C
(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	N/A
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 4.4
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Appendix A and 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 4
(g) An identification of any areas to be avoided, including buffers	Section 4
(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 4.3
(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 4
(k) Any mitigation measures for inclusion in the EMPr	Section 6
(l) Any conditions for inclusion in the environmental authorization	Section 6
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorization	Section 6
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 6 and 7
(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	Section 6
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Informal consultation in fieldwork.
(p) A summary and copies if any comments that were received during any consultation process	Not applicable. To date no 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

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd was appointed by uKhozi Environmentalists (Pty) Ltd to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) for the Springfield Project situated between Vereeniging and Meyerton, in the Sedibeng District Municipality, Gauteng Province.

A further standalone Palaeontological Impact Assessment (PIA) was completed for PGS by Dr Elize Butler of Banzai Environmental

The HIA identified various heritage resources within the study area of which the burial grounds and graves and Provincial Heritage Site of Redan (archaeological rock engravings) could be rated as having a high to very high heritage significance and will require the implementation of the proposed management measures before the project can continue. Several areas containing Historical structures were also identified, some of which would also require mitigation.

Burial grounds and graves

Five burial grounds and graves were identified in the Springfield Mining Right Application (MRA) area (KF001, KF002, KF005, KF006, KF010). An additional burial ground KF007 was identified 60 meters outside of the MRA boundary but no project infrastructure is planned within 100 meters from this specific burial ground. Burial grounds and graves have high heritage significance and are given a Grade IIIA significance rating in accordance with the system described in Section 3.1 of this document.

The impact would be damage to identified graves and burial grounds due to earth-moving or vegetation clearance activities prior to the construction phase, as well as site establishment and the construction of all infrastructure, including the development of open pits and overburden dumps.

The pre-mitigation impact significance is rated as HIGH, but with the implementation of the required mitigation measures the post-mitigation impact will be VERY LOW.

Archaeological Site (Redan engraving site)

The Provincially protected Redan archaeological engraving site (a declared Provincial Heritage site) is located within the study area and at least one archaeological find spot was identified within the study area in a previous HIA study.

The impact would be damage to identified archaeological resources due to earth-moving or vegetation clearance activities prior to the construction phase, as well as site establishment and the construction of all infrastructure, including the development of a box cut. The original layout showed mining less than 50 meters from the rock art site. **However, the recommendation provided to the Applicant in 2020 resulted in the implementation of a 200-meter buffer to the closest mining berms.** The proximity of mining can potentially

damage the site directly through blasting vibrations and fly rock, uncontrolled vehicle movement and increase visiting of the site by mining staff.

The change in the land use from predominantly agricultural to that of industrial will further change the experience of the cultural landscape of the site. Now the site surrounds are described as rural with the planting of maize.

The pre-mitigation Environmental Risk impact significance for the Provincial Heritage Site is rated as VERY HIGH, and with the implementation of the required mitigation measures the post-mitigation impact rating will be LOW.

The impact of the mining on associated cultural landscape was also assessed and it was found that the proposed mining layout will have a significant HIGH impact on the redan rock art cultural landscape. The recommended mitigation measures will reduce the post-mitigation rating to LOW.

Historical Structures

The fieldwork identified four sites containing historical structures associated with the historical Springfield Colliery and Klip Power Station within the study area (KF009, KF011, KF012, KF013).

The impact would be damage to identified historical structures due to dismantling and removal of existing infrastructure, as well as site establishment and the construction of all infrastructure, including the development of a box cut.

The identified historic structure was given a Low to Moderate heritage significance rating. They will be impacted by the proposed opencast mining as well as the proposed placement of the processing plant at the preferred Option 1. It is noted that the design of the Option 1 processing plant has taken the existing buildings into account and will not impact directly on those remaining historic powerplant buildings (KF012).

The historic structures, that include the ruins of the historic Springfield Colliery West shaft and other building currently used by the farm owner at KF013 will be directly impacted by the open cast activities. The building and structures date to the 1930s and are protected under S34 of the NHRA. The recommended mitigation measures will reduce the impact from MEDIUM to LOW.

In the case of KF013, the pre-mitigation impact is rated as HIGH due to its heritage significance rating and the destruction of the site. With the implementation of the recommended mitigation measures this impact will be mitigated to an impact significance of VERY LOW.

Palaeontology

The geology of the proposed Springfield Project is primarily underlain by the Vryheid Formation (Ecca Group, Undifferentiated Karoo), and by Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup). Accordingly, the palaeontological sensitivity of the Vryheid Formation (Ecca Group, Undifferentiated Karoo) is Very High while that of the Malmani Subgroup is High and Quaternary deposits is High (Almond and Pether 2008, SAHRIS website).

An EIA level palaeontology study was conducted to assess the value and prominence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. The purpose of the PIA Report is to elaborate on the issues and potential impacts identified during the scoping phase. A Phase 1 field-based assessment was conducted with research in the site-specific study area, as well as a comprehensive assessment of the impacts identified during the scoping phase. The recommendations will require approval by SAHRA's APM Unit.

None of the proposed alternatives is preferred as the palaeontological resources will be impacted equally by all the alternatives. The implementation of the recommended mitigation measure will reduce the current HIGH rated impact and will have a post-mitigation rating of LOW.

Mitigation measures

Area and site no.	Mitigation measures
General project area	Implement a chance to find procedures in case where possible heritage finds are uncovered.
Burial grounds and graves	These burial grounds should be retained and avoided with a **buffer zone of 100m** (Regulations 17.6(a) and 17.7(a) of the Mine Health and Safety Act Regulations (2014)). If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of S36 of the NHRA and its regulations as well as the National Health Act and its regulations.
Historical Structures	KF0013 and all its structures will require a destruction permit from the Gauteng provincial Heritage Authority (PHRA-G) in accordance with S34 of the NHRA. This application will require the following: i. An application for a mitigation permit from SAHRA; ii. Documentation of the site through excavations to expose the extent of the structures and then through formal plan drawings. iii. A destruction permit from PHRA-G and SAHRA will be then applied for by the Applicant with the backing of the mitigation report.
Redan Rock Art site	**1. A buffer of 200 meters from the closest open cast mining must be put in place** 2. A Heritage Management Plan (HMP) must be developed in consultation with SAHRA and PHRA-G. 3. This HMP must include as a minimum: a. Agreed upon buffer distances b. Fencing strategies c. Monitoring strategies d. Roles and responsibilities

Area and site no.	Mitigation measures
Palaeontological resources	1. The EAP and ECO for this project must be informed that Vryheid Formation (Ecca Group, Undifferentiated Karoo), Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup), as well as Quaternary superficial deposits has a high to very high Palaeontological Sensitivity. 2. Fossils may also be present in the development footprint. If fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations the Chance Find Protocol must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (if possible, in situ) and the ECO ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a palaeontologist. 3. These recommendations must form part of the Heritage Management Plan for Springfield Colliery.

Conclusion

It is the combined considered opinion of the heritage specialists that the proposed project will have a direct impact on several identified heritage resources rated as being of medium to high or very high heritage significance. With the implementation of recommended mitigation measures, as listed above and expanded on in this report, the overall impact on heritage resources will be reduced to acceptable levels during the life cycle of the project.

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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;
- 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 2 500 000 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.

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
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-G	Gauteng Provincial Heritage Resources Authority
PHS	Provincial Heritage Site
PSSA	Palaeontological Society of South Africa
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

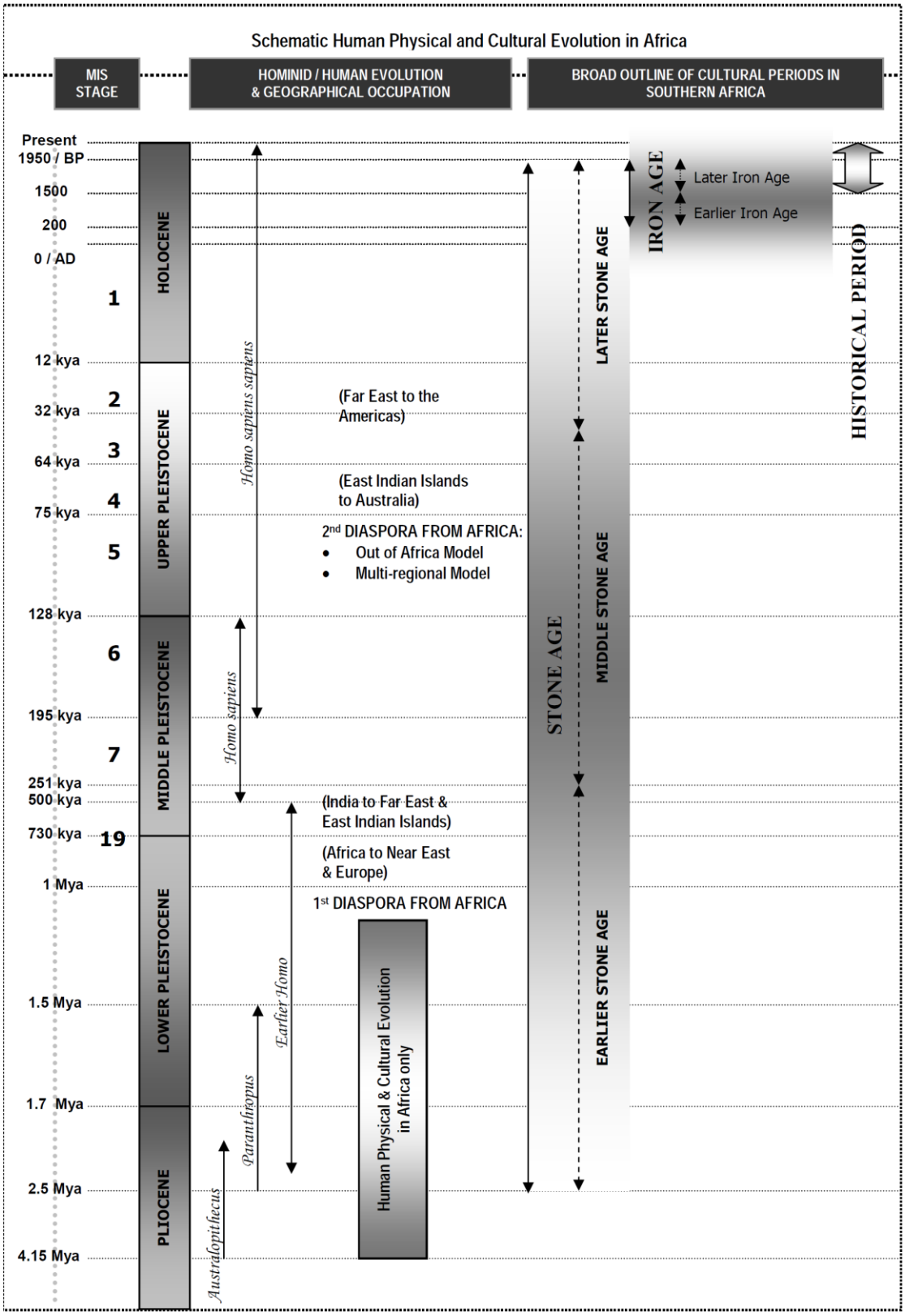


Figure 1 – Human and Cultural Timeline in Africa

1 INTRODUCTION

PGS Heritage (Pty) Ltd was appointed by uKhozi Environmentalists (Pty) Ltd to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) for the Springfield Project situated between Vereeniging and Meyerton, in the Sedibeng District Municipality, Gauteng Province.

A further standalone Palaeontological Impact Assessment (PIA) was completed for PGS by Dr Elize Butler of Banzai Environmental.

1.1 Scope of the Study

The aim of the study is to identify heritage sites and finds that may occur in the proposed mining right area. The HIA aims to inform the EIA 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 Heritage (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.

Wouter Fourie, the Project Coordinator and Archaeologist, is registered with the Association of Southern African Professional Archaeologists (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).

Jennifer Kitto, 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.

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 existing vegetation cover. It should be noted most of the study area was accessible for the fieldwork survey, except for the Ocon Bricks property.

Therefore, should any heritage features and/or objects be located or observed outside the identified heritage sensitive areas during the mining activities, a heritage specialist must be contacted immediately. 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:

- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified
- National Environmental Management Act (NEMA), Act 107 of 1998 – Appendix 6
- National Heritage Resources Act (NHRA), Act 25 of 1999

1.4.1 Notice 648 of the Government Gazette 45421

Although minimum standards for archaeological (2007) and palaeontological (2012) assessments were published by SAHRA, GN.648 requires sensitivity verification for a site selected on the national web based environmental screening tool for which no specific assessment protocol related to any theme has been identified. The requirements for this Government Notice (GN) are listed in **Table 1** and the applicable section in this report noted.

Table 1: Reporting requirements for GN648

GN 648	Relevant section in report	Where not applicable in this report
2.2 (a) a desktop analysis, using satellite imagery;	section 4.3	
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and	4.1	-

GN 648	Relevant section in report	Where not applicable in this report
environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.		
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web-based environmental screening tool;	section 4.1	-
2.3(b) contains motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity;	section 4.1	-

1.4.2 NEMA – Appendix 6 requirements

The HIA report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below. For ease of reference, the table below provides cross-references to the report sections where these requirements have been addressed.

1.4.3 The National Heritage Resources Act

- National Heritage Resources Act (NHRA) Act 25 of 1999
    - Protection of Heritage Resources – Sections 34 to 36; and
    - Heritage Resources Management – Section 38

The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (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 Springfield Coal Mining Project (Springfield Project) is a proposed opencast colliery, located in, on and around the old workings of the abandoned Springfield Colliery, 7km South of Meyerton & 10km North of Vereeniging in the Sedibeng District Municipality of the Gauteng Province (**Figure 2** and **Figure 3**).

2.1.1 Site Description

The Mining Right Area (MRA) extends over 2 547 Ha, encompassing various Portions of the Farms Kookfontein 545 IQ, Damfontein 541 IQ, Smaldeel 542 IQ, Waldrift 599 IQ, and Vlakfontein 546 IQ.

The proposed opencast pit and associated mining infrastructure will disturb an area of approximately 1350 ha over these properties. (**Figure 4)**.

Refer to **the table** below for the project location details.

Project Location Details

Farm Names and affected portions	**Kookfontein 545 IQ** - portions 2, 16, 22, 27, 29, 30, 34, 35, 39, 54, 55, 64, 65, 66, 82, 83, 84, 85, 93, 95, 97, 98, 99, 100, 102, 105, and 106**.** **Damfontein 541 IQ** – portions 2, 8, 36 and 37 **Smaldeel 542 IQ** - Portions 1 and 4 **Waldrift 599 IQ** - Portions 16, 89 and 101 **Vlakfontein 546 IQ** - Portion 159
Application area	2 547 Ha
Magisterial district:	Vereeniging and Meyerton
Distance and direction from nearest town	7km South of Meyerton 10km North of Vereeniging

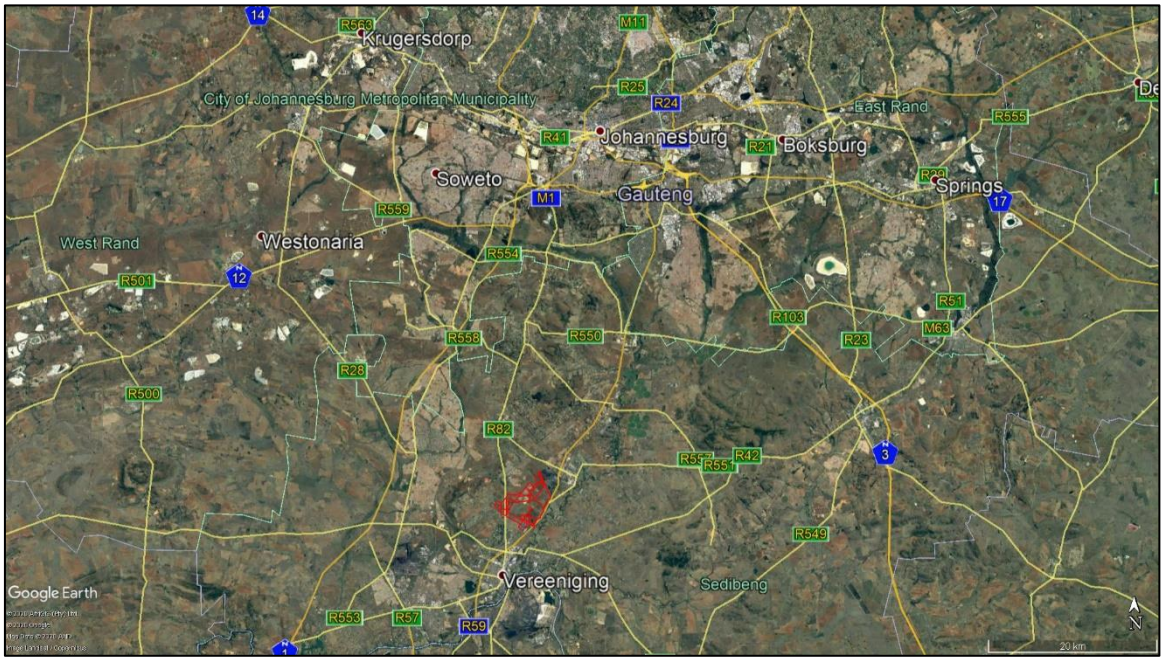


Figure 2 - Regional Locality of study area (red polygon)

Figure 3 - Locality of study area (red polygon) in relation to Meyerton and Vereeniging

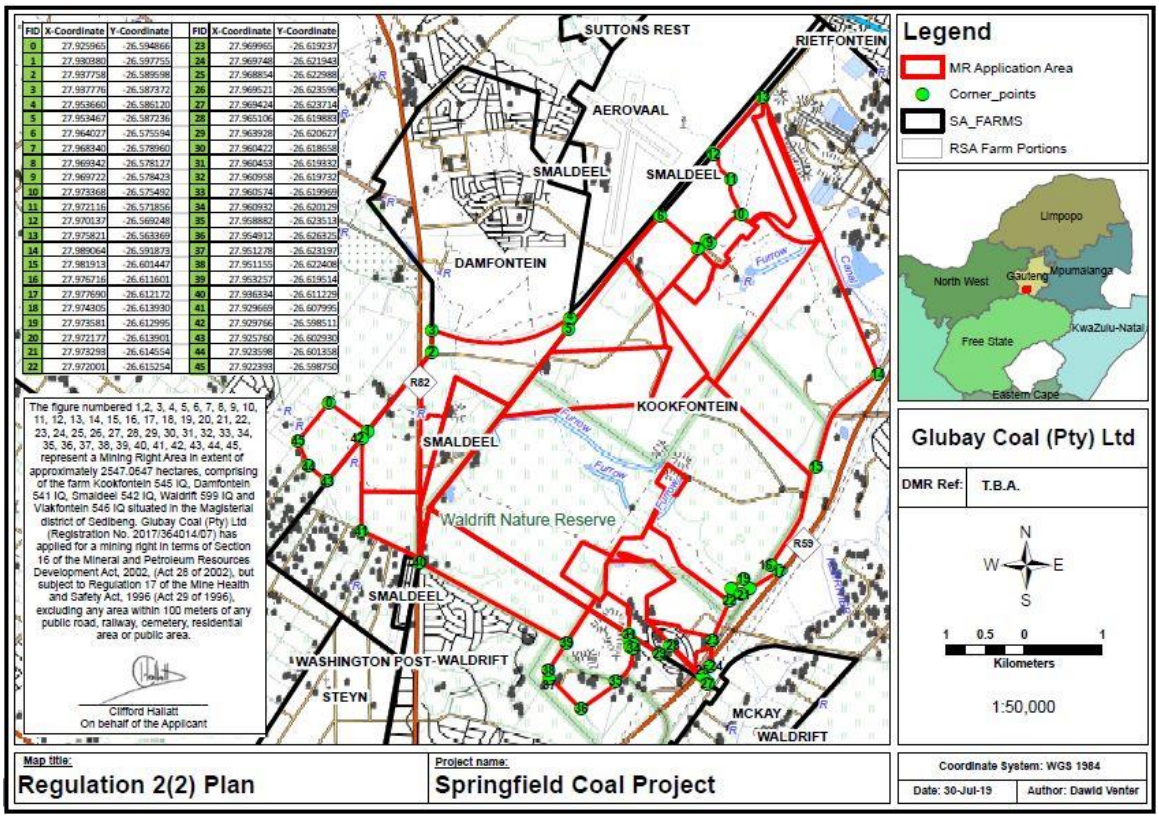


Figure 4 -Springfield Project: affected properties (provided by uKhozi, 2020)

2.2 Technical Project Description

2.2.1 Project description

The proposed opencast coal mining will be conducted with a phased approach, using the conventional truck and shovel rollover method. The mining operation will have a total of six opencast pits, with a total final area of approximately 500 ha. The coal pillars left for supports in the old works and some areas which were not mined out, will be mined from the proposed open cast pits. Mining of the six pits will take place in a phased approach and not all pits will be mined at the same time. Over an expected 30 years Life of Mine (LOM), an area of only approximately 16 ha will be mined per annum with the aim to allow for farming activities to continue whilst mining takes place.

The opencast pits are referred to as:

- Central Pit
- East Pit
- West Pit
- South Pit
- VFN Pit
- Far West Pit

Mining will commence in the northern part of the Central Pit and move in a southern direction. After which mining will commence on the East Pit.

The M61 tarred municipal road runs between Meyerton and Vereeniging along the eastern boundary of the MRA in a north to south direction. The access road to the mining area will be constructed from this road. Haul roads will be constructed inside the MRA operational to facilitate on-site vehicle movement.

Concurrent rehabilitation will occur during the operational phase by means of the roll over method. The activities proposed by Glubay Coal (Pty) Ltd for the Springfield Project will occur in four phases:

1) Pre-construction/planning phase – This phase will involve the dismantling and removal of existing infrastructure situated within the mining area and preparation of footprint areas (Year 1 -2).
2) Construction phase – The construction phase will take approximately 1 year to complete, which will include activities such as site establishment and the construction of all infrastructure, including the development of a box cut (Year 3).
3) Operational phase – All related mine operations, including coal removal, stockpiling, processing, water treatment and transportation as well as concurrent rehabilitation forms part of this phase (year 4– 30);

4) Decommissioning, closure and rehabilitation phase – This phase will involve the implementation of the rehabilitation plan which will be updated throughout the life of the mine (year 31).

Basic Overview of Mining Method

Step 1: Remove a minimum of 1 metre of topsoil and place directly on levelled spoil. It is recommended that the topsoil stripping operation is carried out for one cut width plus 15 metres ahead of the pit advance. This will ensure that the mining cycle will not be interrupted at any time in order for this essential component to be carried out. The topsoil recovered from the box cut areas is to be placed on a resource dump close to the final voids where it will be required for final closure.
Step 2: Remove soft overburden with an excavator and trucks to 2 metres above the hard rock. The 2 metres of soft rock above the hards provides stemming length for the blast holes. By doing this the explosives column can be optimized to fragment the hard rock without incurring excessive fly rock and air blast.
Step 3: Drill and blast and remove the remaining overburden to expose the Top Seam. Some overburden will heave beyond the coal edge and therefore will not need to be excavated.
Step 4: Mine the Top Seam and the parting to the Lower Seam as well as the Lower Seam (if feasible proceed to Step 6, if not able to mine parting simultaneously refer to Step 5).
Step 5: Remove the inter burden with a dozer push over operation to within 2 to 2.5 metres of the Lower Seam. Use an excavator and truck operation to expose the coal. Mine the Lower Seam.
Step 6: The cycle is started again.

Run of Mine (ROM) coal from the proposed Springfield Project will be transported via trucks on proposed unpaved haul roads to the proposed washing plant, situated within the mining area, for processing. A wet coal beneficiation process comprising crushing, screening, spiral concentrators, and dense media separation will be used to obtain the desired product sizes. After the wet beneficiation process, material will be transferred via conveyor to the product stockpile, blended with washed fines from the process plant to improve overall quality, and loaded onto trucks to be transported offsite.

Description of Associated Infrastructure

The project will entail new mining infrastructure being developed, which will potentially include:

- Opencast mining pits.
- Processing plant complex incl. conveyor belts.
- Overburden and topsoil dumps.
- Haul roads, access roads, maintenance roads and security roads (including a firebreak).
- Run of mine (RoM) and product stockpiles.
- Discard dump.
- Pollution Control Dams.
- Slurry dams.
- Clean and dirty water channels.

- Temporary berms/contour banks.
- Site and security offices with hard park areas.
- Bulk fuel storage facility.
- Workshop areas consisting of wash bays, warehousing, and offices.
- Explosive magazine.
- Weighbridges.
- Sewage treatment plant.
- Water treatment plant.
- Water pipelines.
- Electricity supply infrastructure.

Refer to **Figure 5** for the preferred mining layout and **Figure 6** for the alternative mining layout.

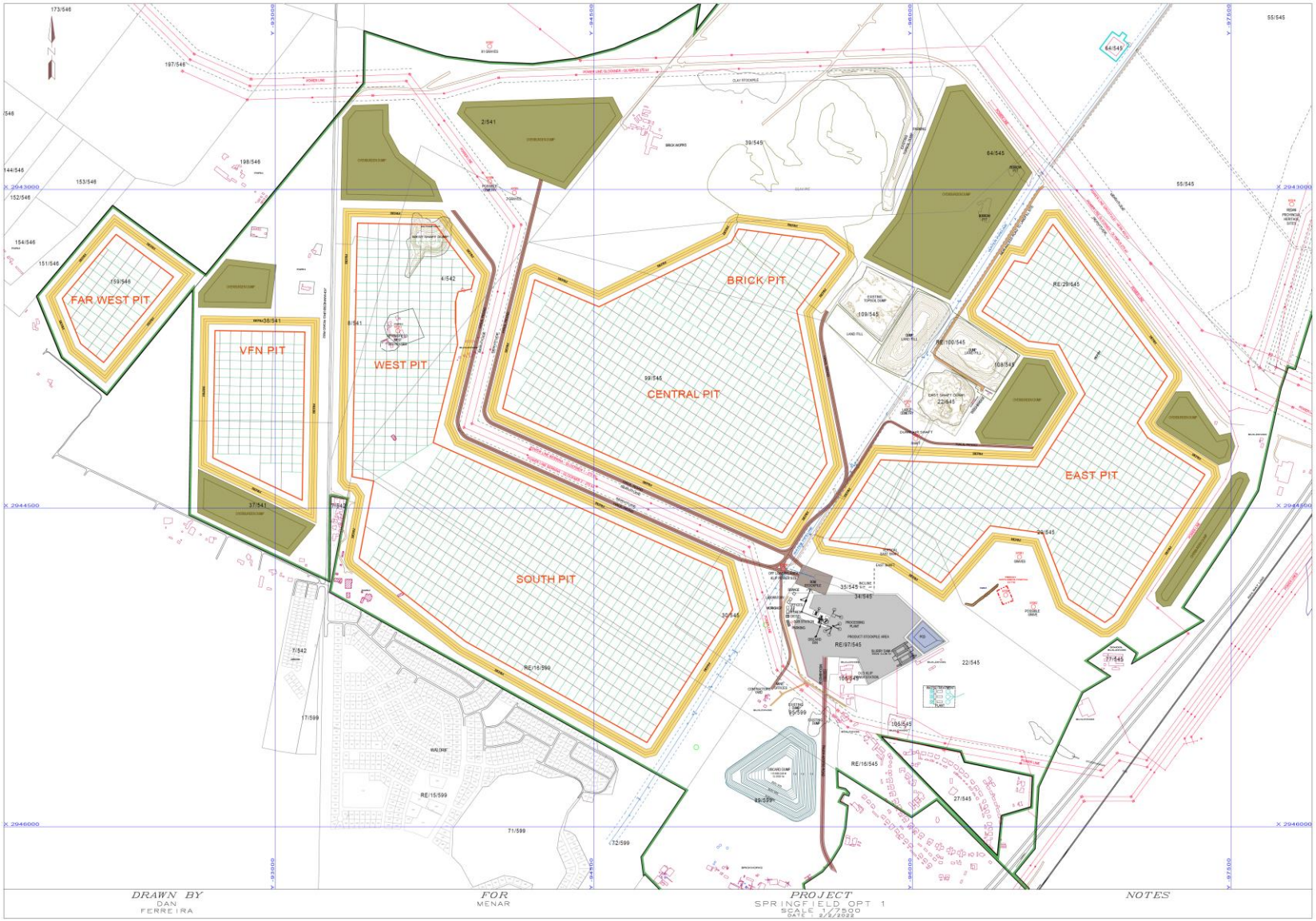


Figure 5 – Mine Layout Plan – Preferred layout (provided by uKhozi, Feb 2022) (Overburden and berms-brown, Pit-green, Plant-grey)

Figure 6 – Mine Layout Plan – Option 2 (provided by uKhozi, Feb 2022) (Overburden and berms-brown, Pit-green, Plant-grey)

3 ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

3.1 Methodology for Assessing Heritage Site significance

This HIA report was compiled by PGS for the proposed Springfield Project. The applicable maps, tables and figures are included, as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (No. 107 of 1998). The HIA process consists of three steps:

Step I – Literature Review and initial site analysis: The background information to the field survey relies greatly on the Heritage Background Research which was undertaken through archival research and evaluation of satellite imagery and topographical maps of the study area.

Step II – Physical Survey: A physical survey was conducted by a combination of vehicle and pedestrian access through the proposed project area by one qualified heritage specialist and one field assistant (12-14 May 2020), 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 heritage resources identified in the physical survey, the assessment of these resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites is 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 - 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:

3.1.1 Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 2** and **Table 3**).

Table 2: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 3: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

3.2 Methodology used in determining the significance of environmental impacts

The methodology used to determine the environmental impact significance was provided by uKhozi Environmental and is explained in **Appendix B**.

4 CURRENT STATUS QUO

4.1 Site Description

The Springfield MR application is characterised by vast tracks of cultivated agricultural land under centre pivot irrigation, made possible by the water aquifer created by the mining activities of the historic Springfield Colliery.

The topography is flat with a gentle slope from the west toward the Klip river that runs north-south just outside the study area.

Figure 7 – Open tracts of land

Figure 8 – Grass farming under irrigation

Figure 9 – Cultivated land and pastures

Figure 10 – View from the western boundary of the study area towards the east

Figure 11 – Ash dumps associated with the historic Springfield Colliery

Figure 12 – View of the Waldrift landfill site

4.2 Environmental Screening Tools

Th DEA. Environmental screening tool indicates that the study area is situated in an archaeological sensitive area with HIGH rating (**Figure 13**). The evaluation of the field work confirmed that the area has a high archaeological sensitivity due to the Redan Provincial heritage site locate in the MR area.

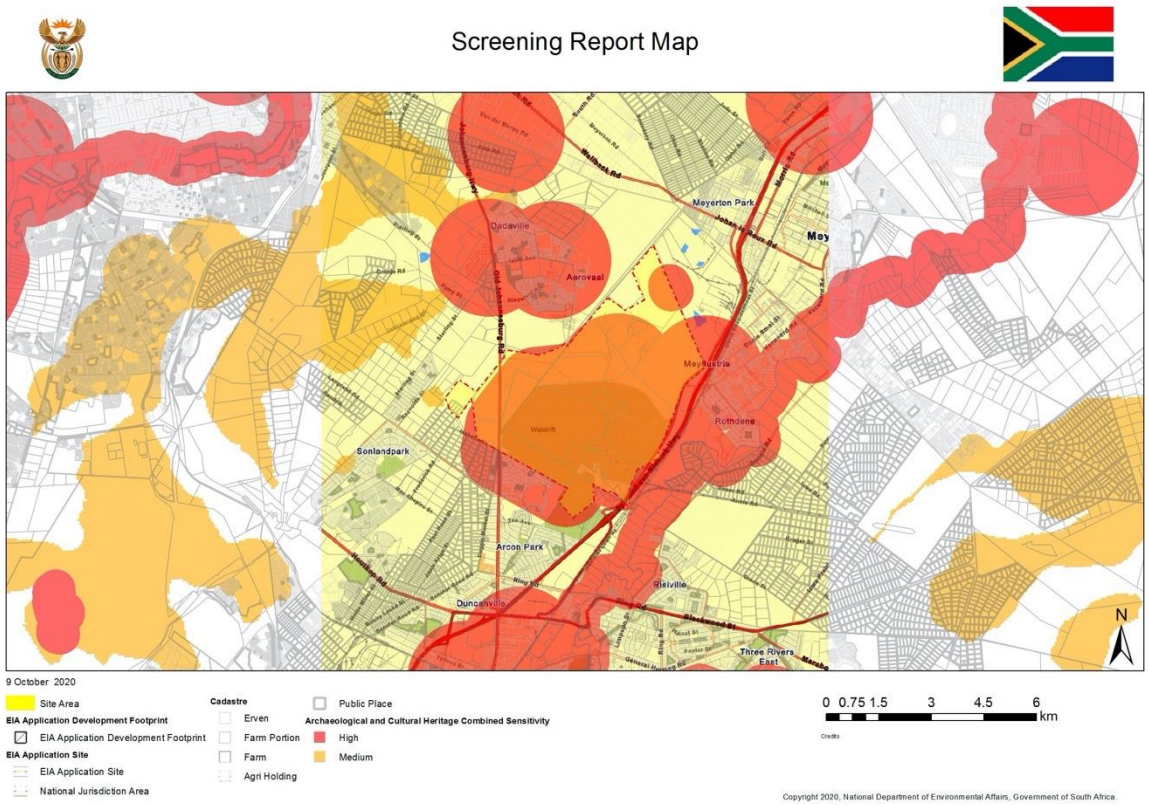


Figure 13 - Screening tool map indicating a high sensitivity rating for archaeology

4.3 Archival/historical maps

Historical topographic maps from 1941 to 1979 were available for utilisation in the background study. The study area was overlain on the map sheets to identify structures or graves situated within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA. Many of the structures identified are farmsteads or homesteads, demarcated as “huts”. Clusters of residential structures were also identified. Several grave and cemetery sites were identified in the same location on all three editions of the map sheets utilised. The Springfield Colliery and the historical railway and road alignments are also depicted.

4.3.1 1:50 000 Topographical Map 2627DB Vereeniging Ed 1 1941

A portion of the First Edition of the 2627DB Vereeniging Topographical Sheet is depicted below (**Figure 14**). The map was compiled and drawn by the survey Depot (Tech) S.A.E.C. from various 1:25 000 sheets published in 1941 and revised in the field by 45 Survey Company in 1943. It was printed by the Government Printing Works of the Union Government in 1945.

Nine potential heritage features or areas were identified. Various groups of residential structures and several groups of African homesteads (“huts”) are depicted in the study area. The old Springfield colliery is also depicted. All these sites are likely to be at least 79 years old.

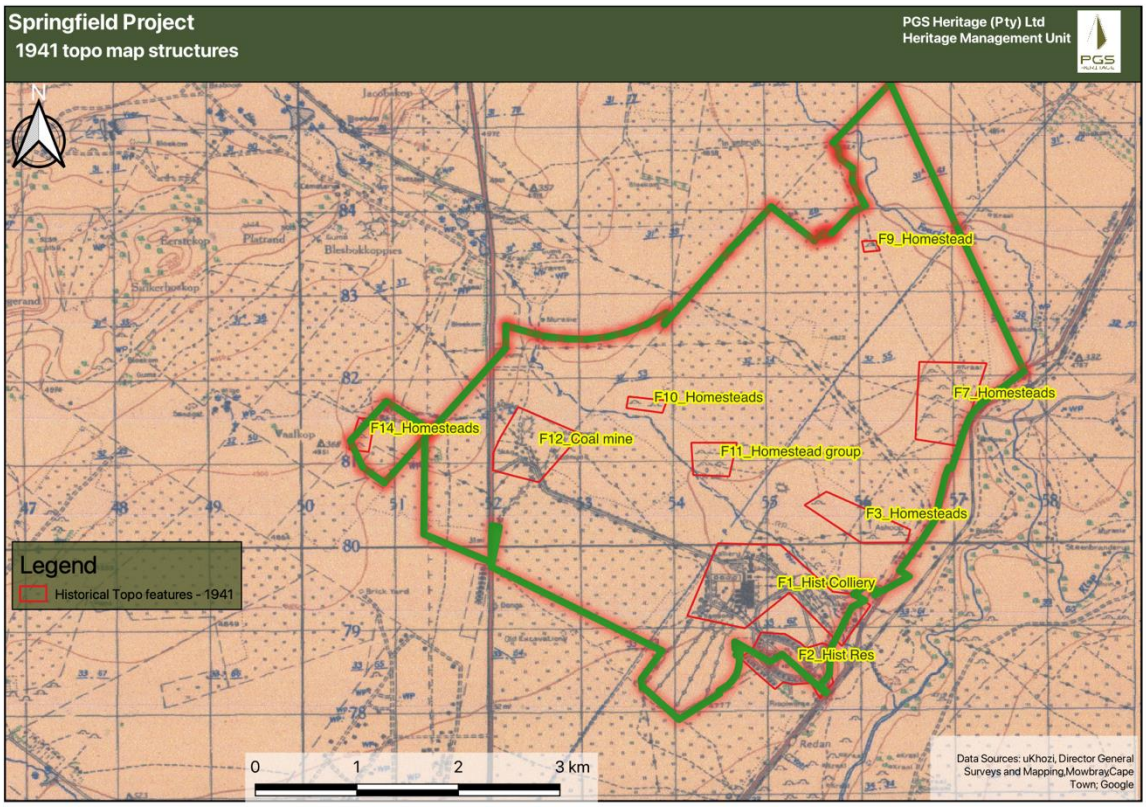


Figure 14 - Enlarged portion of the 2627DB Map Ed 1 1941, project area boundary in green.

4.3.2 1:50 000 Topographical Map 2627DB Vereeniging Ed 2 1954

A portion of the Second Edition of the 2627DB Topographical Sheet is depicted below (**Figure 15**). The map was based on air photography from 1952. It was surveyed in 1954 and drawn in 1957 by the Trigonometrical Survey Office. The map was printed in the Union of South Africa by the Government Printer in 1957.

Many of the same groups of structures and groups of African homesteads ("huts") are depicted on this sheet. In total, 11 potential heritage features are depicted. Some of these sites will be 66 years old or older.

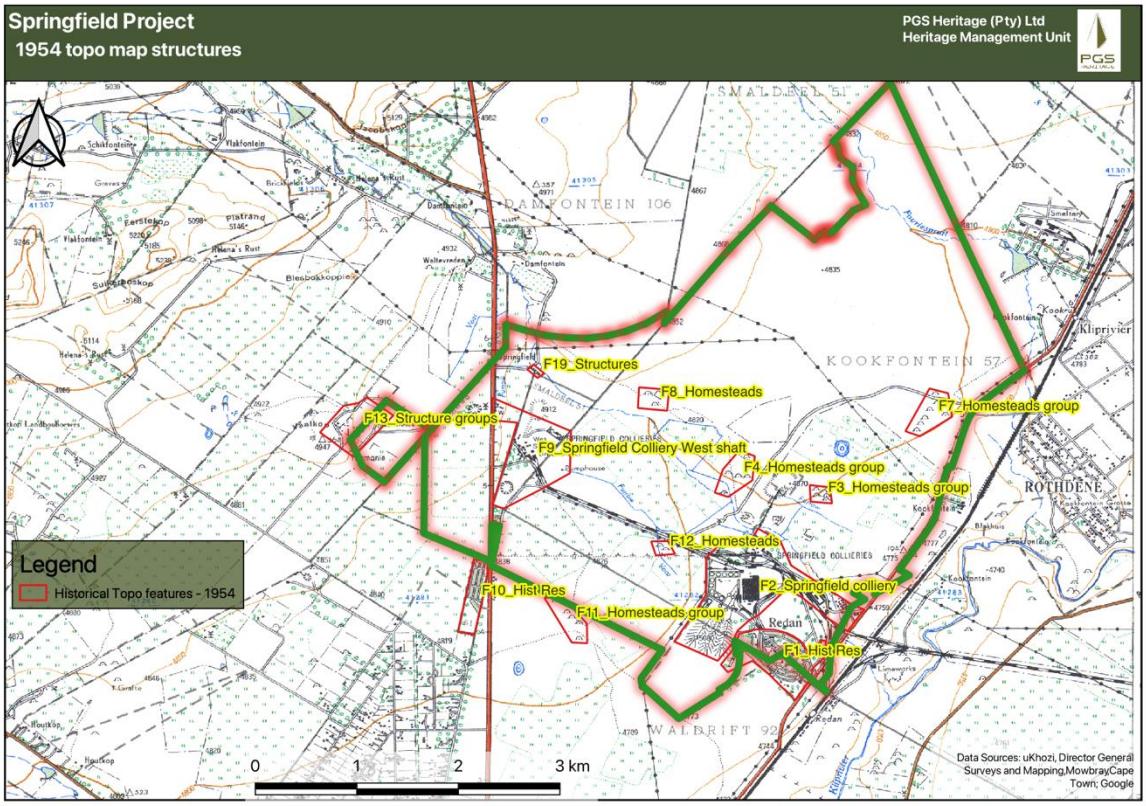


Figure 15 - Enlarged portion of the 2627DB Map Ed 2 1954, project area boundary in green

4.3.3 1:50 000 Topographical Map 2627DB Vereeniging Ed 3 1979

A portion of the Third Edition of the 2627DB Topographical Sheet is depicted below (**Figure 16**). The map was published by the Chief Directorate: Surveys and Land Information and printed by the Government Printer in 1979.

In total, 11 potential heritage features are depicted on this sheet. More groups of structures are depicted in addition to those previously noted. The Springfield Colliery is still depicted. A new industrial area is depicted to the east of the study area. An Archaeological Reserve is now depicted, in the location where the known Redan rock engraving site is located. As noted in section 8.1.1,

this site was declared as a National Monument in 1971 (and is now protected as a Provincial heritage Site).

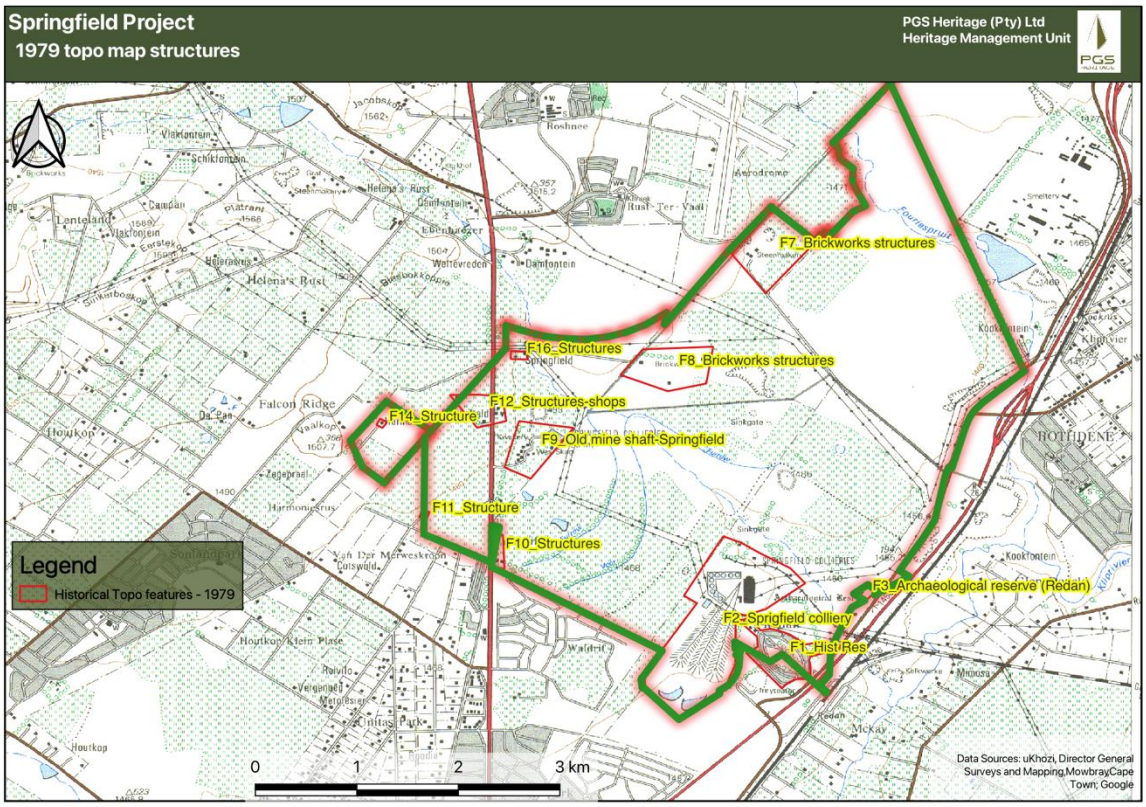


Figure 16 - Enlarged portion of the 2627DB Map Ed 3 1979, project area boundary in green

Most of the features depicted inside the study area are structures (farmsteads, homesteads or residential clusters), including the old Springfield Colliery. These potential heritage features are likely to be 66-79 years or older.

It should be noted that an Archaeological Reserve is depicted inside the study area on the 1979 sheet. The location of this Archaeological Reserve corresponds with the approximate location of the well-known Redan Rock Engraving site. This site is a declared Provincial Heritage Site and therefore formally protected by the NHRA. No action can be taken that would affect this site negatively without obtaining a permit from both the national (SAHRA) and provincial (PHRAG) heritage authorities.

4.4 Aspects of the area's history

4.4.1 Previous Heritage Studies in area

A search on the South African Heritage Resources Information System database (SAHRIS) has identified several Heritage Impact Assessments conducted in and around the study area. A number of these covered various portions of the farm Kookfontein 545 IQ, while one study (Van Schalkwyk

2013), included portions of the current study area and identified several sites situated within the study area boundaries.

Pistorius, JJ. 2007. A Phase I Heritage Impact Assessment Study for Water and Sewage Pipeline Corridors near Vanderbijlpark in the Gauteng Province of South Africa. This study identified the following types of heritage resources: two historical graveyards, a number of historical houses near Houtkop, historical stone structures, historical houses located in one of the suburban areas of Vanderbijlpark. The proposed route corridors are located roughly 6.50km south-west of the current project area.

Coetzee, FP. 2008. Cultural Heritage Survey of the Proposed Development of Portion 53 of the Farm Kookfontein 545-IQ, Rothdene, Midvaal Local Municipality. For Triviron EAP. No archaeological or historical resources were recorded during the survey. The study area is located immediately adjacent to the north-east section of the current project area.

Pelser A.J. & van Vollenhoven A.C. 2009. A Report on a Heritage Impact Assessment Study for the Powerline from Glockner-Kookfontein Substations Vereeniging, Gauteng. For: Baagi Environmental Consultancy CC. No objects, features or any sites of cultural (archaeological or historical) heritage significance were identified in the area of proposed development. This route corridor is located immediately within the north-east section of the current project area.

Pelser A.J 2011. A Report on a Heritage Walkdown Study for the Proposed New 275kv Powerline between the Glockner-Kookfontein Substations Vereeniging, Gauteng. For: Baagi Environmental Consultancy CC. No cultural heritage (archaeological or historical) sites, features and objects of significance were identified during the Walk Down survey. The study area is the same as the report above.

Pelser A.J. 2013. Basic Assessment Report for a Waste Management License Application, DMS Powders, Meyerton Portions 4 & 63 of Kookfontein 545IQ, Gauteng. For: Shangoni Management Services (Pty) Ltd. No sites, features or objects of any archaeological or historical (cultural heritage) significance were identified during the fieldwork. The site is located on Portions 4 & 63 of the farm Kookfontein 545IQ, situated in the industrial area located immediately north-east of the current project area.

Van Schalkwyk, J. 2013. Heritage Impact Assessment for the Proposed Construction of Eskom Five (5) 88kv Powerlines Connecting Kookfontein and Jaguar Substations, Midvaal and Emfuleni Municipalities, Gauteng Province. Eight heritage resources were identified, of which six are situated within or close to the current project area. The six sites include: the rock engraving site of Redan (Provincial Heritage Site), a Stone Age findspot, three cemetery or informal grave sites and a stone railway culvert.

Fourie, W. 2017a. Finding on Possible Exemption from a Heritage Impact Study: Mixed Use Development on Portion 81 of the Farm Rietfontein 364IQ, Meyerton, Gauteng Province. Although large sections of the property were heavily degraded and had in the past been used for dumping and backfilling of quarries, there were two areas identified with high density scatters or remnants of Early (ESA) and Middle Stone Age (MSA) material. This study area is located approx. 3.43km north-east of the current project area.

Fourie, W. 2017b. Archaeological Impact Assessment for Meyerton Mall and Residential Development on Portion 64 of Portion 81 of the Farm Rietfontein 364IQ, Meyerton, Gauteng, Province. This report was a follow-up survey of the two areas identified in the previous study. Thirteen specific sites/findspots were identified containing mostly Middle Stone Age (MSA) stone tools, and a few Late Stone Age (LSA) stone tools. One of these sites was assessed to have medium significance.

Two of the HIA reports identified the occurrence of Early and Middle Stone Age artefacts in the wider region (Fourie 2017a, Fourie 2017b) with one identifying a Stone Age artefact and the Redan rock engraving site (PHS) within the Springfield Project study area (Van Schalkwyk 2013). Several of the previous reports also identified graves or burial grounds, historical houses and historical structures in and around the current study area (Pistorius 2007, Van Schalkwyk 2013, Fourie 2017a, Fourie 2017b).

4.4.2 Archaeological and Historical Overview of the Region

Table 4: Summary of archival data found on the general area

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Earlier Stone Age (ESA) is the first phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan (2.6 – 1.5 Myr) and is characterised by expedient yet organised flaking systems, with primarily core- and flake-based assemblages. The second technological phase is the Acheulian industry (1.7 Myr – 250 kyr) which is comprised of Large Cutting Tools (i.e. handaxes and cleavers) and organised core reduction (i.e. Levallois). A number of ESA sites are known from the confluence of the Klip, Suikerbosrand and Vaal Rivers in proximity to the town of Vereeniging. These sites include Klipplaatdrift, River View Estates and Three Rivers (Bergh 1999). Another Early Stone Age was identified by C Van Riet Lowe during the late 1940s near Henley-on-Klip (Van Riet Lowe & Van der Elst, 1949). The Henley-on-Klip site is approximately 8.90km north-east of the present study area. Several Acheulean-bearing sites are known from the Vereeniging area. According to Bergh (1999) these include Waldrif, Drie Riviere, Duncanville, Riverview Estates. Of these sites, Duncanville is the closest and is located approx. 2.35km south of the study area. The Duncanville Archaeological Reserve was proclaimed as a National Monument in 1944 (Oberholster, 1972). The site contains a large number of Acheulian stone implements lying on the

DATE	DESCRIPTION
	surface of the gravel beds deposited by the Vaal River several million years ago. A similar site is located at the Klip River Quarry (also now a Provincial Heritage Site). Both sites were discovered initially by T N Leslie, an engineer, and later investigated by Van Riet Lowe, who was instrumental in them being declared as National Monuments. These two sites were both excavated by Revil Mason between 1960/61 (Prins, 2005).
250 000 to 40 000 years ago	The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique. This phase is furthermore associated with modern humans and complex cognition (Wadley 2013). Although not many MSA sites are know from this area, MSA stone tools were identified on a property in Meyerton in stratigraphic context for an HIA undertaken in 2017 (Fourie 2017). No archaeological work has been carried out in this area.
40 000 years ago, to the historic past	The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small stone tools known as microliths. A Later Stone Age site is known from the farm Badfontein, roughly 17km south-east of the present study area (Bergh, 1999). An unidentified rock engraving site is known between the study area and Heidelberg (see Bergh, 1999). One identified LSA site has been found in the region of Meyerton (Huffman, 2008), although no archaeological work has been carried out in this area concerning this techno-complex.
AD 1450 - 1650	Evidence of the Late Iron Age (1500-1800 AD) is prevalent in the Suikerboschrand and Klipriviersberg area. Other Late Iron Age stone walled sites, dating from the 18th and 19th centuries, occur towards Alberton, along the rocky ridges of the eastern part of the Klipriviersberg (Huffman, 2007). This period is associated with a Late Iron group referred to as the Ntsuanatsatsi facies of the Urewe Tradition (Huffman, 2007). The Ntsuanatsatsi facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the earliest known Iron Age period within the region of the study area. The decoration on the ceramics from this facies is characterised by a broad band of stamping in the neck, stamped arcades on the shoulder and appliqué (Huffman, 2007).
AD 1500 - AD 1700	The Olifantspoort facies of the Moloko Branch of the Urewe Ceramic Tradition is the next Iron Age facies to be identified within the surroundings of the study area. The key features of the decoration used on the ceramics from this facies include multiple bands of fine stamping or narrow incision separated by colour (Huffman, 2007).
AD 1650 – AD 1850	The Uitkomst facies of the Blackburn Branch of the Urewe Ceramic Tradition represents the third Iron Age period to be identified for the surroundings of the study area. The decoration on the ceramics associated with this facies is

DATE	DESCRIPTION
	characterised by stamped arcades, appliqué of parallel incisions, stamping as well as cord impressions (Huffman, 2007). Based on the available archaeological and oral evidence from this period, the sixteenth and seventeenth centuries saw the movement of Sotho/Tswana communities from the lower lying Bushveld areas in the north (where they had been settled since AD 1500) toward the higher, predominantly grassland areas to the south. By AD 1650, these communities had succesKFully settled in these areas (Hall, 2007).
1700 - 1840	The Buispoort facies of the Moloko branch of the Urewe Ceramic Tradition is the next phase to be identified within the study area's surroundings. The key features on the decorated ceramics include rim notching, broadly incised chevrons and white bands, all with red ochre (Huffman, 2007).
c.1823s	By 1823 the Khudu were known to have resided in the general vicinity of the present study area, and especially near the confluence of the Suikerbosrant and Vaal Rivers (Bergh, 1999). This confluence is located roughly 5.70km south of the present study area.
1823 - 1827	During the so-called Difaqane, the Khumalo Ndebele (also known as the Matabele) of Mzilikazi established themselves along the banks of the Vaal River and pushed the Khudu further to the west (Bergh, 1999). In c. 1827 the Matabele moved further north and settled along the Magaliesberg Mountain and five years later in 1832 settled along the Marico River.
October 1834	A group of Griqua hunters under the leadership of Pieter David were hunting near the confluence of the Vaal and Wilge Rivers when they were attacked here by Mzilikazi's Khumalo Ndebele (Bergh, 1999).
February 1836	Voortrekker leader Louis Trichardt moved with his party to the confluence of the Wilge and Vaal Rivers and stayed on the western bank of the Wilge for a while before crossing over the Vaal (d'Assonville, 2002). They subsequently met up with Lang Hans van Rensburg at Elandspruit, near present-day Heidelberg (Bergh, 1999).
1839	These years saw the early establishment of farms by the Voortrekkers in the general vicinity of the study area. The district of Potchefstroom was also established in 1839 (Bergh, 1999), of which the study area formed part.
1876-1878	In December 1876 President Brand of the Republic of the Orange Free State acquired authority from his Volksraad to appoint Mr GW Stow to undertake prospecting surveys. In 1878 Stow conducted test shafts in the vicinity of the Taaiboschspruit and Vaal River confluence as well as on the farms Maccauvlei and Leeuwspruit. His investigations on both these latter farms indicated the presence of extensive coalfields (Leigh, 1968).
1880-	Subsequent to this discovery, Stow and Samuel Marks, the Kimberley diamond magnate, formed a company in 1880, to exploit the coal deposits and transport

DATE	DESCRIPTION
	them to the Kimberley mines. The company was called "*De Zuid Afrikaansche en Oranje Vrijstaatsche Kolen en Mineralen Vereeniging*" and was later to become the nucleus of the *Vereeniging Estates Limited*. As a result, the farms Leeuwkuil, Klipplaatdrift, Maccauvlei and Rietfontein were acquired. The first mining activities were undertaken in the vicinity of the test shaft on Leeuwkuil, which later was to become Bedworth Colliery (Leigh 1968)
1882-1884	In 1882 the *Vereeniging Estates Limited* applied to the Zuid Afrikaansche Republiek to establish a village on the farms Leeuwkuil and Klipplaatdrift. On 4 July 1884 the Volksraad approved the application as well as the proposed name "Vereeniging", which was derived from the company's name (Leigh, 1968).
1899 – 1902	During the Anglo Boer War (1899-1902) the town of Vereeniging had a significant role to play. This was largely due to its strategic value in that one of the main entry points from the Republic of the Orange Free State into the Zuid Afrikaansche Republiek was located in this area. The railway link between the two republics had also been established here (Leigh 1968). During the initial phase of the war, very few military activities took place in this area. However, after the defeat of the Boer forces in various places, and the British advance into the republics, the Vereeniging area became significant. After the annexation of the Republic of the Orange Free State on 24 May 1900, Lord Roberts (the commander in chief of the British forces) was able to travel via railway line from Bloemfontein all the way to the Vaal River (Bergh, 1999). On 27 May 1900, the crossing of the main British army over the Vaal River took place. Vereeniging was annexed on the same day. During the latter period of the war, the Boer forces divided themselves into smaller mobile units (commandos) and fought the British forces in a guerilla war. In response to this tactic, the Boer farms of both republics were destroyed, while black and white men, women and children still residing on the farms were taken to various concentration camps. Such a camp was also established at Vereeniging. The camp was located on the farm Maccauvlei and was divided into a camp for the Boers and another camp for black people. The Boer camp in turn was divided between the Boer concentration camp (for prisoners-of-war, women and children) and a camp which housed Boers who had surrendered and joined the British forces as part of a Burgher Corps (Leigh, 1968). With time the Boer forces and their leaders started considering negotiating for peace. Sammy Marks offered the opposing sides a site for these negotiations at the Central Mine. Different tented camps were erected for the different participants, such as the Z.A.R leadership, Orange Free State republic leadership and the British leadership. The representatives for the Boer republics were President Steyn of the Orange Free State, as well as Generals Botha,

DATE	DESCRIPTION
	Smuts, Hertzog, De La Rey and De Wet. The British were represented by Lords Milner and Kitchener. The negotiations undertaken here resulted in the eventual signing of the Peace Treaty of Vereeniging at Melrose House, Pretoria on Saturday, 31 May 1902 (Leigh, 1968).
1904	On 17 August 1904, the Milner Government conferred municipal status on Vereeniging (Prins 2005).
1912	In 1912 the status of major municipality was conferred on Vereeniging and Leslie was elected mayor (Prins 2005).
1934 - 1938	The construction of the Vaal Dam was undertaken jointly by Rand Water and the Department of Irrigation. Construction commenced in 1934 and the aim of the dam was to address the rapidly increasing need for water of the population of the Witwatersrand. The dam wall was completed in 1938 with a wall height of 54.2 m above the lowest foundation and a full supply capacity of 994 million m^3. In the early 1950s the wall was raised to 60.3m resulting in a capacity of 2 188 million m^3. In 1985 the wall was raised to a height of 63.4m above the lowest foundation. This increased the capacity of the dam to 2 536 million m^3 (Birkholtz 2009).
21 March 1960	Although a number of important political events took place in the general area, including the massacre at Boipatong on 17 June 1992, the most significant of these was probably the tragedy of Sharpeville, which took place on 21 March 1960. Sharpeville is a township situated near Vereeniging and is located to the west of the present study area. On 16 March 1960, the Police Commissioner was informed by the head of the Pan Africanist Congress, Robert Sobukwe, that a protest campaign against pass laws will be held on 21 March 1960. The aim of the campaign was for black people to leave their passes at home, and to report in their thousands at different police stations, thereby overcrowding the jails and forcing the government to make concessions. By 10 am on the morning of 21 March 1960 a group of between 3000 and 5000 gathered in the centre of Sharpeville. Similar events also took place in neighbouring areas such as Boiphatong and Evaton. The group from Sharpeville marched to the Sharpeville police station, where a tense situation soon started developing. By one o'clock police reinforcements were called for and started arriving. The police force now consisted of 300 policemen who were supported by armoured vehicles. At 13:15 a scuffle broke out after which the fence surrounding the police station was trampled and a police officer pushed over. Simultaneously the front ranks of the crowd pushed forward, which resulted in the police opening fire without any order to do so.

DATE	DESCRIPTION
	The crowd panicked and fled. Sixty-seven protesters (including children) were killed, while 186 people were wounded. The news of the Sharpeville tragedy carried across the world's press, and focused international attention on the political situation and injustices taking place in South Africa (www.sahistory.co.za; Birkholtz 2009). The 21st of March is still annually commemorated in South Africa today as Human Rights Day.

4.4.3 Archaeological Background

Stone Age

Archaeological investigations in the Vereeniging-Meyerton area date to the late 1930's when C. van Riet Lowe investigated the occurrence of archaeological materials stratified within the Vaal River Gravel sequence. This led to the discovery of several sites near Vereeniging and Meyerton, which preserved Large Cutting tools (LCTs) from the Acheulean Industry (Fourie 2017). This established an ESA sequence that is collectively known as the 'Three Rivers Sites' or the 'Vereeniging Sites' which include Klip River Quarry, Henley-on-Klip, Badfontein and the Meyerton Townlands (Fourie 2017).

The 'type site' of the Vaal River Gravel sequence, for the Vereeniging sites mentioned above, is the Klip River Quarry, discovered by C. van Riet Lowe (1937). The gravel sequence of this area comprises rocks of shales and sandstones from the Karoo Supergroup with diabase intrusions (dolerites and andesites). The latter rock types are the major toolstone materials utilized in Acheulean assemblages. Characteristic Acheulean LCTs were discovered, including handaxes and cleavers, yet detailed descriptions of this assemblage have not been provided. The Klip River quarry site was proclaimed as a National Monument in (also a Provincial Heritage Site). This site is located approx. 3.25km south, of the Springfield MR study area.

Another site similar to the Klip River Quarry, is the Duncanville Archaeological Reserve which is located approx. 2.35km south-west of the Springfield MR study area. The Duncanville was proclaimed as a National Monument in 1944 (Oberholster, 1972). In terms of the NHRA the site is now protected as a Provincial Heritage Site. This site was proclaimed due to the large number of stone implements dating to the Acheulian period of the Early Stone Age which were discovered on the surface of the Vaal River gravel beds.

Both of the above proclaimed sites were initially discovered by T N Leslie, an engineer, and later investigated by Van Riet Lowe, who was instrumental in them being declared as National Monuments. These two sites were also excavated by Revil Mason between 1960/61 (Prins, 2005).

A further known site in the nearby area the Meyerton Townlands site, which was briefly reported by le Roux and le Roux in 1959 (Fourie 2017). Trenches excavated by the Rand Water Board

exposed gravels associated with the Klip River from which over 100 artefacts made on quartzite were collected. LCTs were produced through bipolar and large-flaking techniques, similar to other assemblages from the Vereeniging Sites (Fourie 2017).

Iron Age

Evidence of the Late Iron Age (1500-1800 AD) is prevalent in the Suikerboschrand and Klipriviersberg area. Stone kraals and remnants of stone dwellings of the Sotho-Tswana peoples have been found. Other Late Iron Age stone walled sites, dating from the 18th and 19th centuries, occur towards Alberton, along the rocky ridges of the eastern part of the Klipriviersberg (Huffman, 2000).

Iron Age sites have been identified in an AIA produced by Huffman (2008) for the Mountain View development on Farm Nooitgedacht 176 IR, Gauteng, located approximately 18 km north of the proposed Springfield MR area. Stone walling and ceramic residues were identified at several localities near Perdeberg Hill, located on Farm Nooitgedacht. Some ceramics were associated with the “Uitkomst facies” (AD 1800) and of high significance (Fourie 2017).

Redan Rock Engraving Site (Provincial Heritage Site)

Most of the details for the Redan engraving site were obtained from a thesis on the site written by Marguerite Prins (2005). Prins notes that the rock engraving site of Redan, which is located within the Springfield MR area, approximately 700m west of the R59 road, is believed to date to the Late Iron Age. In 1891 T.N. Leslie, an emigrant from England who was employed by Marks settled on the farm Leeuwkuil and opened the Wildebeest Quarry in the area close to the confluence of the Klip River and the Vaal River. While excavating for building stone, he discovered that the area was exceptionally rich in fossil plants, Early Stone Age tools and rock engraving sites. He discovered that rock engravings occurred on both the farms Klipplaatdrift and Leeuwkuil as well as on the farm Kookfontein. However, the inclusion of Klipplaatdrift and Leeuwkuil in the town of Vereeniging, subsequently destroyed those sites. The engravings on Kookfontein were saved only because the farm was excluded from the plans for the new town (Prins 2005).

The rock engravings at Kookfontein were temporarily in the news in 1936 when the Klip Power Station was erected by ESCOM on a portion of the farm Waldrift No. 599, very close to the rock engraving site on the adjoining farm Kookfontein (Prins 2005). These two farms, bought originally in 1888 by Donald McKay, were both coal-bearing, and coal mining was conducted at the Meyerton Colliery on Kookfontein. In order to supply sufficient fuel to the Klip Power Station McKay Estates entered into a contract with Amalgamated Collieries and Springfield Colliery was established at Kookfontein some distance away from the engraving site (Prins 2005: 49-50).

A small settlement and a post office were subsequently established on Waldrift. The closest railway station was Redan and the settlement adopted the name of Redan. The adjoining rock engraving site at Kookfontein also became known as the Redan rock engraving site (Prins 2005).

Prins (2005) notes that Van Riet Lowe published the first systematic index of rock art sites, *Prehistoric Art in South Africa* in 1941, which included the farm Kookfontein No. 187 among four sites in the Vereeniging area.

The engraving site of Redan was researched by A.R. Willcox and H.L. Pager in 1967. Willcox and Pager copied all the petroglyphs by drawing them to scale and recorded a total of 244 petroglyphs, the majority of which comprised geometrical designs. Besides the petroglyphs, Willcox and Pager also documented 21 flattened or smoothed surfaces produced by rubbing or grinding activities. Willcox and Pager considered that the weathering of the surfaces of the petroglyphs suggested an estimated age of between 500 and 100 years; they were therefore probably made by the San people (Kovacs, 1998:10). The detailed analysis of the Redan site by Prins (2005) supports the view that suggests a relatively recent date for the engravings at Redan of within the last several hundred years, and probable association with Korana-Khoekhoe groups who were known to be present on the southern Highveld in the early 1800s (Prins 2005:264)..

In terms of the NHRA this site is now a formally protected Provincial Heritage Site. It was previously declared as a National Monument in 1971 (Prins 2005; SAHRIS). However, subsequent to 1994, and the replacement of the Vereeniging Town Council with the Lekoa Vaal Metropolitan Council, the farm Kookfontein that had been owned and managed by the Town Council and on which Redan is situated, was sold to a private individual, K. Badenhorst. According to the most recent information, portion 29 of Kookfontein 545 IQ is now owned by a brickwork company, Ocon Brick Pty Ltd. The local community is very aware of the site and it has been recently highlighted by the local press with regard to the proposed coal mining project (Vaal Weekblad, 27 February 2020).

Fossilised Forest

Prins notes that in addition to the archaeological sites discovered by Leslie, he also discovered the remains of a fossilised forest on the exposed bed of the Vaal River, in 1906 when he built a weir to dam the river in order to stabilise the water supply to the coal mine and other industries, This fossilised forest was later completely submerged when the Vaal River Barrage was built in 1923 by the Rand Water Board (Prins 2005: 42-43).

4.4.4 Historical Background

Coal Mining

There is some disagreement in the literature as to whether coal was discovered in the Vereeniging-Sasolburg Coalfield in 1871 by Karl Gottlieb Mauch, or in 1878 by George William Stow. However, coal was being commercially exploited during the 1880s and 1890s and supplied to the diamond and gold mining industries in Kimberley and the Witwatersrand. In 1880 Stow met the diamond magnate Sammy Marks, who realised the importance of Stow's discovery and authorised him to purchase all the farms on which he considered coal to exist. Stow purchased the 5675 morgen (=

4860 ha) farm Leeuwkuil (meaning Lion's pit) which lay on the northern bank of the Vaal River. This was the first mine to produce in the coalfield and was also the only colliery to mine coal commercially on the north side of the Vaal River. It was later to become known as the Bedworth Colliery. The discovery of gold on the Witwatersrand in 1886 dramatically increased the demand for coal (Hancox and Götz, 2014).

Springfield Colliery

Donald McKay, who had seen an outcropping of coal on the farms Kookfontein and Waldrift before Marks had registered his company, persuaded Cecil John Rhodes to purchase these farms (totalling 5600 morgen or around 4800 ha) and in 1881 they became equal partners in the mine which was later to be known as Springfield Colliery (Hancox and Götz 2014:60). In 1934, still in partnership with Victoria Falls Power company, Escom built the 400MW Klip Power Station just north of Vereeniging to supply the Rand. It was constructed on the Klip River at the pithead of the Springfield Colliery, which was developed by the Vereeniging Estate specifically to supply the new plant (Groundwork 2006: 64). Springfield Colliery was started in 1948 to supply the requirements of Eskom's early Klip Power Station. In its later life it also supplied the Grootvlei Power Station. Underground sections at Springfield Colliery were eventually closed due to steep gradients and poor and unstable mining conditions caused by dolerite intrusions and faulting (Hancox and Götz 2014:69).

Mining activities ceased at Springfield Colliery in 1953, making Kookfontein available for agricultural purposes (Willemse 1999; Prins 2005).

Klip Power Station

Klip Power Station was built as a result of the rapid growth in the demand for electricity that followed the increase in the price of gold in 1933. Negotiations were started between ESCOM and the Victoria Falls and Transvaal Power Company (the VFP), with the object of producing power on the most economical basis in the interests of consumers as a whole. An agreement was entered into between the VFP and ESCOM by which a new station would be financed and owned by ESCOM but be constructed and operated by the VFP on behalf of ESCOM. It was decided in 1933 to build Klip Power Station adjacent to the Klip River at Redan, about 7km north-east of Vereeniging. Like Vereeniging Power Station, it would be a pithead station. It would be established adjacent to a new colliery shaft from which coal would be mechanically fed right into the bunkers (http://www.eskom.co.za/sites/heritage/Pages/Klip.aspx).

The first generator was started up in March 1936 and the last was taken into service in July 1940. With twelve 33 MW generators and four 7MW house sets, giving a total of 424MW of installed plant, Klip had the distinction of then being the largest steam power station in the Southern Hemisphere. As far as is known, it had the greatest output of any power station in the world at that time, and probably the lowest cost of production of any other similar station. The rate of construction and commissioning of plant constituted another world record. It was the first station in ESCOM to have

cooling towers. (The name ESCOM was changed to Eskom in 1987) (http://www.eskom.co.za/sites/heritage/Pages/Klip.aspx)

Coal was initially supplied from the Springfield Colliery and was raised through two shafts, the East and the West. The East shaft was located immediately adjacent to the station and delivered the coal via a relatively short conveyor belt system. Coal supplied from the West shaft was delivered via a rail connection approximately 2.5km long in 40 ton hopper wagons drawn by steam locomotives and dumped into an open staithe. Both shafts had their own crushing and washing plants. When the station was planned, it was estimated that the mine could supply the station for 40 years. However, by 1948 it became apparent that the coal was becoming exhausted and coal would have to be brought from further afield. Plans were made for the construction of a 65km railway to transport coal to the power station. By 1953 the Springfield colliery was closed down and coal was railed in from Cornelia Colliery (http://www.eskom.co.za/sites/heritage/Pages/Klip.aspx).

The Klip Power station was in operation for almost exactly fifty years, being closed down in March 1986. During the 1980's Eskom had been commissioning its new giant six-pack power stations. But due to a decrease in the rate of growth in the demand for electricity in South Africa, Eskom began to experience a surplus of generation capacity. The older and less efficient stations were thus no longer required. Explosives demolished the cooling towers during 1987. These were the first cooling towers to be built at an ESCOM power station and the first to be demolished. The power station plant and equipment were disposed of as scrap, the buildings were totally demolished and the land rehabilitated. Only the workshops and township remained (http://www.eskom.co.za/sites/heritage/Pages/Klip.aspx).

When the staff housing became redundant after closure of the power station, rather than demolish the buildings, which were fundamentally still sound. The estate included 129 houses and single quarters for 73 employees, as well as other facilities. The township was transformed into a proper retirement village with facilities for local management, medical care, catering and recreation. Accommodation was to be administered jointly by the tenants and the Eskom Foundation, an organisation formed specifically to provide housing and related facilities for Eskom pensioners. The housing estate was handed over for development as a retirement village at a ceremony in June 1988. In later years the Eskom Foundation withdrew participation, and the staff of Lethabo Power Station managed the township (http://www.eskom.co.za/sites/heritage/Pages/Klip.aspx). **Figure 17** and **Figure 18** show the residential village at the time of construction and after its conversion to a retirement village.

Figure 17- Aerial view of Klip power station with the residential houses still under construction

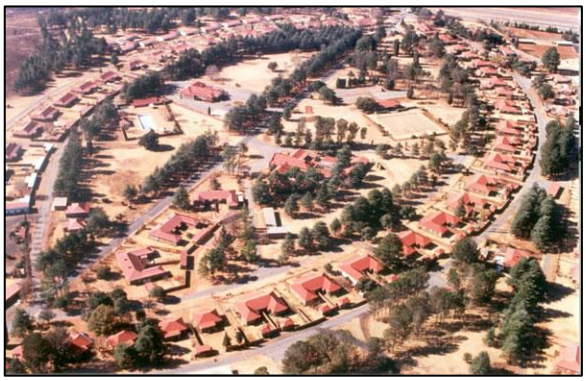


Figure 18 - Aerial view of the retirement village (http://www.eskom.co.za/sites/heritage/Pages/Klip.aspx

4.5 Findings of the Heritage Background Study

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project (**Figure 19)**.

4.5.1 Heritage Sensitivity

The sensitivity maps were produced by overlying:

- Satellite Imagery; and
- Historical Topographical Maps dating from 1941, 1954 and 1979.

This enabled the identification of possible heritage sensitive areas that included:

- Dwellings;
- Clusters of dwellings (homesteads and farmsteads);
- Burial grounds and graves;
- Structures/Buildings;
- Archaeological sites; and
- Provincial Heritage Sites.

By superimposition and analysis, it was possible to rate these structure/areas according to age and thus their level of protection under the NHRA. Note that these structures refer to possible tangible heritage sites as listed in **Table 5.**

Table 5: Possible heritage sites in the study area

Name	Description	Legislative protection
Architectural Structures/ Dwellings	**60 years and older**	NHRA Sect 3 and 34
Burial grounds/graves	Graves	NHRA Sect 3 and 36 and National Health Act
Archaeological sites	Artefacts and/or structures/sites	NHRA Sect 3 and 35 and Sect 27

Provincial Heritage Sites	Formally declared and protected sites	NHRA Sect 27

Heritage resources depicted include burial grounds or possible graves, homesteads and residential or other structures, the old Springfield Colliery and the Redan Rock Engraving Archaeological site (which is a formally protected Provincial Heritage Site). Observation of the previous heritage reports has shown that graves are in abundance in the surrounding areas and especially near farmsteads.

This factor needs to be held in consideration.

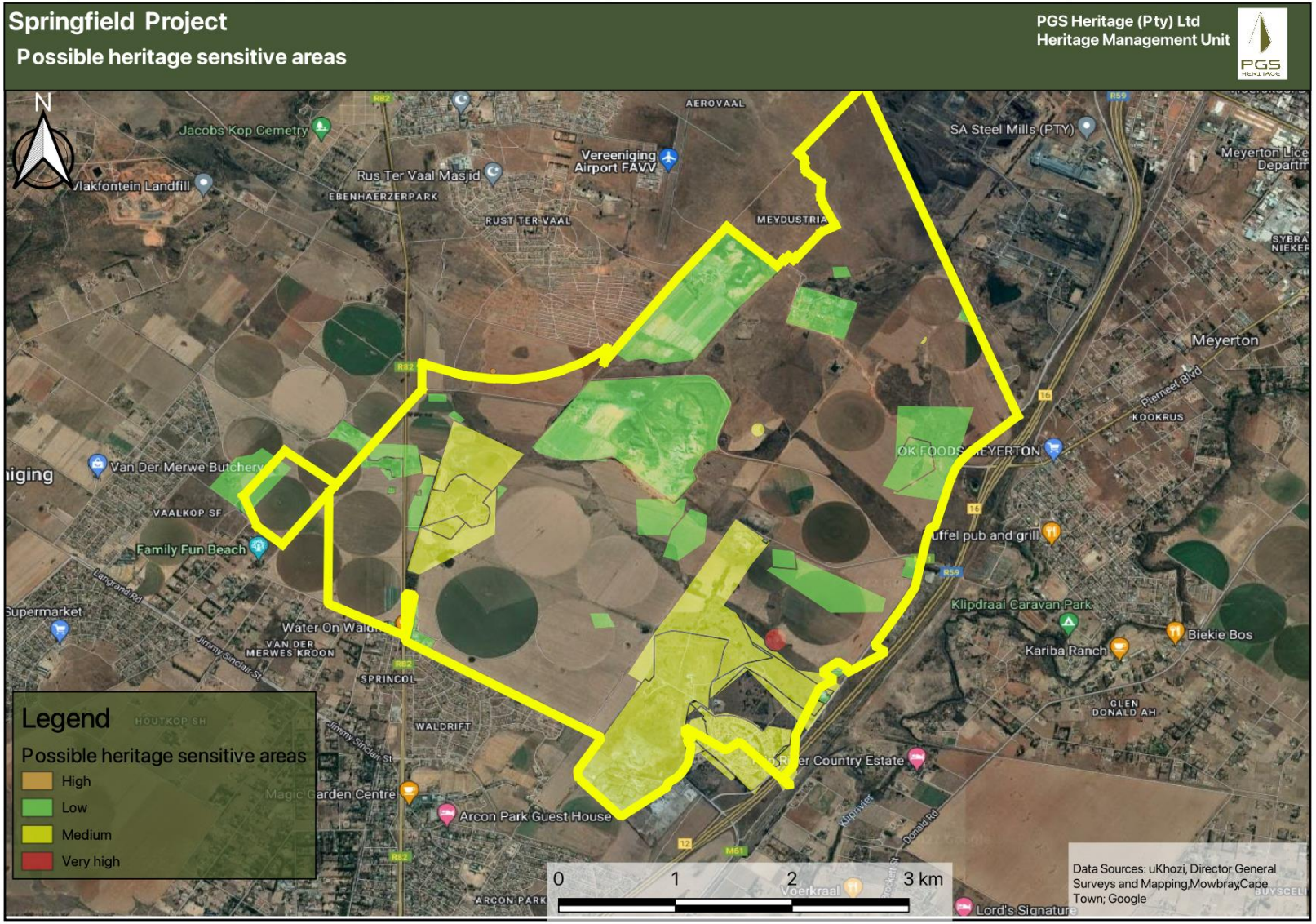


Figure 19 - Heritage sensitivity map showing locations of possible heritage features depicted on the topographical maps and satellite imagery (study area with yellow boundary)

4.6 Fieldwork findings[1]

During the field work in the mining rights area a total of twelve heritage resource were identified. The majority of these (five) were graves and burial grounds (KF001, KF002, KF005, KF006, KF010). An additional burial ground KF007 was identified 60 meters outside of the MRA boundary but no project infrastructure is planned within 100 meters from this specific burial ground. Four sites containing structures associated with the historical Springfield Colliery and Klip Power Station (KF009, KF011, KF012, KF013). The known archaeological rock engraving site of Redan (KF004) is also located within the study area. This site is formally protected as a Provincial Heritage Site. The remains of a modern dairy and piggery were also identified (KF003). The PIA further identified some stromatolites at **KF014**. See **Figure 20** and the individual site descriptions table below.

The PGS team met with two of the landowners, Mr Piet Hamman and Mr William de Jager, who each directed the PGS team to specific areas on their properties where heritage resources were located. It should be noted that while most of the MRA was accessible, the PGS team was unable to access the Ocon Bricks property.

[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.*

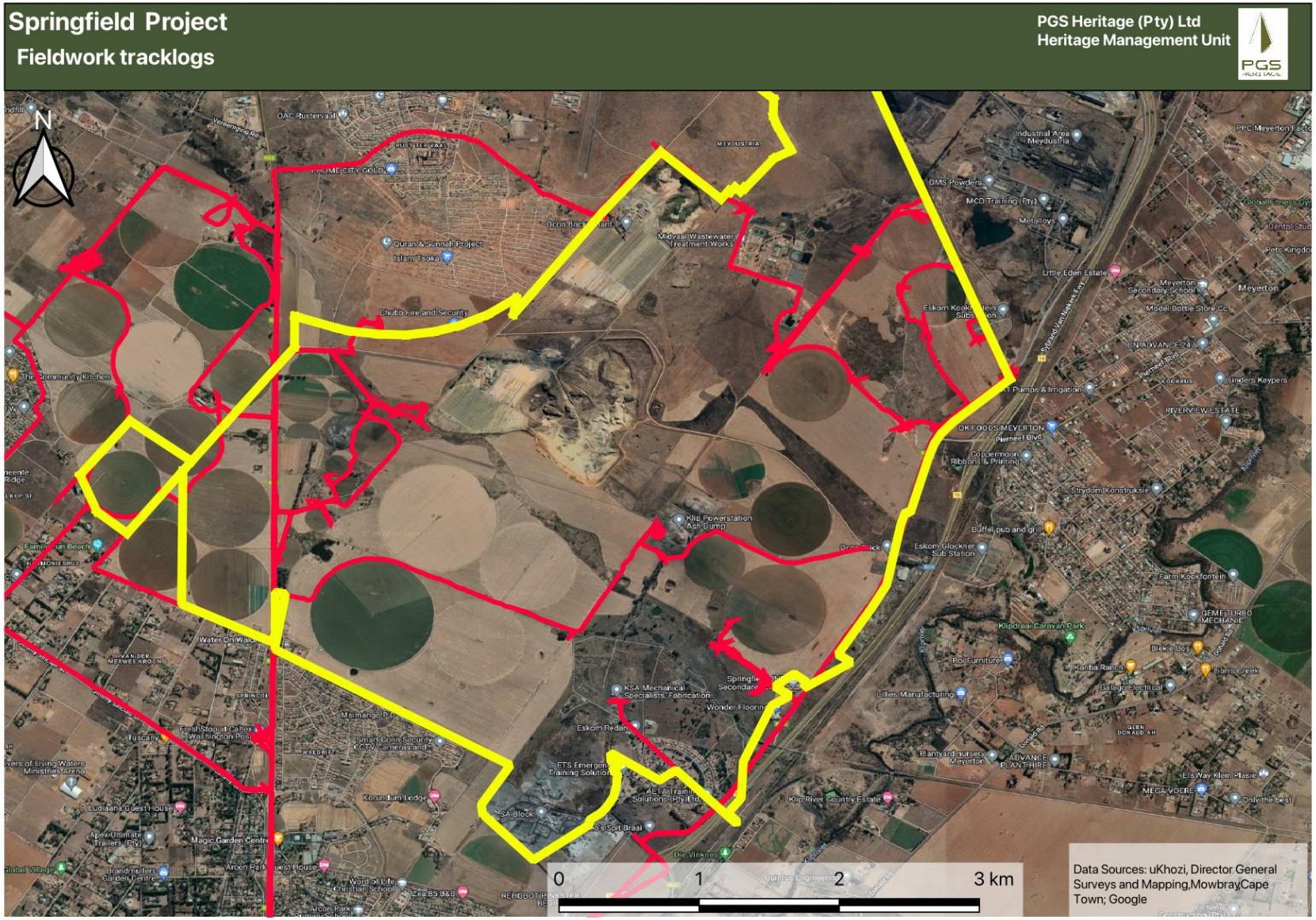


Figure 20 - Fieldwork tracklogs (track in red, study area yellow line)

Figure 21 - Identified heritage resources within the Springfield MR area (yellow line)

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF001	26,60951°S	27,96893°E	The site is an informal burial ground situated in between cultivated maize fields. The burial ground is overgrown and an exact count of the number of graves was not possible (**Figure 22**). A rough count indicated around 200 graves. Grave dressings varied between stone packed to formal headstones with inscriptions and dates ranging from 1918 to 1953 (**Figure 23**). The burial ground and graves are protected under s36 of the NHRA. **Site extent**: Site is approximately 4000m^2 (60x70 meters)	High	IIIA

Figure 22 – View of the burial ground showing one of the headstone in the foreground

Figure 23 – A grave dating to 1918

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF002	26,58536°S	27,96960°E	This possible grave is heavily overgrown (**Figure 24**) and the only indication that it is possibly a grave is a precast cement slab with a wooden extension and a name painted on it. The name reads “Lentsa” (**Figure 25**). **Site extent**: approx. 5x5m.	Moderate	IIIB

Figure 24 – View of heavily overgrown structure

Figure 25 – Inscription on the possible headstone

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF003	26,58536°S	27,98126°E	The site consists of the ruins of a modern dairy and piggery. The dairy is fenced with a low precast wall, while its foundations were constructed with concrete and fired clay bricks (**Figure 26).** The piggery was constructed with precast slabs and pillars (**Figure 27**). **Site extent**: approx. 50x50m	None	Not conservation worthy

Figure 26 – View of the low precast walling around the dairy

Figure 27 – Remains of the piggery

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF004	Coordinates withheld for safety considerations		The site is that of the Redan archaeological site. As described in section 4.7 of this report, the site was declared a national monument in 1971 (**Figure 28**). Under the NHRA the site is now classified as a Provincial heritage site and protected under s27 and s35 of the NHRA. The site consists of 244 petroglyphs (**Figure 29**), ranging from geometric patterns (**Figure 30**) to depictions of animals (**Figure 32**) most related to the hunter gatherers and early herders. Some of the more recent engraving depict dates and initials from the early part of the 20th century. The site is characterised by a rock outcrop on the northern edge of a tributary of the Klip river. The only remains of the original fence are the stubs of the corner posts. The area is scattered with broken glass and other household waste, while damage to some of the depictions is evident (**Figure 34**). Refer to section 4.7 for a detailed assessment. **Site extent**: approx. 50x50m	Very high	II

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 28 – View of the Redan rock art site towards the east

Figure 29 – The main central panel of the Redan site

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 30 – Geometric petroglyph

Figure 31 – Modern engravings dating to 1913

Figure 32 – Petroglyphs depiction of animal

Figure 33 – Engraved initials

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 34 – Damage to a section of one of the petroglyph panels

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF005	26,59420°S	27,94494°E	This burial ground is situated to the north east of the old Springfield Colliery West Shaft on the property owned by Mr William de Jager. Mr de Jager indicated the family cemetery to the PGS fieldwork team. The burial ground consists of two recent graves dating from 2015. Both graves are still earth mounds. Only one has a small cross with an inscription as marker (**Figure 35**). **Site extent**: approx. 10x10m	High	IIIB

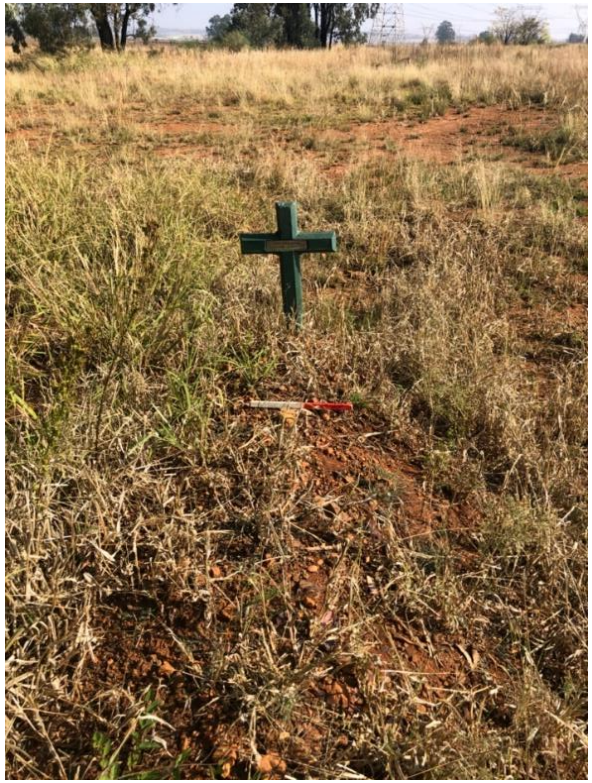


Figure 35 – View of the grave with grave marker

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF006	26,59373°S	27,94377°E	The site is a possible informal burial ground situated some 100 meters to the west of **KF005**. A number of stone structures occur, with some of them aligned east west and consistent with stone packed grave dressings (**Figure 36**). **Site extent**: approx. 20x20m	Moderate	IIIB

Figure 36 – One of the possible graves at KF006

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF007	26,58799°S	27,94372°E	The site is an informal burial ground. It is overgrown with grass and bushes (**Figure 37** and **Figure 38**). A preliminary count indicated the presence of at least 81 graves. The graves dressings vary from formal dressings with headstones to stone packed dressings and in some cases only a rock as headstone. One headstone bears the date of 1945 for the date of burial. The burial ground and its graves are protected under s36 of the NHRA. **Site extent**: approx. 20x36m	High	IIIA

Figure 37 – View of the graves showing some of the formal dressings in the foreground

Figure 38 – View of the burial ground towards the north

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF009 and KF012	26,61010 °S 26,61483°S	27,95778 °E 27,96092°E	The area directly to the east from KF009 up to and including KF012, contains the remains of the original Klip Power station. The history of the power station and Springfield Colliery is described in in **section 4.2.4** of this document. The remains of the foundations of the cooling towers, evaporation ponds and other infrastructure, including the Springfield Colliery East Shaft, covers an area of approximately 100 ha. The Redan residential area that was the Klip Power Station residential area covers an additional 30 hectares within the south-eastern section of the study area. The only buildings still remaining of the power station is the workshops (**Figure 40**) and main offices. The workshops are utilised as business premises for an engineering works while the offices seem to be a residence. The existing buildings, including the Redan residential area, are protected under s34 of the NHRA. The Redan residential area is still well maintained with a vibrant active community. **Site extent**: approx. 100 ha	Low (KF009) to moderate (KF012)	KF009 IIIC KF012 IIIA

Figure 39 – Remaining structures of the power station infrastructure at KF009

Figure 40 – The original workshops of the Klip power station at KF012

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF010	-26,60311 °S	27,96358 °E	The site is an informal burial ground situated to the south of the Waldrift Landfill site. The burial ground was shown to PGS by Mr Pieter Hamman. He indicated that human remains had been found when the concrete palisading was erected for the landfill site. Only one grave with a formal headstone and dressing was identified (**Figure 43**). A walk through of the area revealed numerous small informal headstones (**Figure 42**). Further evaluation of historic Google Earth imagery revealed that the graves were discernible when the vegetation had been burnt (**Figure 44**). The aerial photography indicates at least 6 rows of graves with approximately 100 graves in each row. The graves most probably date from the historic mining operations at the Springfield colliery and as such are protected under s36 of the NHRA. **Site extent**: approx. 100x40m.	High	IIIA

Figure 41 – View of the burial ground at KF010

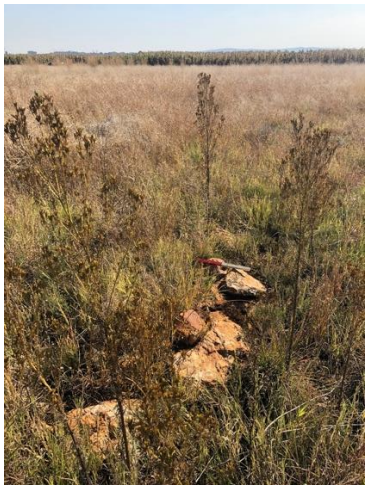


Figure 42 – Informal grave at KF010

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating

Figure 43 – Formal headstone and dressing

Figure 44 – Google earth imagery showing the visibility of the graves in the burial ground (dated: 14 Feb 2019) (yellow block indicates approximate outline of the cemetery)

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF011	-26,60453 °S	27,96401 °E	The site is the shaft and shaft collar of one of the vertical shafts associated with the historic Springfield Colliery (**Figure 45**). The inscribed date on the shaft collar is 1946. The site is generally protected under s34 of the NHRA. **Site extent**: approx. 5x5m.	Low	NCW

Figure 45 – View of the shaft collar of the vertical shaft at KF011

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KF013	26,60011 °S	27,93948 °E	The site is situated on the farmstead and surrounds of the farm Smaldeel. The owner Mr William de Jager indicated that most of the structures that are part of the farmstead were once part of the Springfield Colliery West mining infrastructure. Various structures were converted to dwellings while some others are utilised as storage facilities (**Figure 46**). The only obvious mining infrastructure still visible is the coal tip and ash dumps (**Figure 47**). However the farmstead, outbuildings and shed although renovated, are all part of the original mining infrastructure. The structure date from the late 1930s and are protected under s3 of the NHRA. **Site extent**: approx. 200x150m.	Moderate	IIIB

Figure 46 – Original mine infrastructure now utilised as residential units

Figure 47 – The concrete coal tip of the Springfield Colliery west shaft

4.7 Redan Provincial Heritage Site

Subsequent to the fieldwork completed by PGS, Dr Jeremy Hollman, rock art specialist, was appointed to evaluate the current status of the rock art site as well as the potential impacts that could occur due to the proposed mining activities.

Dr Hollmann concluded that:

> *The Redan engraving site (KF004) is a Category II Provincial Heritage Site and is the only remaining large engraving site in Gauteng. It is legally protected from any developments or activities that threaten its integrity. No mining, or activities of any other kind are permitted within the buffer zone around the site.*
>
> *Natural weathering is causing parts of the rock surface to break off and to crumble. As a result, an undetermined number of the engravings have been damaged. Natural weathering is ongoing and cannot be prevented. It seems inevitable that over an undetermined period of time more of the engravings will be damaged and destroyed in this way.*

Figure 48 - Natural weathering is a severe threat to the Redan engravings. Some of the damage could also be due to vandalism

The presence of sinkholes in the vicinity of the engraving site suggest that the site could be vulnerable to destruction if the current sinkhole gets bigger or if additional sinkholes develop in the area.

Human threats to the Redan engraving site include fire, which heats the rock and, in some cases, causes the engraved rock surfaces to flake off. Access to the Redan engraving site is currently uncontrolled and the site is vulnerable to damage to the outcrops and surrounding areas, theft of the engravings, vandalism, and littering of the site.

The specialist report indicates clearly that the site is not managed by the Gauteng Provincial Heritage Authority. The site is exposed to natural phenomena as well as damage from human interaction such as looting, vandalism and graffiti. Previous management measures such as a wire mesh fence around the site was stolen, with only the concrete footings remaining **(Figure 49**).

Figure 49 - The Redan engraving site was fenced around the time that it was declared a National Monument in 1971. The fence was subsequently torn down by vandals. Photo credit: African Rock Art Digital Archive RSA RED1 13

4.8 Palaeontology

Banzai Environmental was appointed by PGS to conduct the Palaeontological Impact Assessment (PIA) for the Springfield Project. According to this PIA (Butler 2020) the proposed Springfield Project area is primarily underlain by the Vryheid Formation (Ecca Group, Undifferentiated Karoo), Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup), as well as Quaternary superficial deposits (**Figure 50**).

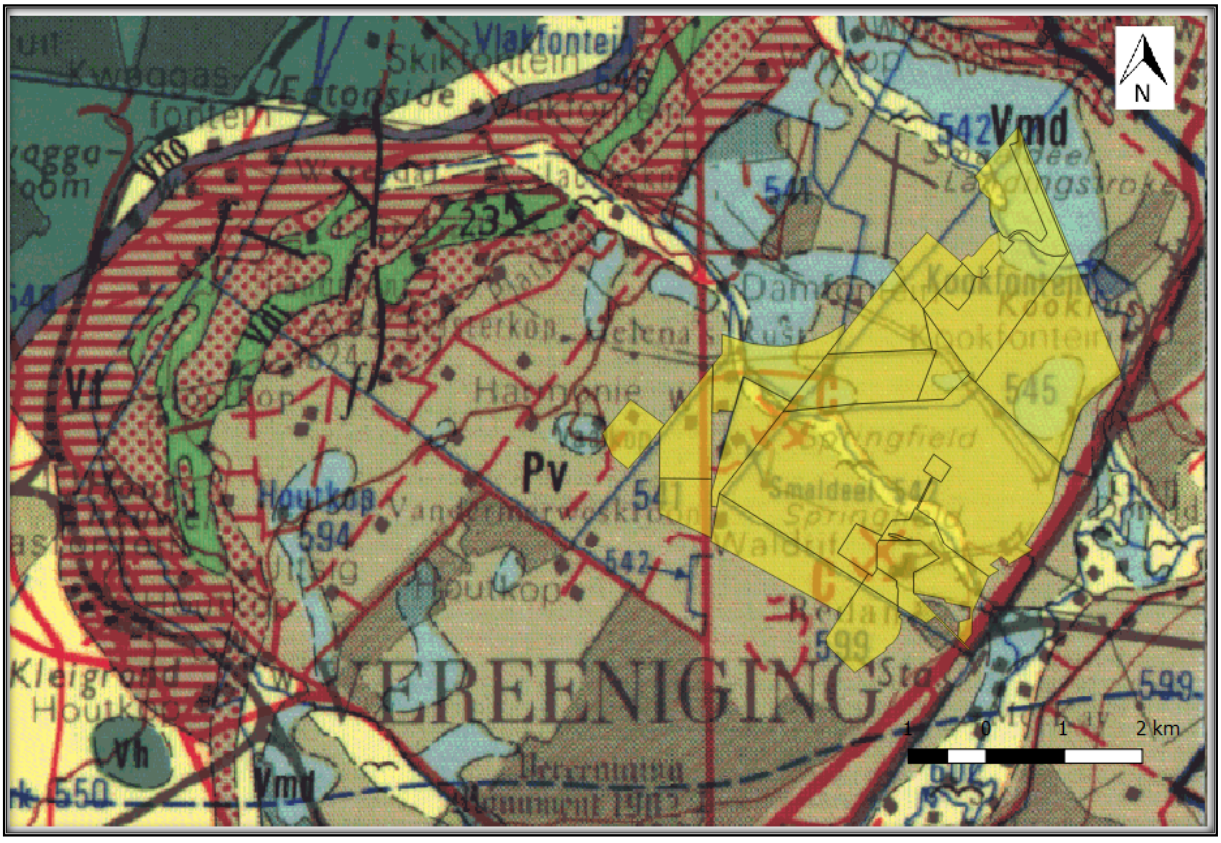
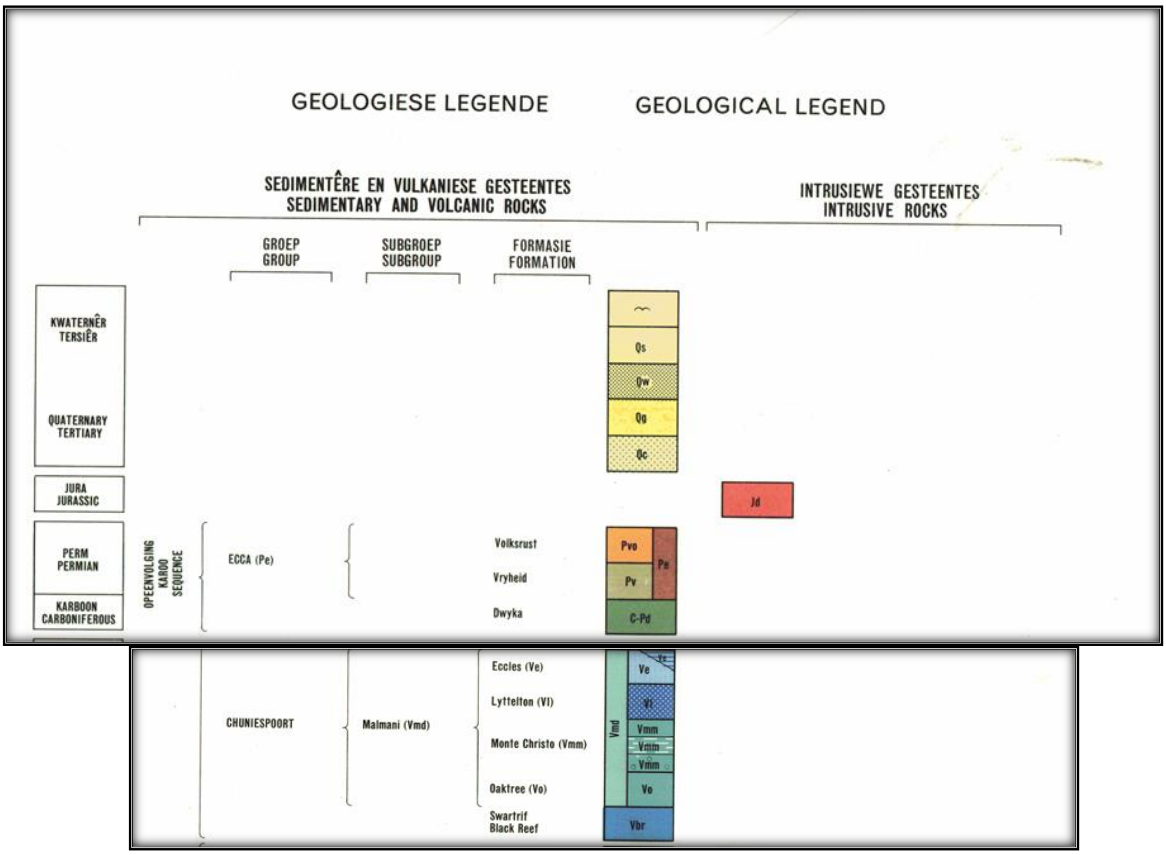


Figure 50 - Extract of the 1:250 000 2626 West Rand Geological Map (Council for Geosciences, Pretoria) indicating the geology of the proposed Springfield Project, between Vereeniging and Meyerton in Gauteng. The Project is underlain by the Vryheid Formation (Ecca Group, Undifferentiated Karoo), Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) and Quaternary deposits. Map drawn by QGIS 2.18.28.



Legend Clarification

Qs-Quaternary soil cover

Pe-Ecca Group- Shale, sandstone, coal

Pv- Ecca; Vryheid Formation- Sandstone, shale, coal

Vmd- Malmani Subgroup-dolomite, chert and remnants of chert breccia of Rooihoogte Formation

Mining

C-Coal

The PIA completed with the fieldwork by the palaeontologist (Butler, 2020) identified several loose stromatolites in a pile in the eastern part of the mining rights area but outside the planned development footprint at **KF014** (**Figure 51**). There is thus a chance that other stromatolite fossils could be present just below the surface of the development footprint. However, it is highly possible that other fossils could also be present in the development.

No other visible evidence of fossiliferous outcrops was identified during the site investigation.

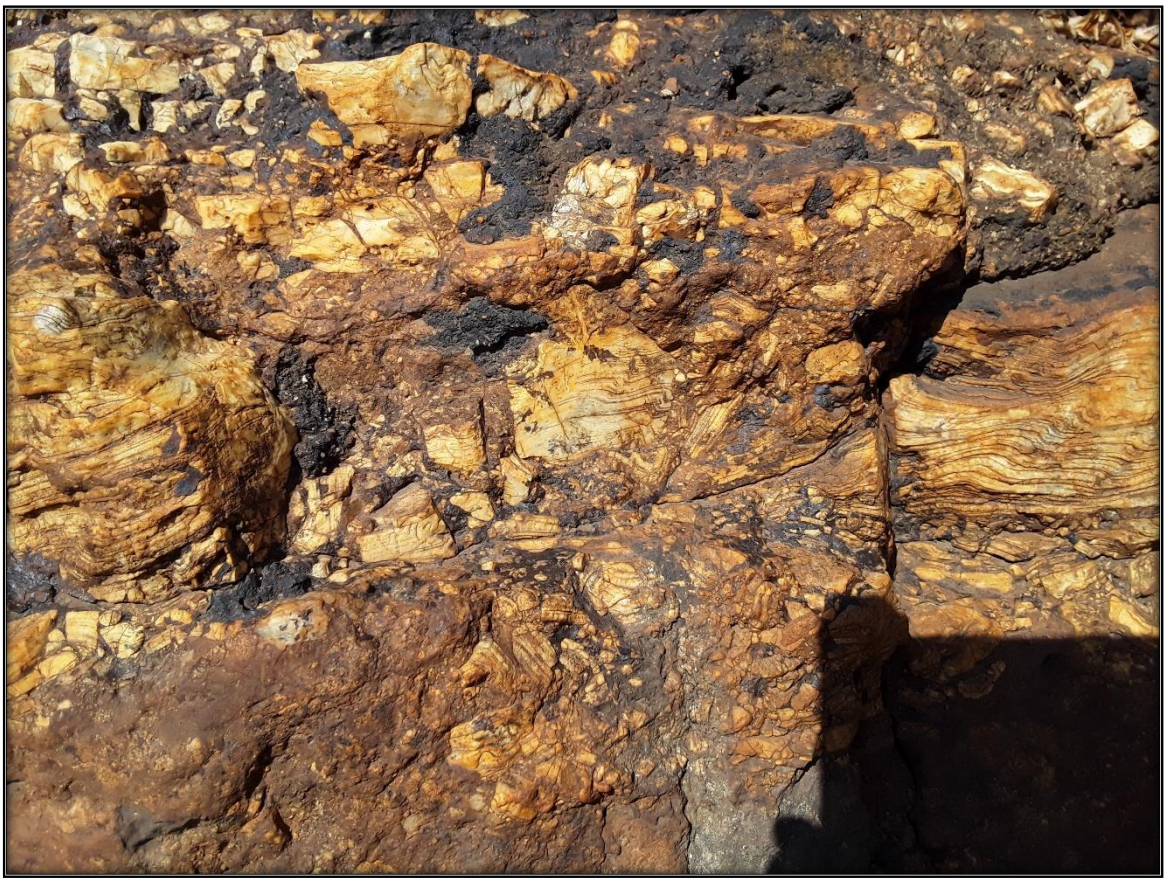


Figure 51 - Stromatolite

GPS coordinates:26° 35’ 40”S 27° 58’ 54”E

5 IMPACT ASSESSMENT

The impact assessment rating is based on the rating scale as contained in **Appendix B**.

The following section provides an analysis of the impact of the proposed project area on heritage resources identified within the Springfield MR area. The fieldwork identified twelve heritage features in total that are inside the MRA. Five of which were burial grounds (KF001, KF002, KF005, KF006, KF010), and four sites contained structures associated with the historical Springfield Colliery and Klip Power Station (KF009, KF011, KF012, KF013). An additional burial ground KF007 was identified 60 meters outside of the MRA boundary but no project infrastructure is planned within 100 meters from this specific burial ground. The known archaeological rock engraving site of Redan (KF004), which is a protected declared Provincial Heritage Site is also located within the study area. The remains of a modern dairy and piggery were also identified (KF003). The PIA further identified some stromatolites at KF014.

The five burial ground sites are considered to have very high significance and would require mitigation measures. Of the four sites with historical structures, two sites are considered to have moderate heritage significance and would require mitigation measures (KF012 and KF013). The

remaining historical structure site (KF011) is of low heritage significance and would require no mitigation, except a permit for destruction (60 years or older). The archaeological site of Redan (KF004) is considered to have Very High significance. Dr Jeremey Hollman, rock art specialist, was appointed to assess the potential impacts of the mining project on the Redan Provincial Heritage Site.

5.1 Status Quo

Although heritage resources of a medium to high significance were identified within the proposed mining right application area, it is anticipated that the impacts on most of these sites can be mitigated.

However, one specific heritage resource **- the Redan rock engraving site, which is a declared Provincial Heritage site -** was identified as a **possible fatal flaw,** without the recommended mitigation, from an archaeological perspective. It must be noted that this site is currently heavily impacted by veldfires, illegal dumping and vandalism. The inclusion of this site in the mining boundary in keeping with its 200-meter buffer and fencing inside the mining boundary can have a positive impact in the protection of the site.

5.2 Details of all alternatives considered

This section describes alternative means of carrying out the operation and the consequences of not proceeding with the proposed project.

The “no-go” alternative refers to the option of not going ahead with the proposed project. This will entail not mining the coal reserve and the status quo of the MRA will remain the same with intensive agriculture and other activities continuing unaltered.

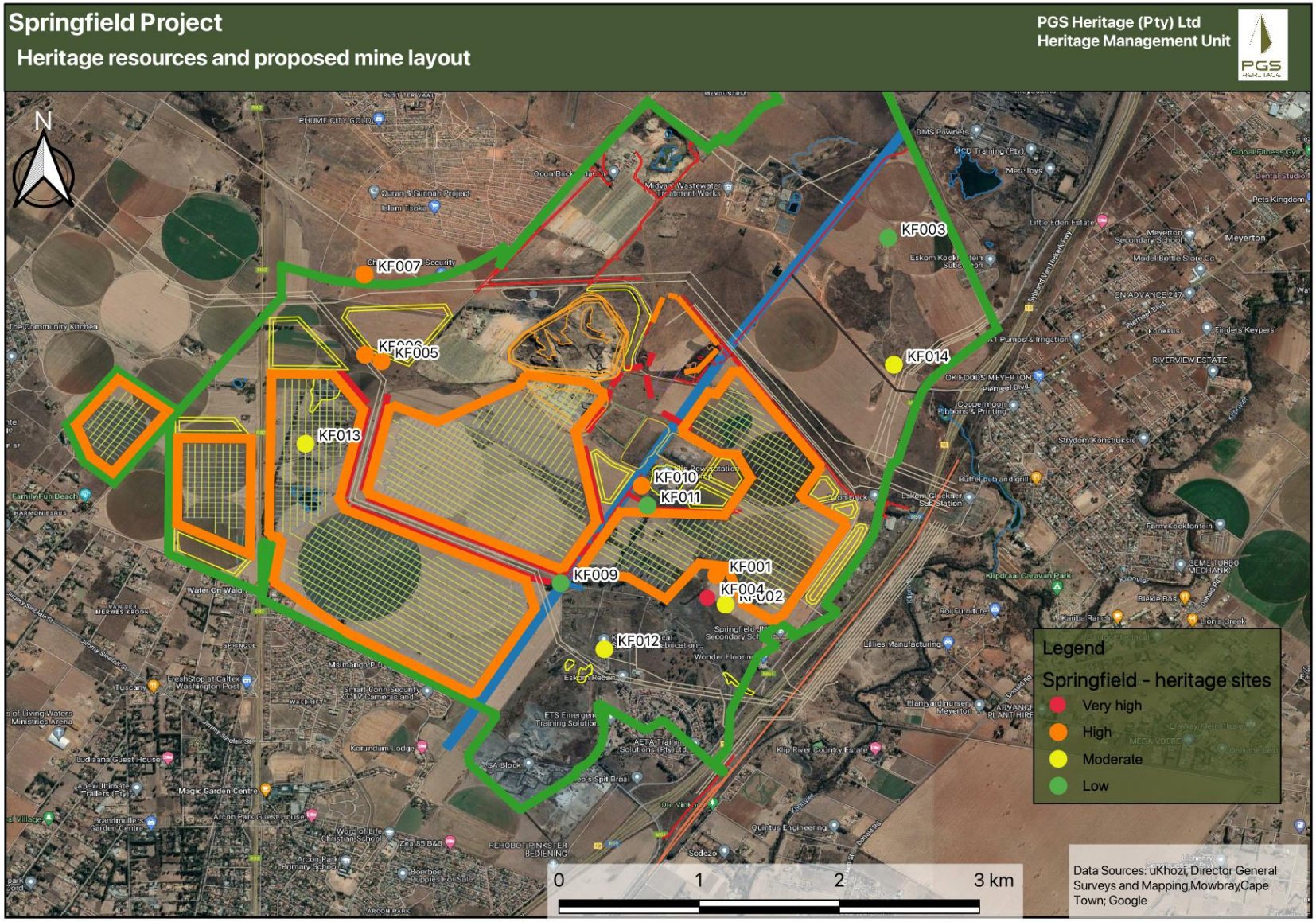


Figure 52 –Heritage resources in relation to mine layouts (project boundary – green line)

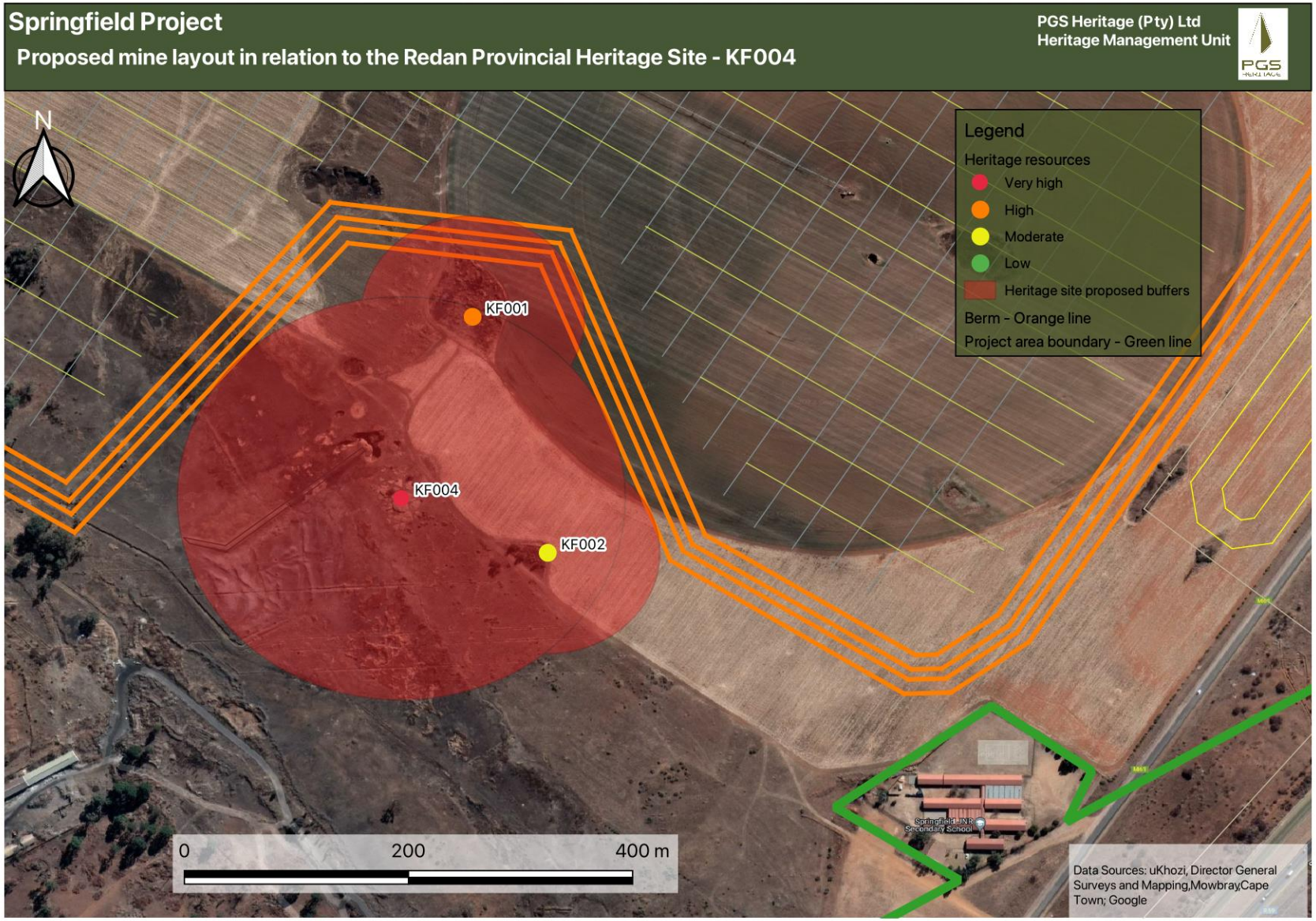


Figure 53 – Position of the redan Rock Art site (KF004) in relation to mine infrastructure (orange lines indicate berms)

5.3 Burial grounds and graves

Five burial grounds and graves were identified in the Springfield MR study area (KF001, KF002, KF005, KF006, KF010). An additional burial ground KF007 was identified 60 meters outside of the MRA boundary but no project infrastructure is planned within 100 meters from this specific burial ground. Burial grounds and graves have high heritage significance and are given a Grade IIIA significance rating in accordance with the system described in Section 3.1 of this document.

The impact would be damage to identified graves and burial grounds due to earth-moving or vegetation clearance activities during the construction phase, as well as site establishment and the construction of all infrastructure, including the development of open pits and overburden dumps.

The pre-mitigation impact significance is rated as HIGH, but with the implementation of the required mitigation measures the post-mitigation impact will be VERY LOW.

5.4 Archaeological Site (Redan engraving site)

The Provincial protected Redan archaeological engraving site (a declared Provincial Heritage site) is located within the study area and at least one archaeological find spot was identified within the study area in a previous HIA study.

The impact would be damage to identified archaeological resources due to earth-moving or vegetation clearance activities prior to the construction phase, as well as site establishment and the construction of all infrastructure, including the development of a box cut. **The original layout showed mining less than 50 meters from the rock art site. However, implementing recommendation provided to the Applicant in 2020 resulted in the implementation of a 200-meter buffer to the closest mining berms.** The proximity of mining can potentially damage the site directly through blasting vibrations and fly rock, uncontrolled vehicle movement and increase visiting of the site by mining staff.

The change in the land use from predominantly agricultural to that of industrial will further change the experience of the cultural landscape of the site. Now the site surrounds are described as rural with the planting of maize.

Figure 54 – View towards the site from the east

Figure 55- View from the site towards the east (springtime)

Figure 56- View from the site towards the east (early-winter)

Figure 57- View from the site towards the south and the position of the preferred plant site

The pre-mitigation Environmental Risk impact significance for the Provincial Heritage Site is rated as VERY HIGH, and with the implementation of the required mitigation measures the post-mitigation impact rating will be LOW.

The impact of the mining on associated cultural landscape was also assessed and it was found that the proposed mining layout will have a significant HIGH impact on the redan rock art cultural landscape. The recommended mitigation measures should reduce the post-mitigation rating to LOW.

5.5 Historical Structures

The fieldwork identified four sites containing historical structures associated with the historical Springfield Colliery and Klip Power Station within the study area (KF009, KF011, KF012, KF013).

The impact would be damage to identified historical structures due to dismantling and removal of existing infrastructure, as well as site establishment and the construction of all infrastructure, including the development of a box cut.

The identified historic structure was given a Low to Moderate heritage significance rating. They will be impacted by the proposed opencast as well as the proposed placement of the processing plant at the preferred Option 1. It is noted that the design of the Option 1 processing plant has taken the existing buildings into account and will not impact directly on those remaining historic powerplant buildings (KF012).

The historic structures, that include the ruins of the Springfield Colliery West shaft and other building currently used by the farm owner at KF013 will be directly impacted by the open cast activities. The building and structures date to the 1930s and are protected under s34 of the NHRA. The recommended mitigation measures will reduce the impact from MEDIUM to LOW.

In the case of KF013, the pre-mitigation impact is rated as HIGH due to its heritage significance rating and the destruction of the site. With the implementation of the recommended mitigation measures this impact will be mitigated to an impact significance of VERY LOW.

5.6 Palaeontology

As noted above, the geology of the proposed Springfield Colliery is primarily underlain by the Vryheid Formation (Ecca Group, Undifferentiated Karoo), and by Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) accordingly the palaeontological sensitivity of the Vryheid Formation (Ecca Group, Undifferentiated Karoo) is Very High while that of the Malmani Subgroup is High and Quaternary deposits is High (Almond and Pether 2008, SAHRIS website).

An EIA level palaeontology study was conducted to assess the value and prominence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. The purpose of the PIA Report is to elaborate on the issues and potential impacts identified during the scoping phase. A Phase 1 field-based assessment was conducted with research in the site-specific study area, as well as a comprehensive assessment of the impacts identified during the scoping phase. The recommendations will require approval by SAHRA's APM Unit.

None of the proposed alternatives is preferred as the palaeontological resources will be impacted equally by all the alternatives. The identified stromatolites are situated outside of the proposed mining and infrastructure footprints. The implementation of the recommended mitigation measure will reduce the current HIGH rated impact and will have a post-mitigation rating of LOW.

5.7 Impact assessment summary table

Implementing the impact assessment methodology as supplied by uKhozi Environmentalists**, Table 6** provides a quantitative assessment of the impacts of the proposed Springfield Project.

Table 6: Impact Summary table

			Pre-Mitigation						Post Mitigation						
Impact	**Alternative**	**Phase**	**Extent**	**Duration**	**Severity**	**Reversibility**	**Probability**	**Pre-mitigation SP**	**Extent**	**Duration**	**Magnitude**	**Reversibility**	**Probability**	**Post-mitigation SP**	**Final score**
Impact on burial grounds and graves	Preferred and alternative	Mining	3	5	8	5	4	84	3	4	4	5	1	16	16,00
Impact on structures older than 60 years	Preferred and alternative	Mining	1	5	6	5	3	51	1	4	4	5	2	28	28,00
Impact on structures older than 60 years - KF013	Preferred and alternative	Mining	1	5	8	5	5	95	1	5	4	5	1	15	15,00
Impact on palaeontological resources	Preferred and alternative	Mining	1	5	8	5	4	76	1	5	4	5	2	30	30,00
Impact on Redan rock art site	Preferred and alternative	Mining	5	4	10	5	5	120	5	4	4	5	2	36	36,00
Impact on Redan rock art site - landscape	Preferred and alternative	Mining	2	4	8	5	5	95	1	4	6	5	2	32	32,00

Table 7: Significance levels

Very Low	Negligible impact which does not require further mitigation.	SP <25
Low	Acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the implementation of the project. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment.	SP 26-50
Medium	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.	SP 51-75
High	A serious impact, if not mitigated, may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural &/or social) environment and result in severe negative or beneficial effects.	SP 76-100
Very High	A very serious impact which, if negative, may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe negative or very beneficial effects.	SP >100

6 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

The following section must be read in conjunction with **Table 9** of this report.

6.1 Construction and operational phases

The project will encompass a range of activities during the construction/mining phase, including ground clearance, establishment of construction camp areas and small-scale infrastructure development and then further on to full scale mining activities associated with the project.

It is possible that cultural material will be exposed during construction and mining and may be recoverable, keeping in mind delays can be costly during construction and mining, 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 developments, such as construction camps and laydown areas, are 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 and mining phases, 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 should be implemented.

6.2 Chance finds procedure

- A heritage practitioner / archaeologist 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 **during the implementation of the EMPr**.
- An appropriately qualified heritage practitioner / 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 halted.
- The qualified heritage practitioner / 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 the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

6.3 Possible finds during construction

The study area occurs within a greater historical and archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed reclamation activities, could uncover the following:

- Historical structures and foundations
- unmarked burial grounds and graves

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 provider	1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and SAHRA	3 months
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 grounds or graves in the way of mining	Service provider – Archaeologist, SAHRA, local government and provincial government	6 months

6.5 Heritage Management Plan for EMPr implementation

Table 9: Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	Implement a chance to find procedures in case where possible heritage finds are uncovered.	Construction and mining	During construction and mining	Applicant ECO Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Burial grounds and graves	All burial grounds and graves should be retained and avoided with a **buffer zone of 100m** (Regulations 17.6(a) and 17.7(a) of the Mine Health and Safety Act Regulations (2014)). If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations.	Construction through to Mining	During Construction and Mining	Applicant Environmental Control Officer (ECO) Heritage specialist	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report
Historical Structures	KF0013 and all its structures will require a destruction permit from the Gauteng provincial Heritage Authority (PHRA-G) in accordance with s34 of the NHRA. This application will require the following: i. An application. For a mitigation permit from SAHRA; ii. Documentation of the site through excavations to expose the extent of the structures and then through formal plan drawings. iii. A destruction permit from PHRA-G and SAHRA will be then applied for by the Applicant with the backing of the mitigation report.	Pre-construction	After the approval of the EA and before construction occurs	Applicant Environmental Control Officer (ECO) Archaeologist		Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
Redan Rock Art site	**1. A buffer of 200 meters from the closest open cast mining must be put in place** 2. A Heritage Management Plan (HMP) must be developed in consultation with SAHRA and PHRA-G after approval of the EA. 3. This HMP must include as a minimum: a. Agreed upon buffer distances b. Fencing strategies c. Monitoring strategies d. Roles and responsibilities	Pre-construction and mining	Pre-construction to be implemented before mining	Applicant Archaeologist SAHRA PHRA-G	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 of NHRA	Yearly reports to the PHRA-G
Palaeontological resources	1. The EAP and ECO for this project must be informed that Vryheid Formation (Ecca Group, Undifferentiated Karoo), Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup), as well as Quaternary superficial deposits has a high to very high Palaeontological Sensitivity . 2. Fossils may also be present in the development footprint. If fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations the Chance Find Protocol must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (if possible, in situ) and the ECO ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a palaeontologist.	Construction through to Mining	During Construction and Mining	Applicant Environmental Control Officer (ECO)	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	3. These recommendations must form part of the Heritage Management Plan for Springfield Colliery.						

7 CONCLUSIONS AND RECOMMENDATIONS

The HIA identified various heritage resources within the study area including burial grounds and graves and the Provincial Heritage Site of Redan (archaeological rock engravings) which are rated as having a high to very high heritage significance and will require further mitigation work before the project can continue. Several areas containing Historical structures were also identified, some of which would also require mitigation before the project can continue.

7.1 Burial grounds and graves

Five burial grounds and graves were identified in the MRA area (KF001, KF002, KF005, KF006, KF010). An additional burial ground KF007 was identified 60 meters outside of the MRA boundary but no project infrastructure is planned within 100 meters from this specific burial ground. Burial grounds and graves have high heritage significance and are given a Grade IIIA significance rating in accordance with the system described in Section 3.1 of this document.

The impact would be damage to identified graves and burial grounds due to earth-moving or vegetation clearance activities prior to the construction phase, as well as site establishment and the construction of all infrastructure, including the development of open pits and overburden dumps.

The pre-mitigation impact significance is rated as HIGH, but with the implementation of the required mitigation measures the post-mitigation impact will be VERY LOW.

7.2 Archaeological Site (Redan engraving site)

The known formally protected Redan archaeological engraving site (a declared Provincial Heritage site) is located within the study area and at least one archaeological find spot was identified within the study area in a previous HIA study.

The impact would be damage to identified archaeological resources due to earth-moving or vegetation clearance activities prior to the construction phase, as well as site establishment and the construction of all infrastructure, including the development of a box cut. The original layout showed mining less than 50 meters from the rock art site. **However, the recommendation provided to the Applicant in 2020 resulted in the implementation of a 200-meter buffer to the closest mining berms.** The proximity of mining can potentially damage the site directly through blasting vibrations and fly rock, uncontrolled vehicle movement and increase visiting of the site by mining staff.

The change in the land use from predominantly agricultural to that of industrial will further change the experience of the cultural landscape of the site. Now the site surrounds are described as rural with the planting of maize.

The pre-mitigation Environmental Risk impact significance for the Provincial Heritage Site is rated as VERY HIGH, and with the implementation of the required mitigation measures the post-mitigation impact rating will be LOW.

The impact of the mining on associated cultural landscape was also assessed and it was found that the proposed mining layout will have a significant HIGH impact on the redan rock art cultural landscape. The recommended mitigation measures should reduce the post-mitigation rating to LOW.

7.3 Historical Structures

The fieldwork identified four sites containing historical structures associated with the historical Springfield Colliery and Klip Power Station within the study area (KF009, KF011, KF012, KF013).

The impact would be damage to identified historical structures due to dismantling and removal of existing infrastructure, as well as site establishment and the construction of all infrastructure, including the development of a box cut.

The identified historic structure was given a Low to Moderate heritage significance rating. They will be impacted by the proposed opencast as well as the proposed placement of the processing plant at the preferred Option 1. It is noted that the design of the Option 1 processing plant has taken the existing buildings into account and will not impact directly on those remaining historic powerplant buildings (KF012).

The historic structures, that include the ruins of the Springfield Colliery West shaft and other building currently used by the farm owner at KF013 will be directly impacted by the open cast activities. The building and structures date to the 1930s and are protected under s34 of the NHRA. The recommended mitigation measures will reduce the impact from MEDIUM to LOW.

In the case of KF013, the pre-mitigation impact is rated as HIGH due to its heritage significance rating and the destruction of the site. With the implementation of the recommended mitigation measures this impact will be mitigated to an impact significance of VERY LOW.

7.4 Palaeontology

As noted above, the geology of the proposed Springfield Colliery is primarily underlain by the Vryheid Formation (Ecca Group, Undifferentiated Karoo), and by Precambrian dolomites and

associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup). Accordingly, sensitivity of the Vryheid Formation (Ecca Group, Undifferentiated Karoo) is Very High while that of the Malmani Subgroup is High and Quaternary deposits is High (Almond and Pether 2008, SAHRIS website).

An EIA level palaeontology study was conducted to assess the value and prominence of fossils in the development area and the effect of the proposed development on the palaeontological heritage. The purpose of the PIA Report is to elaborate on the issues and potential impacts identified during the scoping phase. A Phase 1 field-based assessment was conducted with research in the site-specific study area, as well as a comprehensive assessment of the impacts identified during the scoping phase. The recommendations will require approval by SAHRA's APM Unit.

None of the proposed alternatives is preferred as the palaeontological resources will be impacted equally by both the alternatives. The implementation of the recommended mitigation measure will reduce the current HIGH rated impact and will have a post-mitigation rating of LOW.

7.5 Mitigation measures

Area and site no.	Mitigation measures
General project area	Implement a chance to find procedures in case where possible heritage finds are uncovered.
Burial grounds and graves	These burial grounds should be retained and avoided with a **buffer zone of 100m** (Regulations 17.6(a) and 17.7(a) of the Mine Health and Safety Act Regulations (2014)). If this is not possible, the graves could be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of s36 of the NHRA and its regulations as well as the National Health Act and its regulations.
Historical Structures	KF0013 and all its structures will require a destruction permit from the Gauteng provincial Heritage Authority (PHRA-G) in accordance with s34 of the NHRA. This application will require the following: iv. An application. For a mitigation permit from SAHRA; v. Documentation of the site through excavations to expose the extent of the structures and then through formal plan drawings. vi. A destruction permit from PHRA-G and SAHRA will be then applied for by the Applicant with the backing of the mitigation report.
Redan Rock Art site	**4. A buffer of 200 meters from the closest open cast mining must be put in place** 5. A Heritage Management Plan (HMP) must be developed in consultation with SAHRA and PHRA-G. 6. This HMP must include as a minimum: a. Agreed upon buffer distances b. Fencing strategies c. Monitoring strategies d. Roles and responsibilities
Palaeontological resources	4. The EAP and ECO for this project must be informed that Vryheid Formation (Ecca Group, Undifferentiated Karoo), Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal

Area and site no.	Mitigation measures
	Supergroup), as well as Quaternary superficial deposits has a high to very high Palaeontological Sensitivity. 5. Fossils may also be present in the development footprint. If fossil remains are discovered during any phase of construction, either on the surface or exposed by new excavations the Chance Find Protocol must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (if possible, in situ) and the ECO ought to alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a palaeontologist. 6. These recommendations must form part of the Heritage Management Plan for Springfield Colliery.

7.6 General

It is the combined considered opinion of the heritage specialists that the proposed project will have a direct impact on several identified heritage resources rated being of medium to high or very high heritage significance.

With the implementation of recommended mitigation measures the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project life of the mine.

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APPENDIX A

HERITAGE ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the study.

This HIA report was compiled by PGS Heritage (PGS) for the proposed Springfield Project. The applicable maps, tables and figures are included, as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (No. 107 of 1998). The HIA process consists of three steps:

Step I – Literature Review and initial site analysis: The background information to the field survey relies greatly on the Heritage Background Research which was undertaken through archival research and evaluation of satellite imagery and topographical maps of the study area.

Step II – Physical Survey: A physical survey was conducted by a combination of vehicle and pedestrian access through the proposed project area by one qualified heritage specialist and one field assistant (12-14 May 2020), 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 heritage resources identified in the physical survey, the assessment of these resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites is 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 - 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 use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 2** and **Table 3**).

Table 10: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by HWC. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satiKFactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 11: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by HWC.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the	Low Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
		environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

APPENDIX B

ENVIRONMENTAL IMPACT METHODOLOGY

UKHOZI ENVIRONMENTALISTS: IMPACT ASSESSMENT METHODOLOGY

The methodology used determines the significance of the impacts by evaluating the consequence (extent, duration, and severity) and likelihood (probability and frequency of activity) of each impact. The definitions of the terms used within the methodology are provided below, followed by the stepped approach.

Definitions

Aspect	a particular part or feature of something.
Impact	is defined as any change to the environment, whether positive or negative, resulting from a facility/project/development's products, development, and activities.
Cause/Activity	the precipitating factor resulting in a perceived impact.
Mitigation Measures	identified actions and requirements designed to be instituted to reduce the undesirable effects of a perceived impact.
Significance Level	the degree of importance of the impact on the social and/or biophysical environment; a proxy for the degree to which the impact is reversible and may cause irreplaceable loss of a resource. The approach used to determine significance makes use of value judgements to determine the degree of change on the social and/or biophysical environment, after which the consequence and likelihood of the impact are ranked to provide a significance level.
Extent	the spatial scope of the perceived impact. (How large an area will be impacted). Duration – the temporal scope of the perceived impact, or the period of time during which the social and/or biophysical environment is changed by the impact. (How long the impact will last). Severity – the degree to which the natural, cultural, and/or social functions and processes of an environment may be affected or altered by a perceived impact. (How extreme/harsh the impact will be. The degree of disturbance).
Probability	the possibility or likelihood of the impact occurring or manifesting.

1 APPROACH

The stepped approach used is provided below:

Step 1: The different aspects of the proposed project are identified along with the associated environmental and social impacts which may occur during each phase of the project.

Step 2: Assess the consequence of the impact by providing a numerical score for each of the following factors using the ranking scales in Table 2: Variables with each category score:

- Extent;
- Duration;
- Severity;
- Reversibility.

The consequence is determined using the sum of the extent, duration, severity, and reversibility variables. The maximum value of points (SP) is 25.

Step 3: Assess the likelihood of the impact by providing a numerical score for each of the following factors using the ranking scales in Table 2-: Variables with each category score:
Probability of the impact.

The likelihood is determined using the probability frequency variables. The maximum value of points (SP) is 5.

Step 4: Once these factors are ranked for each impact, the significance points are calculated by using the formula below.

SP (Significant Points) = Consequence (Extent + Duration + Severity + Reversibility) x Likelihood (Probability)

Step 5: Mitigation measures for each impact are determined as part of the impact assessment, and the above approached is repeated to determine the significance of each impact post-mitigation.

2 SIGNIFICANCE LEVEL

The maximum value is 125 significant points. The significance level of the impact could therefore be rated as either Very High (VH), High (H), Medium (M), Low (L), or Very Low (VL) on the following basis:

Table 1: Significance levels

Very Low	Negligible impact which does not require further mitigation.	**SP 26 - 50**
Low	Acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the implementation of the project. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment	**SP 51 - 75**
Medium	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.	**SP 76 - 100**
High	A serious impact, if not mitigated, may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural &/or social) environment and result in severe negative or beneficial effects.	**SP 101 - 125**

Very High	A very serious impact which, if negative, may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe negative or very beneficial effects.	**SP 26 - 50**

Table 2: Variables with each category score

CONSEQUENCE		**Extent (Magnitude) of the Impact**	**SP**
	Site specific	Limited to a specific part of the mine boundary.	1
	Project area	Limited to within the mine boundary.	2
	Local	Within a 5km radius of the mine boundary.	3
	Regional	Beyond a 5km radius of the mine boundary.	4
	National	Widespread, far beyond the project area.	5
		Duration of the Impact	
	Immediate	One day to one month.	1
	Short term	One month to one year.	2
	Medium term	One year to ten years.	3
	Long term	Ten years to thirty-one years. Ceases with operational life (31 years for this specific project).	4
	Post Closure/Permanent	Impact occurs beyond lifespan of the project.	5
		Severity of the Impact	
	Minor	Non-harmful. Impacts affect the environment in such a way that natural, cultural and/or social functions and processes are not affected.	2
	Low	Potentially harmful. Impacts affect the environment in such a way that natural, cultural and/or social functions and processes are negligibly altered.	4
	Medium	Slightly harmful. Impacts affect the environment in such a way that natural, cultural and/or social functions and processes are slightly altered.	6
	High	Significantly Harmful. Impacts affect the environmental in such a way that natural, cultural and/or social functions and processes are notably altered.	8
	Very High	Extremely harmful. Impacts affect the environmental in such a way that natural, cultural and/or social functions and processes are severely altered.	10

	Reversibility of the Impact		
	Complete reversible	The impact is reversible without any mitigation measures and management measures.	1
	Nearly completely reversible	The impact is reversible without any significant mitigation and management measures. Some time and resources are required.	2
	Partly reversible	The impact is only reversible with the implementation of mitigation and management measures. Substantial time and resources required.	3
	Nearly irreversible	The impact can only marginally be reversed with the implantation of significant mitigation and management measures. Significant time and resources required to ensure impact is on a controllable level.	4
	Irreversible	The impact is irreversible.	5
Likelihood	**Probability of impact**		
	None	0% chance of the impact occurring.	0
	Improbable	The possibility of the impact materializing is very low. 1% to 9% chance of occurrence.	1
	Low Probability	Impact not expected to occur, but conceivable; 10% to 30% chance of occurrence; and Circumstances rarely encountered.	2
	Medium Probability	Impact may occur sometimes; 31 – 60% chance of occurrence; Circumstances occasionally encountered.	3
	High probability	Impact will probably occur; 61 – 90% chance of occurrence; Circumstances frequently encountered;	4
	Almost Certain	91 -100% chance of occurrence.	5

APPENDIX C

PGS TEAM CVS

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, Zambia, Mozambique, and the Democratic Republic of the Congo