

HERITAGE IMPACT ASSESSMENT

(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999))

For the Proposed Dunbar Opencast Coal Mine

Type of development:

Opencast Coal Mine

Client:

Enviro Insight

Developer:

Vandabyte (Pty) Ltd



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21953

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APPROVAL PAGE

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| Project Name | Dunbar Opencast Coal Mine |
| Report Title | Heritage Impact Assessment For The Proposed Dunbar Opencast Coal Mine Mpumalanga Province |
| Authority Reference Number | MP30/5/1/12/2/10237MR |
| Report Status | Draft Report |
| Applicant Name | Vandabyte (Pty) Ltd |

| | Name | Qualifications and Certifications | Date |
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Amendments on Document

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REPORT OUTLINE

Appendix 6 of the GNR 326 NEMA EIA Regulations published on 7 April 2017 as amended provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 1. Specialist Report Requirements.

| Requirement from Appendix 6 of GN 326 EIA Regulation 2017 | Chapter |
|--|------------------------------------|
| (a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae | Section a Section 12 |
| (b) Declaration that the specialist is independent in a form as may be specified by the competent authority | <i>Declaration of Independence</i> |
| (c) Indication of the scope of, and the purpose for which, the report was prepared | Section 1 |
| (cA) an indication of the quality and age of base data used for the specialist report | Section 3.4 and 7.1. |
| (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change; | 9 |
| (d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment | Section 3.4 |
| (e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used | Section 3 |
| (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 8 and 9 |
| (g) Identification of any areas to be avoided, including buffers | Section 9 |
| (h) 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 8 |
| (I) Description of any assumptions made and any uncertainties or gaps in knowledge | Section 3.7 |
| (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 or activities; | Section 9 |
| (k) Mitigation measures for inclusion in the EMPr | Section 9 and 10 |
| (l) Conditions for inclusion in the environmental authorisation | Section 9 and 10 |
| (m) Monitoring requirements for inclusion in the EMPr or environmental authorisation | Section 9 and 10 |
| (n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (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 10.2 |
| (o) Description of any consultation process that was undertaken during the course of preparing the specialist report | Section 6 |
| (p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and | Refer to EIA report |
| (q) Any other information requested by the competent authority | Section 10 |

Executive Summary

HCAC was appointed to conduct a Heritage Impact Assessment of the proposed Dunbar Opencast Coal Mine, south of Komati in Mpumalanga to determine the presence of cultural heritage sites and the impact of the proposed development on these non-renewable resources. The study area was assessed both on desktop level and by a field survey. The field survey was conducted as a non-intrusive pedestrian survey to cover the extent of the mine footprint.

The study area consists of extensive ploughed fields that would have destroyed surface indicators of heritage sites. However during the survey three features (Table 2) were recorded consisting of a stone cairn (Feature 1), ruins of a farmstead younger than 60 years (Feature 2) and the remains of a rectangular brick structure (Feature 3). An independent palaeontological assessment was conducted and the study concluded that fossils plants of the *Glossopteris* flora is associated with the shales close to the coal seams and therefore a Fossil Chance Find Protocol should be added to the EMPr and no further palaeontological site visits are required until fossils are found by the geologist or responsible person (Bamford 2019).


The impact of the proposed project on heritage resources is considered to be low with the correct mitigation measures in place and it is recommended that the proposed project can commence based on the following recommendations included as a condition of authorisation in the EMPr:

- It is recommended that the Stone Cairn (Feature 1) should be avoided by the development with a 15 meter buffer. If this is not possible, it should be confirmed whether the Stone Cairn represents a grave through a social consultation process. If it is indeed a grave, Feature 1 should preferably be avoided and retained *in situ*. If the feature is not a grave no mitigation is required.
- The implementation of a chance finds procedure during the pre-construction and construction phase of the project.

Table 2. Sites recorded in the assessment with recommended mitigation measures.

| LABEL | LONGITUDE | LATITUDE | DESCRIPTION | IMPACT | SIGNIFICANCE | RECOMMENDATION |
|-----------|--------------------|--------------------|-------------------------------------|--------|---|---|
| Feature 1 | 29° 31' 33.2617" E | 26° 11' 31.2755" S | Stone Cairn | Direct | If confirmed to be a grave the feature is of high social significance. If not, the feature is of no heritage significance | It should be confirmed whether the feature represents a grave during social consultation. If it is a grave it should be avoided. If this is not possible the grave can be relocated adhering to all legal requirements. |
| Feature 2 | 29° 31' 33.8233" E | 26° 11' 01.6188" S | Ruins of farm stead | Direct | No heritage significance | Implementation of a chance finds procedure. |
| Feature 3 | 29° 31' 14.4417" E | 26° 10' 46.3826" S | Ruin of rectangular brick structure | Direct | No heritage Significance | Implementation of a chance finds procedure. |

Declaration of Independence

| | |
|------------------------------------|--|
| Specialist Name | Jaco van der Walt |
| Declaration of Independence | <p>I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I:</p> <ul style="list-style-type: none"> • I act as the independent specialist 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 the specialist report relevant to this application, 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 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; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act. |
| Signature |  |
| Date | 29/08//2019 |

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of ASAPA (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as he Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia and Tanzania. Through this he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

| |
|--|
| AIA: Archaeological Impact Assessment |
| ASAPA: Association of South African Professional Archaeologists |
| BGG Burial Ground and Graves |
| BIA: Basic Impact Assessment |
| CFPs: Chance Find Procedures |
| CMP: Conservation Management Plan |
| CRR: Comments and Response Report |
| CRM: Cultural Resource Management |
| DEA: Department of Environmental Affairs |
| EA: Environmental Authorisation |
| EAP: Environmental Assessment Practitioner |
| ECO: Environmental Control Officer |
| EIA: Environmental Impact Assessment* |
| EIA: Early Iron Age* |
| EIA Practitioner: Environmental Impact Assessment Practitioner |
| EMP: Environmental Management Programme |
| ESA: Early Stone Age |
| ESIA: Environmental and Social Impact Assessment |
| GIS Geographical Information System |
| GPS: Global Positioning System |
| GRP Grave Relocation Plan |
| HIA: Heritage Impact Assessment |
| LIA: Late Iron Age |
| LSA: Late Stone Age |
| MEC: Member of the Executive Council |
| MIA: Middle Iron Age |
| MPRDA: Mineral and Petroleum Resources Development Act |
| MSA: Middle Stone Age |
| NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998) |
| NHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999) |
| NID Notification of Intent to Develop |
| NoK Next-of-Kin |
| PRHA: Provincial Heritage Resource Agency |
| SADC: Southern African Development Community |
| SAHRA: South African Heritage Resources Agency |

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

1 Introduction and Terms of Reference:

HCAC has been contracted by Enviro-Insight Environmental Consultants to conduct a heritage impact assessment of the proposed Dunbar Mining Right development. The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme Report (EMPR) for the Dunbar Open Cast Coal Mine, Mpumalanga (Figure 1 -3).

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilised before and during the survey, which includes: Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey no archaeological features were recorded, but the ruins of a farmstead with associated buildings and a stone cairn were recorded. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) requires all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regs section 40 (1) and (2), to be submitted to SAHRA. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it is completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA. To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

Table 3: Project Description

| | |
|---|--|
| Type of development | Coal Mining. |
| Size of farm and portions | Portion of Portion 1, Portion 2 and the remaining extent of the Farm Dunbar 189 IS, Portion 1 of the Farm Middelkraal 50 IS and Portion 6 of the Farm Halfgewonnen 190 IS located in Mpumalanga Province (Figure 1 – 3). |
| Magisterial District | Nkangala District Municipality Steve Tshwete Local Municipality Gert Sibande District Municipality Govan Mbeki Local Municipality |
| 1: 50 000 map sheet number | 2629BA |
| Central co-ordinate of the development | 26°10'25.74"S 29°31'12.26"E |

Table 4: Infrastructure and project activities

| | |
|----------------------------|---|
| Type of development | Opencast Coal Mine |
| Project size | 1797 ha for the mining right of which approximately 200 ha is identified for current mining operations. This assessment focuses on the 200 ha earmarked for mining operations. |
| Project Components | <p>The project includes the following infrastructure:</p> <ul style="list-style-type: none"> • Access & Haul roads (with necessary security) including the upgrading of the access point to mining area; • Contractor's Yard with septic/chemical ablution facilities; • Offices; • Weighbridge, workshop and stores (with septic/chemical ablution facilities); • Rail Siding (possible future expansion); • Diesel facilities and a hardstand; • Power and Water; • Boxcut; • Stockpiles (topsoil, overburden, subsoil/softs, ROM); • Crushing & screening facility; and • Surface water management measures (stormwater diversion berms and trenches; pollution control dams etc). |

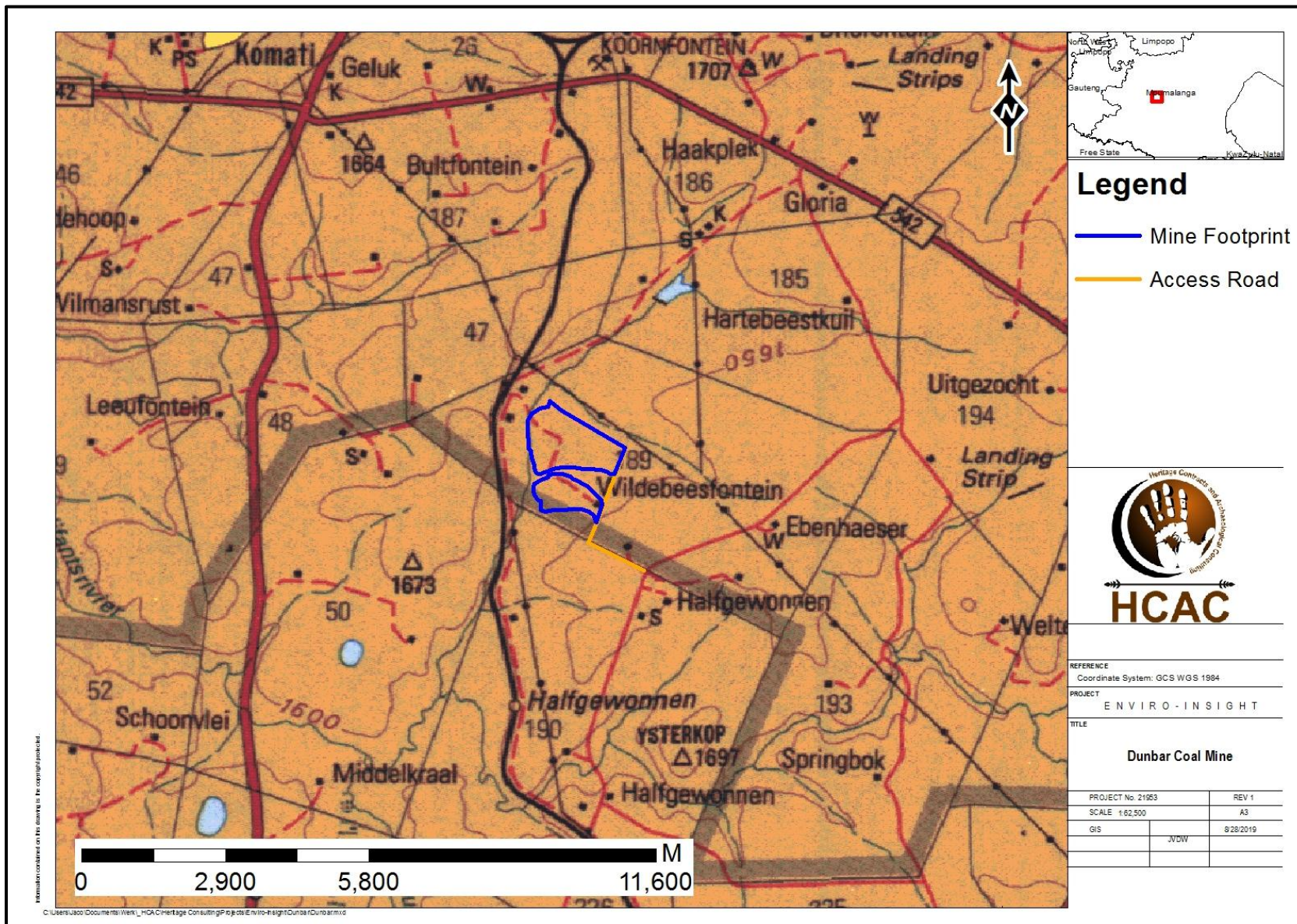


Figure 1. Provincial locality map (1: 250 000 topographical map)

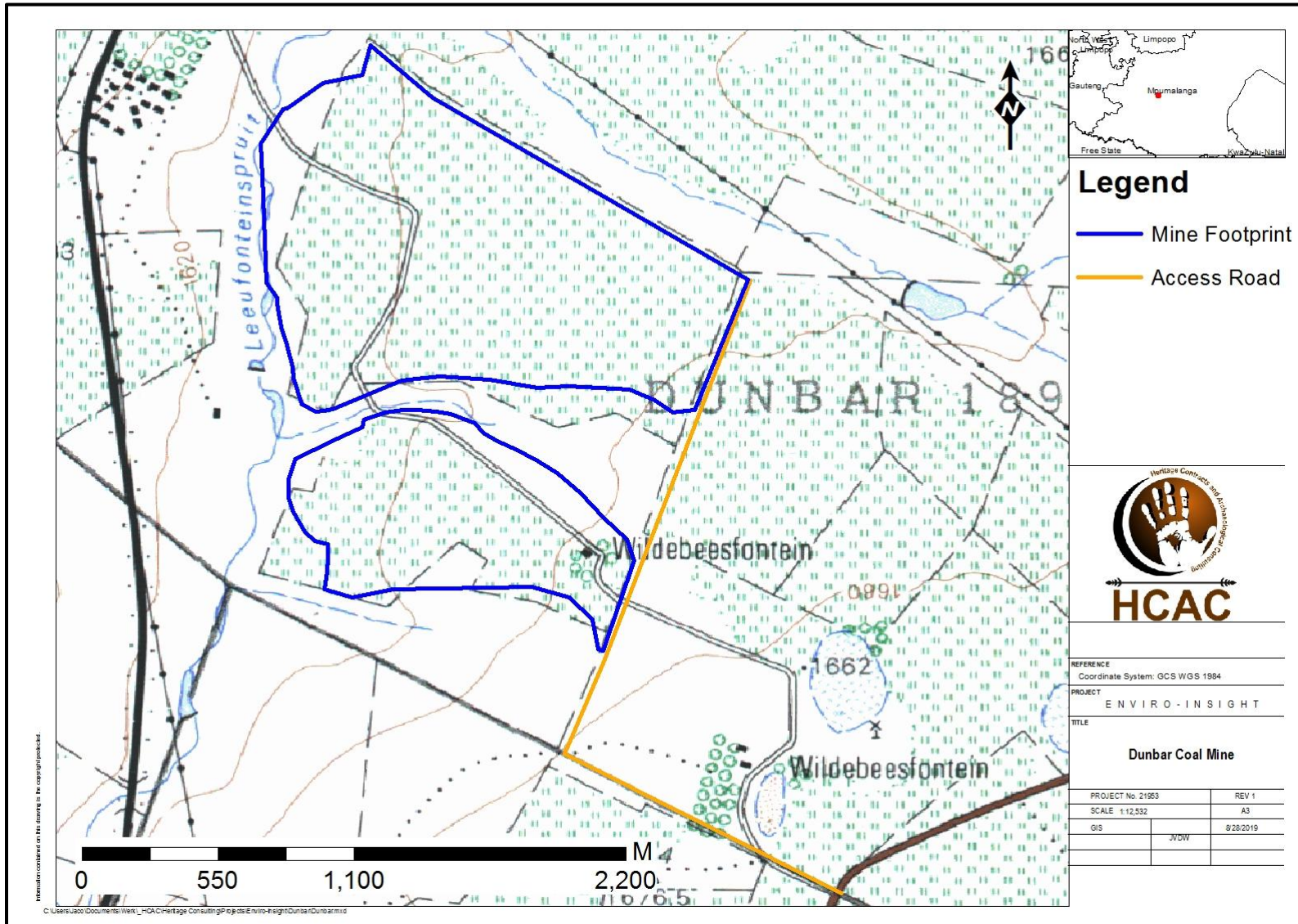


Figure 2: Regional locality map (1:50 000 topographical map).



Figure 3. Satellite image indicating the study area (Google Earth 2019).

2 LEGISLATIVE REQUIREMENTS

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999
- National Environmental Management Act (NEMA), Act No. 107 of 1998 - Section 23(2)(b)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province or to SAHRA. SAHRA will ultimately be responsible for the professional evaluation of Phase 1 AIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 AIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 AIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the SADC region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 AIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and includes (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999 is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925), as well as the Human Tissues Act (Act 65 of 1983), and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the field work phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EIA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation
- The compilation of an EIA report.
- The compilation of a Comments and Response Report (CRR).

3.4 Site Investigation

Conduct a field study to: a) systematically survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources recorded in the project area.

During the survey, background scatters of Stone Age and historical artefacts as well as Stone Age and possible burial sites were identified. General site conditions and features on sites were recorded by means of photographs, GPS locations, and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report.

Table 5: Site Investigation Details

| | Site Investigation |
|--------|--|
| Date | 24 – 25 July 2019 by professional Archaeologists and 5 – 7 August 2019 by paleontologists |
| Season | Winter – Large sections is ploughed with high archaeological visibility, while some areas are highly overgrown with low to zero heritage visibility. The study area was however sufficiently covered (Figure 4) to adequately record the presence of heritage resources. |

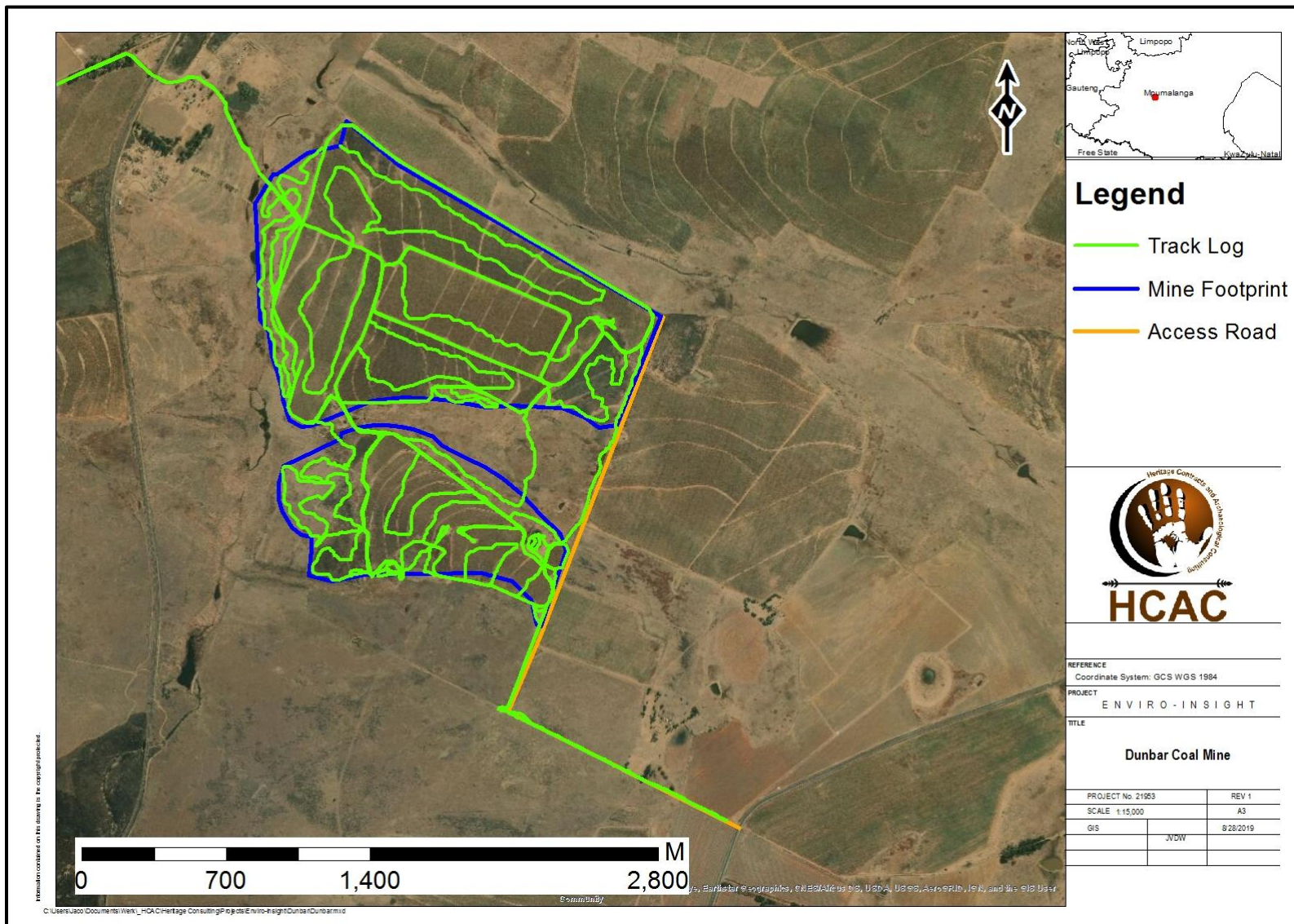


Figure 4. Track logs of the survey in green.

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as 'part of the national estate' if they have cultural significance or other special value. These criteria are:

- » Its importance in/to the community, or pattern of South Africa's history;
 - » Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
 - » Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
 - » Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
 - » Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
 - » Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
 - » Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
 - » Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
 - » Sites of significance relating to the history of slavery in South Africa.
- » The presence and distribution of heritage resources define a 'heritage landscape'. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:
- The unique nature of a site;
 - The integrity of the archaeological/cultural heritage deposits;
 - The wider historic, archaeological and geographic context of the site;
 - The location of the site in relation to other similar sites or features;
 - The depth of the archaeological deposit (when it can be determined/is known);
 - The preservation condition of the sites; and
 - Potential to answer present research questions.
- » In addition to this criteria field ratings prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

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

3.6 Impact Assessment Methodology

Once a potential impact has been determined it is necessary to identify which project activity will cause the impact, the probability of occurrence of the impact, and its magnitude and extent (spatial and temporal). This information is important for evaluating the significance of the impact, and for defining mitigation and monitoring strategies. Direct and indirect impacts of the impacts identified during the specialist investigations were assessed in terms of five standard rating scales to determine their significance.

The rating system used for assessing impacts (or when specific impacts cannot be identified, the broader term issue should apply) is based on five criteria, namely:

- **Status** of impacts (Table 6) – determines whether the potential impact is positive (positive gain to the environment), negative (negative impact on the environment), or neutral (i.e. no perceived cost or benefit to the environment). Take note that a positive impact will have a low score value as the impact is considered favourable to the environment;
- **Spatial extent** of impacts (Table 7) – determines the spatial scale of the impact on a scale of localised to global effect. Many impacts are significant only within the immediate vicinity of the site or within the surrounding community, whilst others may be significant at a local or regional level. Potential impact is expressed numerically on a scale of 1 (site-specific) to 5 (global);

Duration of impacts (Table 8

- Table 8) – refers to the length of time that the aspect may cause a change either positively or negatively on the environment. Potential impact is expressed numerically on a scale of 1 (project duration) to 5 (permanent);
- **Frequency of the activity** (Table 9) – The frequency of the activity refers to how regularly the activity takes place. The more frequent an activity, the more potential there is for a related impact to occur.
- **Severity** of impacts (Table 10) – quantifies the impact in terms of the magnitude of the effect on the baseline environment, and includes consideration of the following factors:
 - The reversibility of the impact;
 - The sensitivity of the receptor to the stressor;
 - The impact duration, its permanency and whether it increases or decreases with time;
 - Whether the aspect is controversial or would set a precedent;
 - The threat to environmental and health standards and objectives;
- **Probability** of impacts (Table 11) –quantifies the impact in terms of the likelihood of the impact occurring on a percentage scale of <5% (improbable) to >95% (definite).

•

Table 6: Status of Impacts

| Rating | Description | Quantitative Rating |
|-----------------|--|---------------------|
| Positive | A benefit to the receiving environment (positive impact) | + |
| Neutral | No determined cost or benefit to the receiving environment | N |
| Negative | At cost to the receiving environment (negative impact) | - |

Table 7: Extent of Impacts

| Rating | Description | Quantitative Rating |
|------------------|---|---------------------|
| Very Low | Site Specific – impacts confined within the project site boundary | 1 |
| Low | Proximal – impacts extend to within 1 km of the project site boundary | 2 |
| Medium | Local – impacts extend beyond to within 5 km of the project site boundary | 3 |
| High | Regional – impacts extend beyond the site boundary and have a widespread effect - i.e. > 5 km from project site boundary | 4 |
| Very High | Global – impacts extend beyond the site boundary and have a national or global effect | 5 |

Table 8: Duration of Impacts

| Rating | Description | Quantitative Rating |
|------------------|--|---------------------|
| Very Low | Project duration – impacts expected only for the duration of the project or not greater than 1 year | 1 |
| Low | Short term – impacts expected on a duration timescale of 1 to 2 years | 2 |
| Medium | Medium term – impacts expected on a duration timescale of 2-5 years | 3 |
| High | Long term – impacts expected on a duration timescale of 5-15 years | 4 |
| Very High | Permanent – impacts expected on a duration timescale exceeding 15 years | 5 |

Table 9: Frequency of impacts

| Rating | Frequency | Quantitative Rating |
|------------------|------------------|---------------------|
| Very Low | Annually or less | 1 |
| Low | 6 monthly | 2 |
| Medium | Monthly | 3 |
| High | Weekly | 4 |
| Very High | Daily | 5 |

Table 10: Severity of Impacts

| Rating | Description | Quantitative Rating |
|------------------|--|---------------------|
| Very Low | Negligible – zero or very low impact | 1 |
| Low | Site specific and short term impacts | 2 |
| Medium | Local scale and / or short term impacts | 3 |
| High | Regional and / or long term impacts | 4 |
| Very High | Global scale and / or permanent environmental change | 5 |

Table 11: Probability of Impacts

| Rating | Description | Quantitative Rating |
|--------------------------|---|---------------------|
| Highly Improbable | Likelihood of the impact arising is estimated to be negligible; <5%. | 1 |
| Improbable | Likelihood of the impact arising is estimated to be 5-35%. | 2 |
| Possible | Likelihood of the impact arising is estimated to be 35-65% | 3 |
| Probable | Likelihood of the impact arising is estimated to be 65-95%. | 4 |
| Highly Probable | Likelihood of the impact arising is estimated to be > 95%. | 5 |

Determination of Impact Significance

The information presented above in terms of identifying and describing the aspects and impacts is summarised in below in Table 12 and significance is assigned with supporting rationale.

Significance will be classified according to the following:

- Very Low to Low - it will not have an influence on the decision;
- Medium to Medium-High - it should have an influence on the decision unless it is mitigated;
- High to Very High- it would influence the decision regardless of any possible mitigation. Alternative options including rehabilitation and/or offset should be investigated.

Table 12: Consolidated Table of Aspects and Impacts Scoring

| Spatial Scale | Rating | Duration | Rating | Severity | Rating |
|--------------------------------|--------|---------------------------------|------------------|------------------------------|--------|
| Activity specific | 1 | One day to one month | 1 | Insignificant/non-harmful | 1 |
| Area specific | 2 | One month to one year | 2 | Small/potentially harmful | 2 |
| Whole site/plant/mine | 3 | One year to ten years | 3 | Significant/slightly harmful | 3 |
| Regional/neighbouring areas | 4 | Life of operation | 4 | Great/harmful | 4 |
| National | 5 | Post closure | 5 | Disastrous/extremely harmful | 5 |
| Frequency of Activity | Rating | Probability of Impact | Rating | | |
| Annually or less | 1 | Almost never/almost impossible | 1 | | |
| 6 monthly | 2 | Very seldom/highly unlikely | 2 | | |
| Monthly | 3 | Infrequent/unlikely/seldom | 3 | | |
| Weekly | 4 | Often/regularly/likely/possible | 4 | | |
| Daily | 5 | Daily/highly likely/definitely | 5 | | |
| Significance Rating of Impacts | | | Timing | | |
| Very Low (1-25) | | | | | |
| Low (26-50) | | | Pre-construction | | |
| Low – Medium (51-75) | | | Construction | | |
| Medium – High (76-100) | | | Operation | | |
| High (101-125) | | | Decommissioning | | |
| Very High (126-150) | | | | | |
| Adjusted Significance Rating | | | | | |

The environmental significance rating is an attempt to evaluate the importance of a particular impact, the consequence and likelihood of which is assessed by the relevant specialist. The description and assessment of the aspects and impacts is presented in a consolidated table with the significance of the impact assigned using the process and matrix detailed above (Table 12).

The sum of the first three criteria (spatial scope, duration and severity) provides a collective score for the consequence of each impact. The sum of the last two criteria (frequency of activity and frequency of impact) determines the likelihood of the impact occurring. The product of consequence and likelihood leads to the assessment of the significance of the impact, shown in the significance matrix below in Table 13.

Table 13: Significance Assessment Matrix.

| Consequence (Severity + Spatial Scope + Duration) | | | | | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Likelihood (Frequency of Activity + Frequency of Impact) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 |
| | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 |
| | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 |
| | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 |
| | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 |
| | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 |
| | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 |
| | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 | 117 | 126 | 135 |
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |

Table 14: Positive and Negative Impact Mitigation Ratings.

| Colour Code | Significance Rating | Value | Negative Impact Management Recommendation | | Positive Impact Management Recommendation | |
|-------------|---------------------|---------|---|---------|---|---------|
| Red | Very High | 126-150 | Improve Management | Current | Maintain Management | Current |
| Orange | High | 101-125 | Improve Management | Current | Maintain Management | Current |
| Yellow | Medium-High | 76-100 | Improve Management | Current | Maintain Management | Current |
| Green | Low-Medium | 51-75 | Maintain Management | Current | Improve Management | Current |
| Cyan | Low | 26-50 | Maintain Management | Current | Improve Management | Current |
| Light Blue | Very Low | 1-25 | Maintain Management | Current | Improve Management | Current |

The model outcome is then assessed in terms of impact certainty and consideration of available information. Where a particular variable rationally requires weighting or an additional variable requires consideration the model outcome is adjusted accordingly.

3.7 Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of archaeological artefacts, the possibility exists that some features or artefacts may not have been discovered/recorded during the survey and the possible occurrence of graves and other cultural material cannot be excluded and might require further mitigation. Similarly, the depth of the deposit of heritage sites cannot be accurately determined due to its subsurface nature. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 DESCRIPTION OF SOCIO ECONOMIC ENVIRONMENTAL

According to Census 2011, Steve Tshwete Local Municipality has a total population of 217 073 people, of whom 73,6% are black African, and 21,8% are white. The other population groups make up the remaining 4,6%.

Of those aged 20 years and older, 3,4% have completed primary school, 30,8% have some secondary education, 35% have completed matric, and 14,4% have some form of higher education, while 7,4% of have no form of schooling.

According to Census 2011, Govan Mbeki Local Municipality has a total population of 294 538, of which 80,5% are black African, 16,0% are white, with the other population groups making up the remaining 3,5%.

Of those 20 years and older, 3,9% completed primary school, 33,9% have some secondary education, 31,4% completed matric, and 12,6% have some form of higher education. The percentage of those aged 20 years and older with no form of schooling is 7,9%.

5 DESCRIPTION OF THE PHYSICAL ENVIRONMENT:

The study area measures approximately 200 ha, situated on an agricultural property about 10 km south east of Komati and 5km south of Meerlus in Mpumalanga. The landscape features consist of slightly to moderately undulating plains with some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition, including species from the genera *Aristida*, *Digitaria*, *Eragrostis*, *Themeda* and *Tristachya*, with small, scattered rocky outcrops of wiry, sour grasses and some woody species such as *Senegalia caffra*, *Celtis africana*, *Diospyros lycioides* subsp *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Englerophytum magalismsontanum* (Mucina & Rutherford, 2010).

The study area consists mostly of ploughed fields that have been extensively farmed for a number of years. The study area is divided into a Northern section, a Southern section as well as a planned route for a future access road linking with an unnamed road towards the South East of the study area. The only areas not altered by agriculture are located on the boundaries of the ploughed fields. These open areas on the sides of the fields also seem to have been worked in the past but is highly overgrown with weeds (Figure 5 -8).



Figure 5. Ploughed fields



Figure 6. Overgrown areas on the boundary of ploughed fields



Figure 7. General site conditions



Figure 8. General site conditions

6 RESULTS OF PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT:

Adjacent landowners and the public at large were informed of the proposed activity as part of the EIA process. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in a local newspaper as part of the process.

7 LITERATURE / BACKGROUND STUDY:

7.1 Literature Review

The following studies were consulted in the greater study area:

| Author | Year | Project | Findings |
|-----------------------|------|--|---|
| Huffman, T.N. | 1995 | Archaeological Survey of Forzano Coal Holdings | Homesteads and Cemeteries |
| Van Schalkwyk, J | 1997 | A Survey of Cultural Resources in The Proposed Kleinfontein Mining Area, Mpumalanga Province | Cemeteries and a farm house as well as Stone Age scatters |
| Van Schalkwyk, J. | 2002 | A Survey of Cultural Resources for the Koorfontein Mining Development, Middelburg District, Mpumalanga Province | Farmsteads and cemeteries |
| Van Schalkwyk, J. | 2003 | Goedehoop Mine, Mpumalanga: Archaeological and Cultural Historical Survey and Impact Assessment | No Sites |
| Van Vollenhoven, A.C. | 2013 | A Report on A Cultural Heritage Impact Assessment for A Proposed Mining Right Amendment Application at The Halfgewonnen Colliery, Between Bethal And Hendrina, Mpumalanga Province | No Sites |

7.1.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated close to the study area.

7.2 General History of the area

7.2.1 Archaeology of the area

The Stone Age is divided in Early; Middle and Late Stone Age and refers to the earliest people of South Africa who mainly relied on stone for their tools.

Very few Early Stone Age sites are on record for Mpumalanga and no sites dating to this period are expected for the study area. An example in Mpumalanga is Maleoskop on the farm Rietkloof where ESA tools have been found. This is one of only a handful of such sites in Mpumalanga.

The MSA has not been extensively studied in Mpumalanga but evidence of this period has been excavated at Bushman Rock Shelter, a well-known site on the farm Klipfonteinhoek in the Ohrigstad district. This cave was excavated twice in the 1960's by Louw and later by Eloff. The MSA layers show that the cave was repeatedly visited over a long period. Lower layers have been dated to over 40 000 BP (Before Present) while the top layers date to approximately 27 000 BP (Esterhuizen & Smith in Delius, 2007; Bergh, 1998). Some isolated finds were recorded close to Witbank as well by Huffman (1999) on the farm Rietfontein.

The Later phases of the Stone Age began at around 20 000 years BP. This period was marked by numerous technological innovations and social transformations within these early hunter-gatherer societies. These people may be regarded as the first modern inhabitants of Mpumalanga, known as the San or Bushmen. They were a nomadic people who lived together in small family groups and relied on hunting and gathering of food for survival. Evidence of their existence is to be found in numerous rock shelters throughout the Eastern Mpumalanga where some of their rock paintings are still visible. A number of these shelters have been documented throughout the Province (Bornman, 1995; Schoonraad in Barnard, 1975; Delius, 2007). These include areas such as Witbank, Ermelo, Barberton, Nelspruit, White River, Lydenburg and Ohrigstad.

Three late Stone Age sites are on record in the greater area. The sites are Welgelegen Skuiling close to Ermelo, Chrissiesmeer (also known for rock art) and lastly Groenvlei close to Carolina, this area is also known for rock art (Bergh 1999).

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

The Early Iron Age: Most of the first millennium AD.

The Middle Iron Age: 10th to 13th centuries AD

The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. No Early Iron Age sites are on record in the greater region. Around 220 Late Iron Age stone walled sites are on record to the east of the study area (Bergh 1999) and is also associated with numerous pre-*difaqane* and *difaqane* wars that took place during the last quarter of the 18th century and during the first three decades of the 19th century. The sites are located close to Bethal. The study area was most probably inhabited by the Phuting group (Berg 1999). Around the study area the Phuting moved south due to the Ndebele migration (Difaqane). These wars led to the displacement of large numbers of Tswana clans on the Highveld where Mzilikazi's Ndebele caused chaos and havoc.

Late Iron Age settlements are characterised by extensive dry stonewalls and dates back to the 17th century. Late Iron Age communities who contributed to this stone walled architecture were the Sotho, Pedi, Ndebele and Swazi. The stone building tradition that these indigenous groups established many decades before the first colonial settlers arrived, may have influenced the colonial farmers to utilize these same resources as building material for the first farmsteads which arose on the Eastern Highveld (Pistorius 2006).

7.2.2. Historical Background

Sites dating to the historic period occur sporadically in the study area. These are mostly farming related, although some mining sites also occur. The farming related sites are usually farmsteads and farm cemeteries, either belonging to the landowners or their labourers. Mining related sites are for example the old Albion Colliery, dating to the 1940's.

7.2.2 The Anglo-Boer War (1899-1902)

The Anglo-Boer War, which took place between 1899 and 1902 in South Africa, was one of the most turbulent times in South Africa's history. Even before the outbreak of war in October 1899 British politicians, including Sir Alfred Milner and Mr. Chamberlain, had declared that should Britain's differences with the Z.A.R. result in violence, it would mean the end of republican independence. This decision was not immediately publicized, and as a consequence republican leader based their assessment of British intentions on the more moderate public utterances of British leaders. Consequently, in March 1900, they

asked Lord Salisbury to agree to peace on the basis of the status quo ante bellum. Salisbury's reply was, however, a clear statement of British war aims (Du Preez 1977).

During the Anglo-Boer War, a number of battles took place in the region. The one closest to the study area took place on the farm Wilmansrust, some distance to the east, in June 1901. During this clash, more than 50 British troops were killed.

7.2.3 Cultural Landscape

The cultural landscape form part of the agricultural and mining landscape of the greater area. The area under investigation is located about four kilometres to the south of Meerlus and about 17 kilometres to the west of Hendrina in Mpumalanga Province.

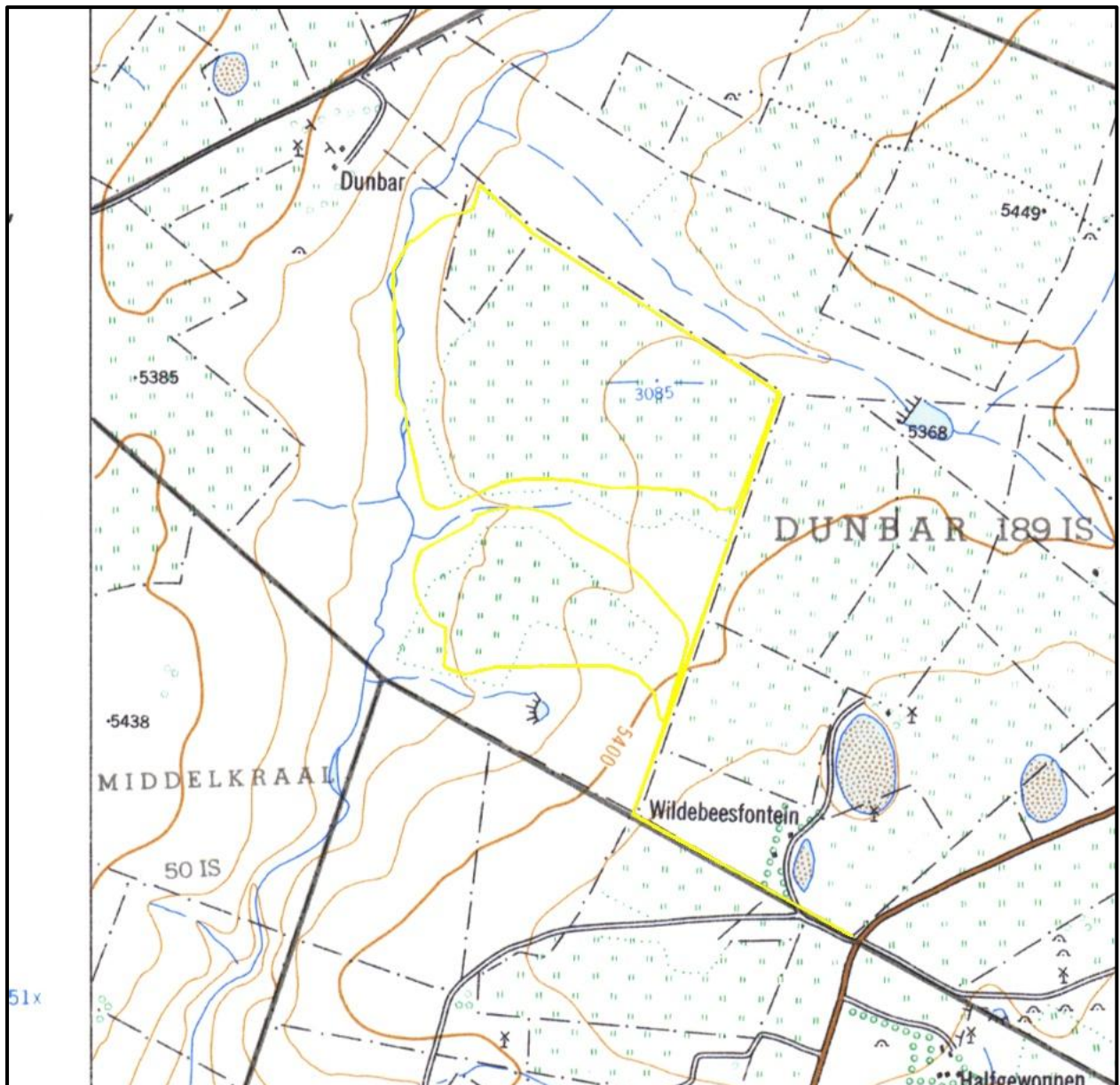


Figure 9. 1965 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. The area was used as cultivated lands. No other developments are visible in the study area. One can see a river to the west of the site and the Wildebeesfontein

development, including a minor road, two buildings and two dams, to the east. (Topographical Map 1965)

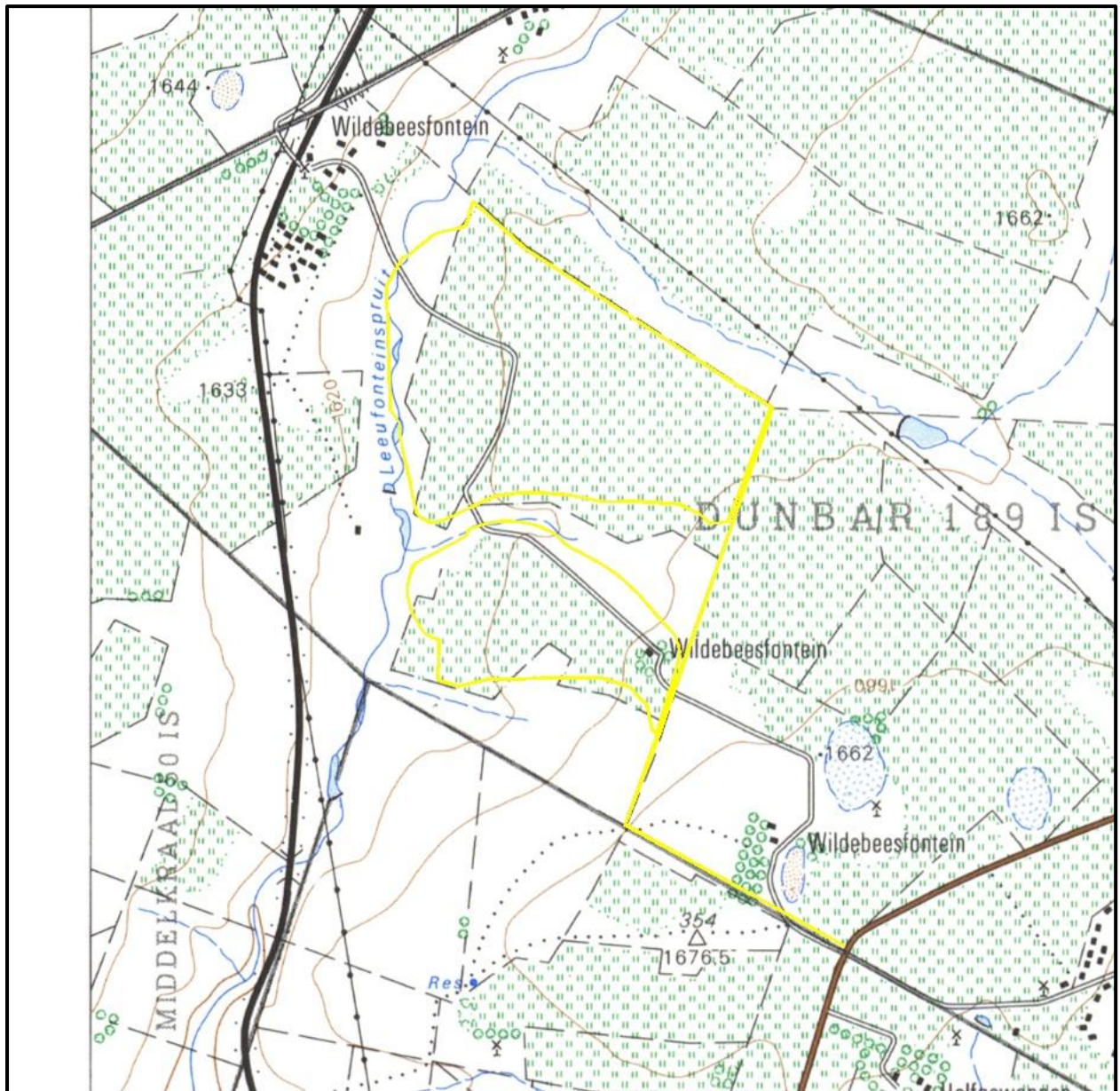


Figure 10. 1984 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. The area was used as cultivated lands. A minor road went through the sites under investigation, and one building is visible at Wildebeesfontein. (Topographical Map 1984)

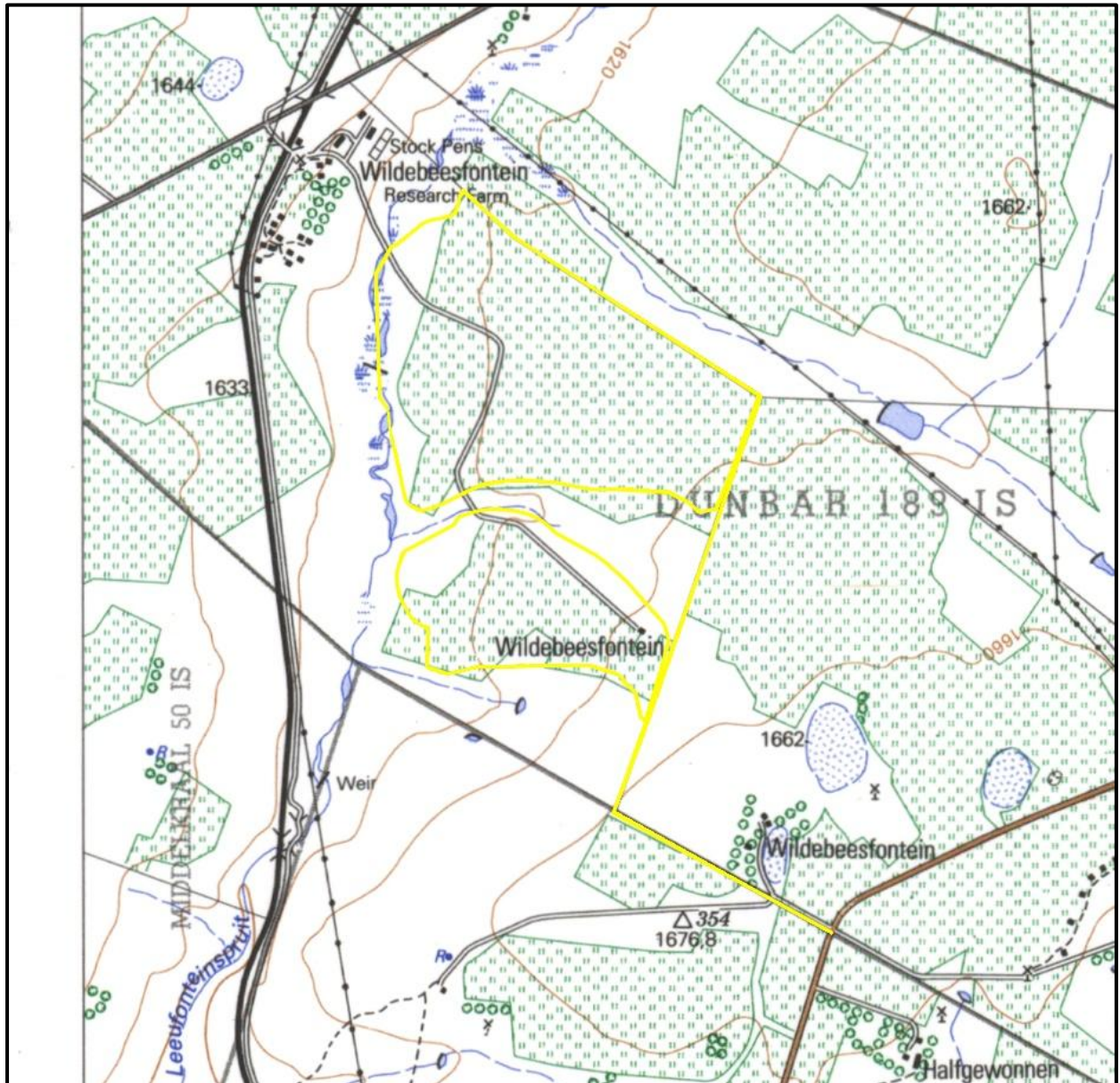


Figure 11. 1996 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. The area was used as cultivated lands. A minor road went through the sites under investigation, and one building is visible at Wildebeesfontein. To the north of the study area one can see the Wildebeesfontein Research Farm. (Topographical Map 1996)



Figure 12. 2019 Google Earth image showing the study area in relation to Meerlus, Hendrina, Kriel and other sites. (Google Earth 2019)

8 FINDINGS OF THE SURVEY

It is important to note that the entire farm was not surveyed. Only the footprint of the development was surveyed on foot and by vehicle (Figure 1 - 4). The study area is divided into a Northern section, a Southern section as well as a planned route for a future access road linking with an unnamed road towards the South East of the study area. The study area consists mostly of ploughed fields that have been extensively farmed for a number of years. The only areas not altered by agriculture are located on the boundaries of the ploughed fields and these areas are highly overgrown.

During the survey three features (Table 15) were recorded (Figure 13) consisting of a stone cairn (Feature 1), ruins of a farmstead younger than 60 years (Feature 2) and the remains of a rectangular brick structure (Feature 3), and is described below.

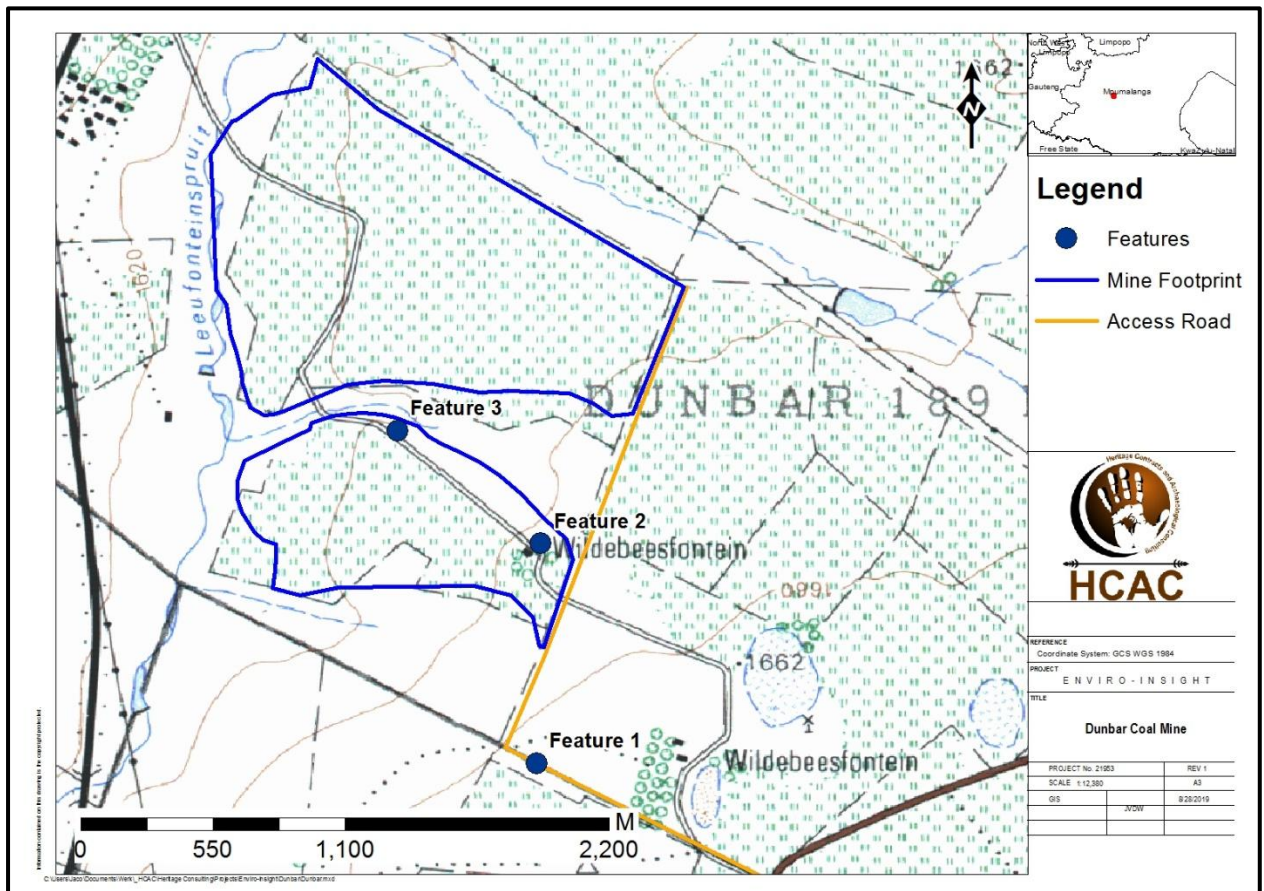


Figure 13. Site distribution map

Table 15. Features recorded during the assessment.

| LABEL | LONGITUDE | LATITUDE | DESCRIPTION | IMPACT | SIGNIFICANCE |
|-----------|--------------------|--------------------|-------------------------------------|--------|---|
| Feature 1 | 29° 31' 33.2617" E | 26° 11' 31.2755" S | Stone Cairn | Direct | If confirmed to be a grave the feature is of high social significance. If not, the feature is of no heritage significance |
| Feature 2 | 29° 31' 33.8233" E | 26° 11' 01.6188" S | Ruins of farm stead | Direct | No heritage significance |
| Feature 3 | 29° 31' 14.4417" E | 26° 10' 46.3826" S | Ruin of rectangular brick structure | Direct | No heritage Significance |

8.1.1 Built Environment (Section 34 of the NHRA) / Historical artefacts

Feature 2 consists of the ruins of the Wildebeesfontein farmstead that is located in the eastern corner of the southern section of the study area. This site consists of multiple buildings including a house, garage, outbuilding and a cement water reservoir. This site seems to be a modern farmstead that was abandoned within the last couple of decades. Based on historical maps this feature dates to between 1965 and 1984 and is therefore not older than 60 years and of no heritage significance (Figure 9 & 10).



Figure 14. Red brick structure viewed from the north



Figure 15. Red brick structure viewed from the west



Figure 16. Main dwelling viewed from the north east



Figure 17. Main dwelling viewed from the west

Feature 3 consist of the remains of a rectangular brick structure, possibly a pump house. This structure is not indicated on historical maps and is not considered to be of heritage significance.



Figure 18. Remains of Feature 3.

Field Rating – GP C: Heritage Significance – Low

8.1.2 Archaeological resources (Section 35 of the NHRA)

The study area is located outside of the known distribution of Iron Age settlements in Mpumalanga and in the unlikely event that settlements did occur in the study area, the extensive ploughing of the study area would have destroyed surface indicators of such sites if they ever existed. The lack of Stone Age sites or artefacts can be a result of the local geology. The lithology of the study area consists of fine to coarse-grained sandstone, shale and coal seams with a small section in the centre with dolerite and minor ultrabasic rocks (1:25000 Geological Map) and no raw material suitable for knapping were noted in the study area and no archaeological sites were identified during the survey.

8.1.3 Cultural Landscapes, Intangible and Living Heritage.

The cultural landscape of the greater study area is characterised by mining and agricultural developments and the project will not impact on significant viewsapes.

8.1.4 Paleontological Resources

Prof Marion Bamford conducted an independent paleontological study and concluded that: "*The proposed site lies on the shales, mudstones, sandstones and coals of the Vryheid Formation, lower Ecca Group, Karoo Supergroup. No fossils and no shales were observed throughout the site, only deep soils, ploughed fields and fallow fields. Around Hendrina the uppermost coal seam is about 18m below the surface and is overlain by sandstone, mudstone/siltstone and 14m of modern soils so until excavations and mining commence it is unlikely that any fossils would be observed. Since fossils plants of the Glossopteris flora will be associated with the shales close to the coal seams a Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no further palaeontological site visits are required until fossils are found by the geologist or responsible person.*" Bamford 2019.

8.1.5 Battlefields and Concentration Camps

No Battlefield sites were identified in the project site.

8.1.6 Burial Grounds and Graves (Section 36 of the NHRA)

Several sandstone outcrops occur within the ploughed fields but do not represent stone packed grave dressings (Figure 19). A stone cairn (Feature 1) of unknown purpose was recorded along the proposed access route (Figure 13) that could mark a possible grave although it is more likely that the pile consists of cleared stones for agricultural purposes. The stone cairn is located under a fence, measures approximately 1.2 meter wide by 2 meter long and is aligned east to west (Figure 20 – 21). If any graves are located in future they should ideally be preserved *in-situ* or alternatively relocated according to existing legislation.



Figure 19. Sandstone outcrop in agricultural field.



Figure 20. General view of Feature 1.



Figure 21. Stone cairn at Feature 1.



Figure 22. Stone cairn at feature 1.

Field Rating – GP A (if confirmed to be a grave)
Significance – High Social Significance (if confirmed to be a grave)

9 Potential Impact

The biggest potential risk to the project is the occurrence of currently unknown graves. The impact can be mitigated to an acceptable level with the implementation of a chance find procedure as outlined in Section 10.1.

The impact on heritage sites by the proposed development is considered to be low with the correct mitigation measures in place. Impacts that may occur would be during the construction phase only and would be of low significance unless unknown graves are impacted on, in which case the impact would be of high social significance.

Cumulative impacts occur from the combination of effects of various impacts on heritage resources. The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. The area is not rich in heritage resources and the proposed development is in line with other similar developments in the area. This and other projects in the area could, however, have an indirect impact on the larger heritage landscape.

9.1.1 Pre-Construction phase:

It is assumed that the pre-construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure needed for the construction phase. These activities can have a negative and irreversible impact on heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.2 Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. These activities can have a negative and irreversible impact on heritage sites. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.3 Operation Phase:

No impact is envisaged for the recorded heritage resources during this phase.

Table 16. Consolidated Table of Aspects and Impacts Scoring of Impact on Heritage Resources

| Spatial Scale | Rating | Duration | Rating | Severity | Rating |
|--------------------------------|--------|---------------------------------|--------|------------------------------|--------|
| Activity specific | 1 | One day to one month | 1 | Insignificant/non-harmful | 1 |
| Area specific | 2 | One month to one year | 2 | Small/potentially harmful | 2 |
| Whole site/plant/mine | 3 | One year to ten years | 3 | Significant/slightly harmful | 3 |
| Regional/neighbouring areas | 4 | Life of operation | 4 | Great/harmful | 4 |
| National | 5 | Post closure | 5 | Disastrous/extremely harmful | 5 |
| Frequency of Activity | Rating | Probability of Impact | | Rating | |
| Annually or less | 1 | Almost never/almost impossible | | 1 | |
| 6 monthly | 2 | Very seldom/highly unlikely | | 2 | |
| Monthly | 3 | Infrequent/unlikely/seldom | | 3 | |
| Weekly | 4 | Often/regularly/likely/possible | | 4 | |
| Daily | 5 | Daily/highly likely/definitely | | 5 | |
| Significance Rating of Impacts | | Timing | | | |
| Very Low (1-25) | | | | | |
| Low (26-50) | | Pre-construction | | | |
| Low – Medium (51-75) | | Construction | | | |
| Medium – High (76-100) | | Operation | | | |
| High (101-125) | | Decommissioning | | | |
| Very High (126-150) | | | | | |
| Adjusted Significance Rating | | | | | |

Table 17. Impact table - heritage resources.

| Consequence (Severity + Spatial Scope + Duration) | | | | | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|-----------|-----|-----|-----|-----|-----|-----|
| Likelihood (Frequency of Activity + Frequency of Impact) | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 |
| | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 |
| | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 |
| | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 |
| | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | <u>54</u> | 60 | 66 | 72 | 78 | 84 | 90 |
| | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 |
| | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 |
| | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 | 117 | 126 | 135 |
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |

9.2 Cumulative Impacts

From a cumulative perspective, it is anticipated that the Dunbar Mine will not result in a whole-scale change to the heritage character of the area as the development will not impact on any significant heritage resources and is in line with other developments in the area. A Chance Find Procedure should however be implemented for the project should any sites be identified during the construction process.

10 CONCLUSION AND RECOMMENDATIONS

The study area was assessed both on desktop level and by a field survey by archaeologists and palaeontologists. The study is applicable to the mine footprint and not to the mining right area. If the mine footprint changes from the current layout as assessed in this HIA the changes will have to be subjected to a walk down.

The study area consists mostly of ploughed fields that have been extensively farmed for a number of years. The study area is divided into a Northern section, a Southern section as well as a future access road linking with an unnamed road towards the South East of the study area. The only areas not altered by agriculture are located on the boundaries of the ploughed fields. These open areas on the sides of the fields also seem to have been worked in the past but is highly overgrown with weeds.

The study area is located outside of the known distribution of Iron Age settlements in Mpumalanga and in the unlikely event that settlements did occur in the study area, the extensive ploughing of the study area would have destroyed surface indicators of such sites if they ever existed. The lack of Stone Age sites or artefacts can be a result of the local geology. The lithology of the study area consists of fine to coarse-grained sandstone, shale and coal seams with a small section in the centre with dolerite and minor ultrabasic rocks and no raw material suitable for knapping were noted in the study area, and no archaeological sites were identified during the survey. Three features were however recorded namely a stone cairn (Feature 1), ruins of a farmstead younger than 60 years (Feature 2) and the remains of a rectangular brick structure (Feature 3).

Feature 1 is a stone cairn of unknown purpose that is located along the proposed access route and could mark a possible grave although it is more likely that the pile consists of cleared stones for agricultural purposes. The stone cairn is located under a fence, measures approximately 1.2 meter wide by 2 meter long and is aligned east to west. If Feature 1 is a grave it is of high social significance.

Feature 2 consists of the ruins of the Wildebeesfontein farmstead that is located in the eastern corner of the southern section of the study area. This site consists of multiple buildings including a house, garage, outbuilding and a cement water reservoir. This site seems to be a modern farmstead that was abandoned within the last couple of decades. Based on historical maps this feature dates to between 1965 and 1984 and is therefore not older than 60 years and of no heritage significance (Figure 9 & 10). Feature 3 consists of the remains of a rectangular brick structure, possibly a pump house. This structure is not indicated on historical maps and is not considered to be of heritage significance.

In terms of the palaeontology an independent paleontological study was conducted (Bamford 2019) that concluded that the study area is located on the shales, mudstones, sandstones and coals of the Vryheid Formation, lower Ecca Group, Karoo Supergroup. During the site visit conducted by the palaeontologists no fossils and no shales were observed only deep soils, ploughed fields and fallow fields and concluded that until excavations and mining commence it is unlikely that any fossils would be observed and no further palaeontological site visits are required until fossils are found by the geologist or responsible

person. However, since fossils plants of the *Glossopteris* flora will be associated with the shales close to the coal seams a Fossil Chance Find Protocol is recommended.

The impact of the proposed project on heritage resources is considered to be low with the correct mitigation measures in place and it is recommended that the proposed project can commence based on the following recommendations included as a condition of authorisation in the EMPr:

- It is recommended that the Stone Cairn (Feature 1) should be avoided by the development with a 15 meter buffer. If this is not possible, it should be confirmed whether the Stone Cairn represents a grave through a social consultation process. If it is indeed a grave, Feature 1 should preferably be avoided and retained *in situ*. If the feature is not a grave no mitigation is required. If any graves are located in future they should ideally be preserved in-situ or alternatively relocated according to existing legislation.
- The implementation of a chance finds procedure during the pre-construction and construction phase of the project as outlined under Section 10.1 of this report.

10.1 Chance Find Procedures

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as graves, stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefore chance find procedures should be put in place as part of the EMPr. A short summary of chance find procedures is discussed below.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find, and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.2 Reasoned Opinion

The impact of the proposed project on heritage resources is considered to be of low significance. Therefore, the project is considered to be acceptable from a heritage perspective and no further pre-construction mitigation in terms of archaeological resources is required based on approval from SAHRA. Furthermore, the socio-economic benefits also outweigh the possible impacts of the development with the correct mitigation measures (i.e. chance find procedure) implemented for the project.

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12 APPENDICES:**Appendix A****Curriculum Vitae of Specialist**

Jaco van der Walt
Archaeologist

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Education:

Particulars of degrees/diplomas and/or other qualifications:

Name of University or Institution: University of Pretoria
Degree obtained : BA Heritage Tourism & Archaeology
Year of graduation : 2001

Name of University or Institution: University of the Witwatersrand
Degree obtained : BA Hons Archaeology
Year of graduation : 2002

Name of University or Institution : University of the Witwatersrand
Degree Obtained : MA (Archaeology)
Year of Graduation : 2012

Name of University or Institution: University of Johannesburg
Degree : PhD
Year : Currently Enrolled

EMPLOYMENT HISTORY:

2011 – Present: **Owner – HCAC (Heritage Contracts and Archaeological Consulting CC).**
2007 – 2010 : **CRM Archaeologist**, Managed the Heritage Contracts Unit at the University of the Witwatersrand.
2005 - 2007: **CRM Archaeologist**, Director of Matakoma Heritage Consultants
2004: **Technical Assistant**, Department of Anatomy University of Pretoria
2003: **Archaeologist**, Mapungubwe World Heritage Site
2001 - 2002: **CRM Archaeologists**, For R & R Cultural Resource Consultants, Polokwane
2000: **Museum Assistant**, Fort Klapperkop.

Countries of work experience include:

Republic of South Africa, Botswana, Zimbabwe, Mozambique, Tanzania, The Democratic Republic of the Congo, Lesotho and Zambia.

SELECTED PROJECTS INCLUDE:

Archaeological Impact Assessments (Phase 1)

Heritage Impact Assessment Proposed Discharge Of Treated Mine Water Via The Wonderfontein Spruit Receiving Water Body Specialist as part of team conducting an Archaeological Assessment for the Mmamabula mining project and power supply, Botswana

Archaeological Impact Assessment Mmamethlake Landfill

Archaeological Impact Assessment Libangeni Landfill

Linear Developments

Archaeological Impact Assessment Link Northern Waterline Project At The Suikerbosrand Nature Reserve

Archaeological Impact Assessment Medupi – Spitskop Power Line,

Archaeological Impact Assessment Nelspruit Road Development

Renewable Energy developments

Archaeological Impact Assessment Karoshoek Solar Project

Grave Relocation Projects

Relocation of graves and site monitoring at Chloorkop as well as permit application and liaison with local authorities and social processes with local stakeholders, Gauteng Province.

Relocation of the grave of Rifle Man Maritz as well as permit application and liaison with local authorities and social processes with local stakeholders, Ndumo, Kwa Zulu Natal.

Relocation of the Magolwane graves for the office of the premier, Kwa Zulu Natal

Relocation of the OSuthu Royal Graves office of the premier, Kwa Zulu Natal

Phase 2 Mitigation Projects

Field Director for the Archaeological Mitigation For Booyensdal Platinum Mine, Steelpoort, Limpopo Province. Principle investigator Prof. T. Huffman

Monitoring of heritage sites affected by the ARUP Transnet Multipurpose Pipeline under directorship of Gavin Anderson.

Field Director for the Phase 2 mapping of a late Iron Age site located on the farm Kameelbult, Zeerust, North West Province. Under directorship of Prof T. Huffman.

Field Director for the Phase 2 surface sampling of Stone Age sites effected by the Medupi – Spitskop Power Line, Limpopo Province

Heritage management projects

Platreef Mitigation project – mitigation of heritage sites and compilation of conservation management plan.

MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

- Association of Southern African Professional Archaeologists. Member number 159
Accreditation:
 - Field Director Iron Age Archaeology
 - Field Supervisor Colonial Period Archaeology, Stone Age
 Archaeology and Grave Relocation
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association Professional Archaeologists (2011 – 2012)

PUBLICATIONS AND PRESENTATIONS

- A Culture Historical Interpretation, Aimed at Site Visitors, of the Exposed Eastern Profile of K8 on the Southern terrace at Mapungubwe.
 - J van der Walt, A Meyer, WC Nienaber
 - Poster presented at Faculty day, Faculty of Medicine University of Pretoria 2003
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- Fieldwork Report: Mapungubwe Stabilization Project.
 - WC Nienaber, M Hutten, S Gaigher, J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2004
- A War Uncovered: Human Remains from Thabantšho Hill (South Africa), 10 May 1864.
 - M. Steyn, WS Boshoff, WC Nienaber, J van der Walt
 - Paper read at the 12th Congress of the Pan-African Archaeological Association for Prehistory and Related Studies 2005
- Field Report on the mitigation measures conducted on the farm Bokfontein, Brits, North West Province .
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 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2007
- Field report on the mitigation measures employed at Early Farmer sites threatened by development in the Greater Sekhukhune area, Limpopo Province. J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2008
- Ceramic analysis of an Early Iron Age Site with vitrified dung, Limpopo Province South Africa.
 - J van der Walt. Poster presented at SAFA, Frankfurt Germany 2008

- Bantu Speaker Rock Engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga (*In Prep*)
 - J van der Walt and J.P Celliers
- Sterkspruit: Micro-layout of late Iron Age stone walling, Lydenburg, Mpumalanga. W. Fourie and J van der Walt. A Poster presented at the Southern African Association of Archaeologists Biennial Conference 2011
- Detailed mapping of LIA stone-walled settlements' in Lydenburg, Mpumalanga. J van der Walt and J.P Celliers
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Bantu-Speaker Rock engravings in the Schoemanskloof Valley, Lydenburg District, Mpumalanga. J.P Celliers and J van der Walt
 - Paper read at the Southern African Association of Archaeologists Biennial Conference 2011
- Pleistocene hominin land use on the western trans-Vaal Highveld ecoregion, South Africa, Jaco van der Walt.
 - J van der Walt. Poster presented at SAFA, Toulouse, France. Biennial Conference 2016

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- | | |
|-------------------------|--|
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