HERITAGE IMPACT ASSESSMENT

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

FOR THE KRANSPAN MINING RIGHT EXTENSION PROJECT, NEAR CAROLINA MPUMALANGA PROVINCE.

Type of development:

Mining

Client:

ABS Africa Sustainability Advisors

Applicant:

Illima Coal Company

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Project Reference:
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APPROVAL PAGE

Project Name	Ilima Coal.
Report Title	Heritage Impact Assessment for the Kranspan Mining Right Extension Project Mpumalanga Province.
Authority Reference Number	TBC
Report Status	Revised Report
Applicant Name	Ilima Coal Company

Responsibility	Name	Qualifications and Certifications	Date
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DOCUMENT PROGRESS

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Amendments on Document

Date	Report Reference Number	Description of Amendment
20 February 2023	22141 V2	Technical revision addressing client's comments and inclusion of finds from areas that were previously inaccessible

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REPORT OUTLINE

Appendix 6 of the GNR 326 EIA Regulations published on 7 April 2017 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
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	*Declaration of Independence*
(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.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 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 site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 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 1.3
(k) Mitigation measures for inclusion in the EMPr	Section 10.1 and 10.5
(l) Conditions for inclusion in the environmental authorisation	Section 10. 1 and 10.5
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 4.
(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 5
(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	No other information requested at this time

Executive Summary

ABS Africa has been appointed as the independent Environmental Assessment Practitioner (EAP) to apply for environmental authorization for the proposed S102 application on behalf of Illima Coal Company. Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the project and the study area was assessed through a desktop assessment and by a non-intrusive pedestrian field survey that focussed on tangible heritage resources. Key findings of the assessment include:

- The study area is characterised by extensive maize fields that have been cultivated prior to 1966. These agricultural activities would have impacted on surface indicators of heritage sites if any ever existed in these areas;
- Archaeological remains are sparse throughout the study area and only three sites (KP 1, 2 & 3) were recorded centred around a large pan. These sites consist of a scatter of Stone tools, ephemeral remains of what could have been rock art and a small shelter;
- Other finds include farmsteads, ruins, burial sites and stone cairns of unknown purpose;
- The burial sites are the biggest risk to the project since the survey recorded 15 grave sites of which the majority will be directly impacted on based on the current layout. More graves are expected in the Project area; and
- According to the SAHRA Paleontological sensitivity map the study area is of very high significance and was independently assessed. The study by Bamford (2022) concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr

The impact on heritage resources is high but can be mitigated to an acceptable level provided that the recommendations in this report as well as the site-specific recommendations in section 9 are adhered to, based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations based on impacts from the current layout:

- All recorded heritage features should be indicated on development plans and construction crews and employees should be made aware of heritage features and the requirements for each type of heritage feature;
- Graves and cemeteries impacted on (KP 14, KP 18, C004, C010B, C010C, C014, C015B, C020, C027, C103 & C105) should be avoided with a 100 m buffer zone (following the SAHRA Burial Grounds and Graves permitting policy 2020) and access for families should be ensured. If this is not possible graves can be relocated adhering to all legal requirements;
- Stone cairns (KP19 & C102) that are of unknown purpose but could potentially be graves should be verified during the social consultation process and could require further testing like GPR and test excavations;
- Historical structures (C003, C006, C007, C010A, C015A, C016, C101) should be assessed by a conservation architect who will make suitable recommendations for mitigation, after which a destruction permit can be applied for from the relevant heritage authority;
- Ruins (KP 12, KP 13, KP 17, KP 21, KP 22, C001, C012, C013, C017, C024, C025 &) should be monitored during initial mining activities or construction as these could contain unmarked graves;
- The final layout must be subjected to a heritage walkdown prior to development;
- Development of a heritage site development plan that addresses access protocols for safe access to burial sites for family members;
- The presence of additional graves should be confirmed during the social consultation process;
- Implementation of Chance Find Procedure for the project; and
- The study area should be monitored by the ECO during construction.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I: • I act as an 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 49 A of the Act.
Signature	
Date	10/12/2022

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (CRM) archaeologist for more than 20 yearss.. Jaco is an accredited member of the Association of South African Professional Archaeologists (ASAPA) (#159) and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, Kwa Zulu Natal (KZN) as well as the Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, Democratic Republic of the Congo (DRC) Zambia, Guinea, Afghanistan, Nigeria and Tanzania. Through this, he has a sound understanding of the International Finance Corporations (IFC) Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage

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ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DFFE: Department of Fisheries, Forestry and Environment,
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EAP Environmental Assessment Practitioner
EMPr: 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, 2002 (Act No. 28 of 2002)
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)
Earlier 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 the historic period)
The Iron Age (~ AD 400 to 1840)
Historic (~ AD 1840 to 1950)
Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the proposed Illima Coal S102 application. The project is situated approximately 18 km southwest of Carolina in the Mpumalanga Province (Figure 1.1 to 1.3). The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr) for the development. An HIA was done by Beyond Heritage in February 2019 for the Kranspan site, and this report is an extension of the initial report (Van der Walt 2019).

The aim of the study is to survey the proposed development footprint to understand the range of cultural heritage sites in the area, 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 utilized 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, several heritage sites were identified including farmsteads, ruins and burial sites. 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 this report. The South African Heritage Resources Agency (SAHRA) as a commenting authority under section 38(8) of NHRA require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's 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).

1.2 Project Description

Project components and the location of the proposed Ilima Coal Company is outlined under Table 2 and 3.

Table 2: Project Description

Farm and Magisterial District	Vaalbank 212 IS, Roodebloem 51 IT
Central co-ordinate of the development	Property co-ordinates: 26°11'46.47"S 29°58'41.92"E
Topographic Map Number	2630AA & 2629BB

Table 3: Infrastructure and project activities

Type of development	Mining
Size of study area	~4 974.96 Ha.
Project Description	The planned operations on the proposed extension areas entail surface mining of the coal seams as well as the establishment of various mine support infrastructure. Based on the mine planning studies completed to date, the following is proposed: • The intention for the proposed extension areas is surface (opencast) mining focusing on extraction of the B, CL and E Seam via the roll over mining method; • Besides the opencast, haul roads, temporary topsoil and overburden stockpiles, ROM stockpiles and pollution control dams will be established on the proposed extension areas as part of the mining process. In addition, temporary container-type office and ablution facilities and potable water abstraction boreholes will be established. The location of these is still to be determined; • A coal processing plant (wet and dry) will be established on the proposed extension areas to process the coal following extraction. Alternatively, processing of the coal at the Kranspan Mine coal processing plant is an option. This will include dry crushing and screening of the coal at the processing plant area, and beneficiation of the export coal product through an on-site coal washing plant with filter press; and • Dewatering of seepage water will be required for the surface mining over the Life of Mine (LOM). Water removed from pits will be retained in pollution control dams. Below is a summarised list of the proposed mining activities to be undertaken on the proposed extension areas. • Exploration geophysical surveying, drilling, pit sampling and trenching; • Clearing and grubbing (surface mining areas and surface infrastructure footprint); • Topsoil removal and stockpiling (surface mining areas and surface infrastructure footprint); • Overburden removal and stockpiling; • Drilling and blasting (when necessary, surface mining);

	• Excavation of coal and material transfer to a coal stockpile area (surface mining); • Dry crushing and screening of coal at the processing plant area; • Beneficiation of the export coal product; and • Loading, hauling and transport of coal product (surface mining).

1.3 Alternatives

No alternatives were provided. The extent of the area assessed allows for siting of the development within this area to minimize impacts to heritage resources.

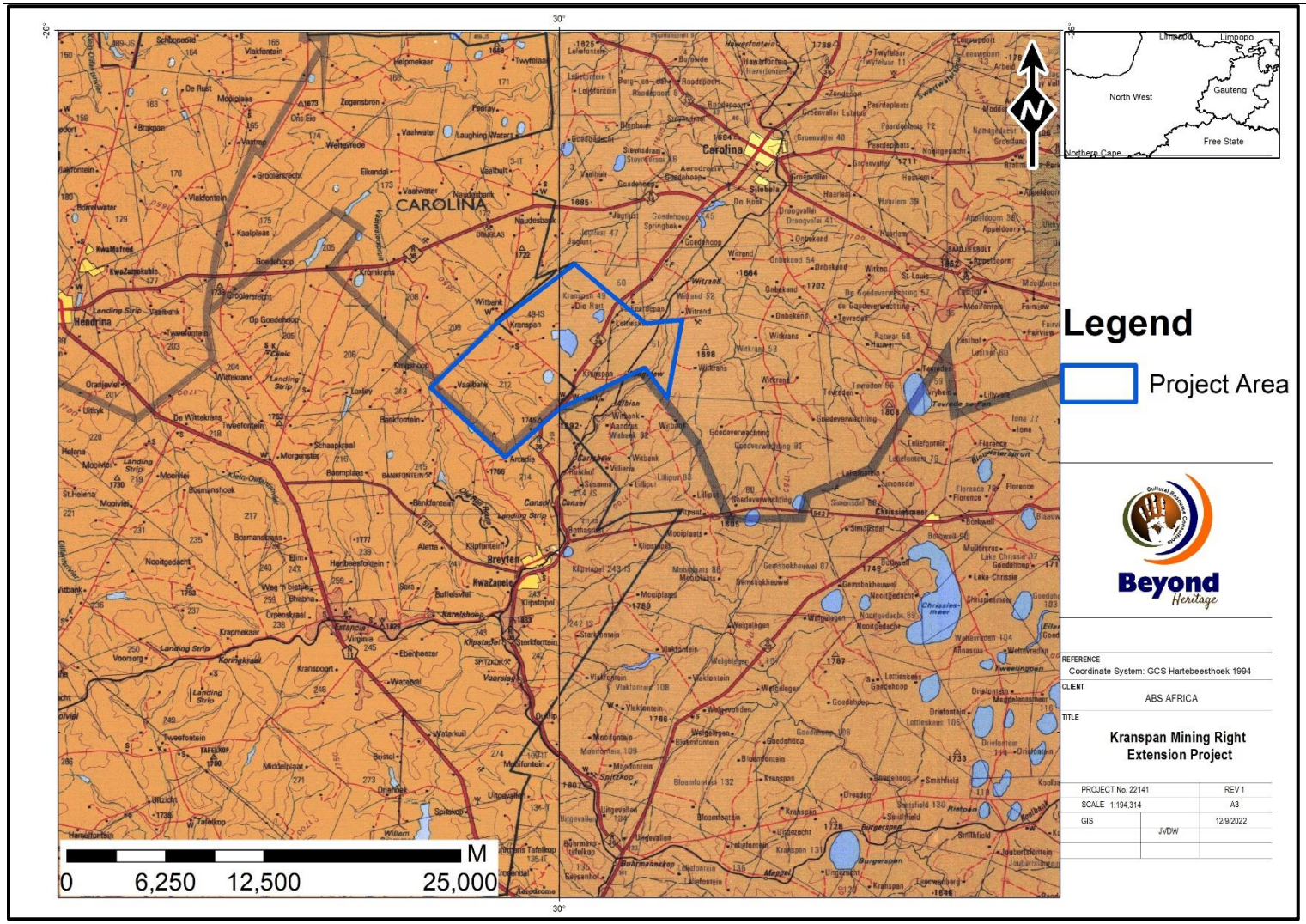

Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

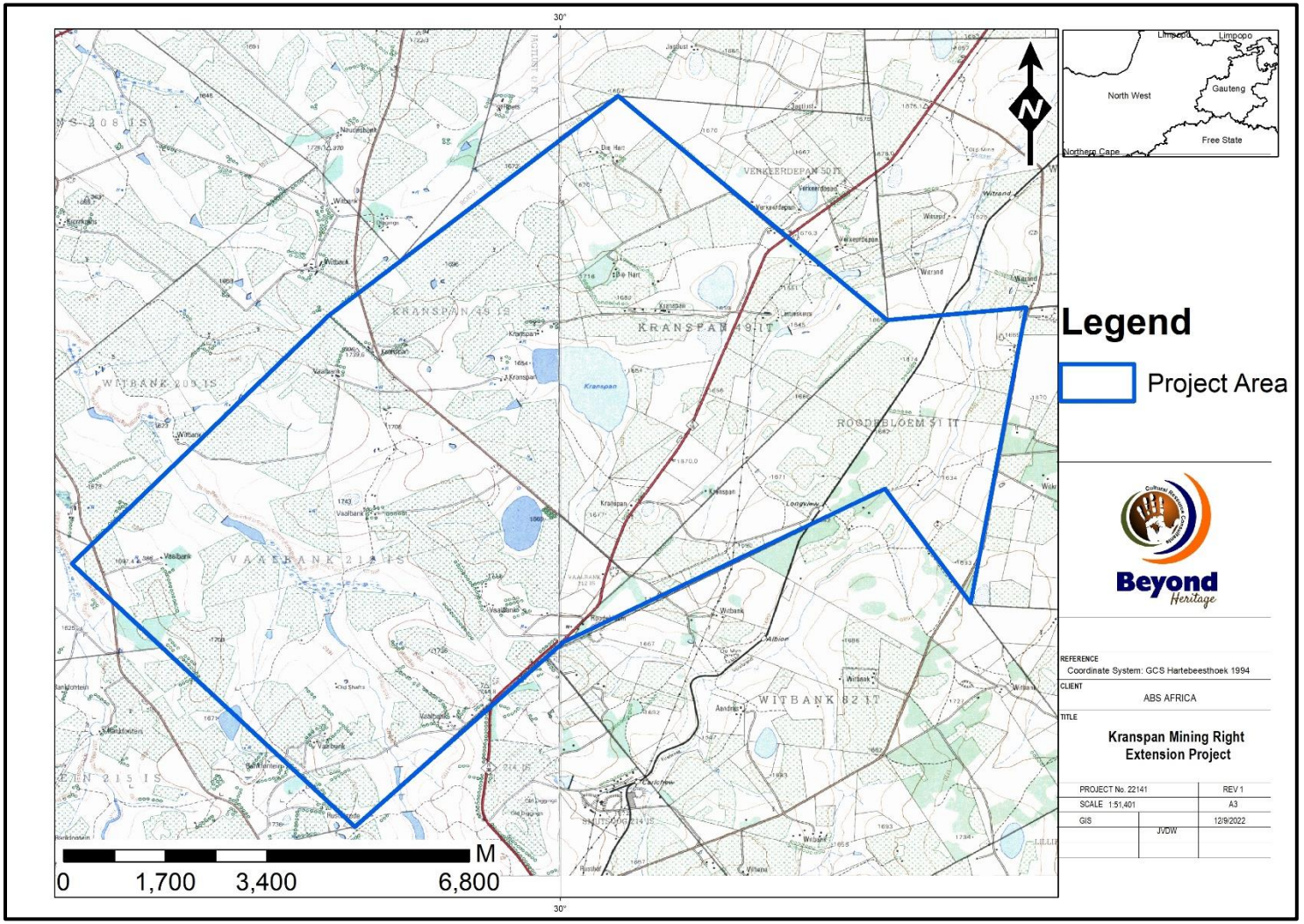

Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

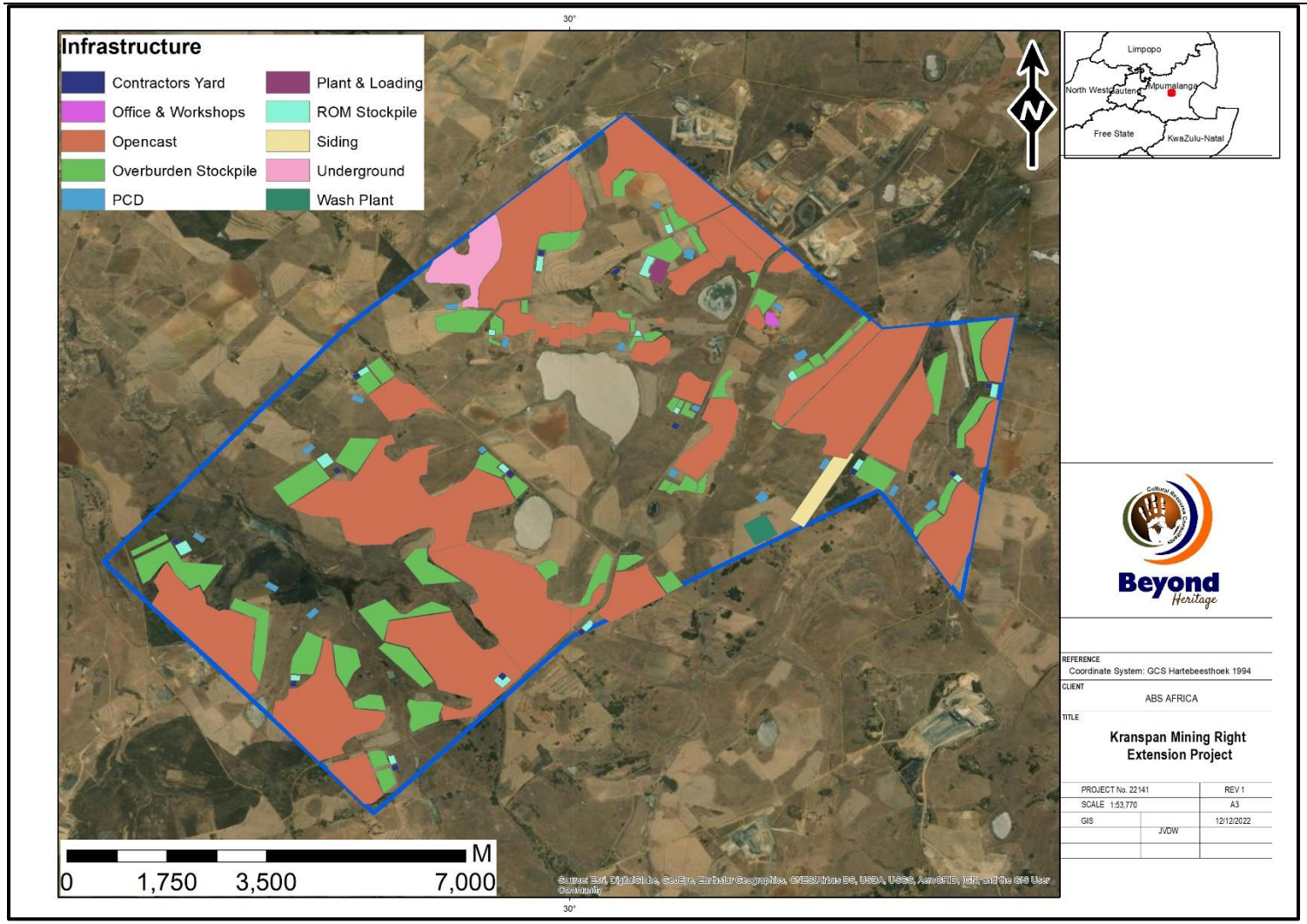

Figure 1.3. Aerial image of the Project area.

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)

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 (or avoidance) 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 evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA 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 HIA 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 HIA'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 fieldwork 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 undertaken by the EAP was to capture and address any issues raised by community members and other stakeholders.

3.4 Site Investigation

The aim of the site visit was to:

a) survey the proposed project area to understand the heritage character of the area and to 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.

Table 4: Site Investigation Details

	Site Investigation
Date	The week of 11 October 2022 with a follow up visit from the 31st of January to the 2nd of February 2023.
Season	Summer – The overall heritage visibility was low due to extensive cultivation of crops and dense vegetation outside of these areas. The Project area was however sufficiently covered to understand the heritage character of the area (Figure 3.1).

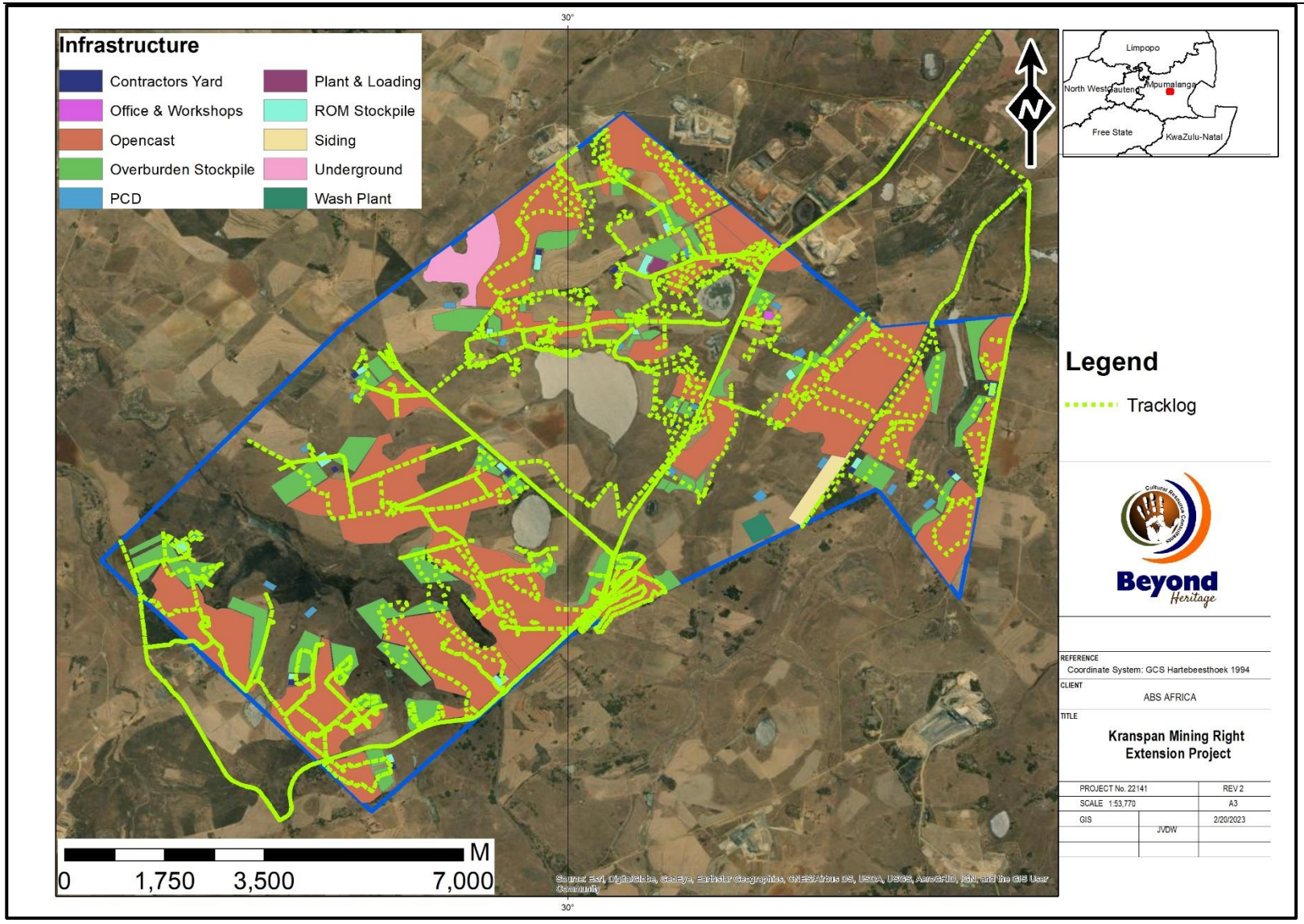

Figure 3.1. Tracklog of the survey path in green.

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 (2007), 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.

Table 5: Heritage significance and field ratings

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

The criteria below are used to establish the impact rating on sites:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0-1 years), assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years), assigned a score of 2;
  - medium-term (5-15 years), assigned a score of 3;
  - long term (> 15 years), assigned a score of 4; or
  - permanent, assigned a score of 5;
  - The **magnitude**, quantified on a scale from 0-10 where; 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
  - The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where; 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
  - The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
  - the **status**, which will be described as either positive, negative or neutral.
  - the degree to which the impact can be reversed.
  - the degree to which the impact may cause irreplaceable loss of resources.
  - the *degree* to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:
S = (E+D+M) P
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

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 nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. This limitation is successfully mitigated with the implementation of a Chance Find Procedure and monitoring of the study area by the Environmental Control Officer (ECO). 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 will be 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 Environment

Stats SÁ provides the following information: The total population of the Albert Luthuli Local Municipality is 186,010. Of those aged 20 years and older, 4,4% have completed primary school, 28,8% have some secondary education, 27% have completed matric and 6,3% have some form of higher education. 35,4% of the 45 116 economically active individuals (i.e., those who are employed or unemployed but looking for work) are unemployed.

5 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the EIA process by the EAP. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process. No heritage concerns have been raised thus far.

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

Few HIA's was conducted in the immediate area, studies conducted that were consulted is listed in Table 6.

Table 6. Studies conducted in the greater area.

Author	Year	Project	Findings
Van Schalkwyk, J.	2003	Archaeological Survey of a Section of The Secunda-Mozambique Gas Pipeline, Carolina District, Mpumalanga	Cemeteries
Pistorius, JCC.	2007	A Phase I Heritage Impact Assessment (HIA) Study for The Upgrading of Eskom's Nooitgedacht Substation on The Farm Wintershoek 451 Near Carolina In the Mpumalanga Province of South Africa	No sites were recorded.
Van Schalkwyk, J. A.	2007	Heritage Impact Assessment for The Planned Development on The Farms Hebron 421JT And Twyfelaar 11 IT, Carolina Municipal District, Mpumalanga Province	Iron Age, Historical Sites and Cemeteries were recorded.
Van Schalkwyk, J.A.	2007	Heritage Impact Scoping Report for The Planned Hendrina-Marathon Powerline, Mpumalanga Province	Settlements to initiation sites, industrial and farming related sites as well as cemeteries were noted in the area.
Pelser, A and Van der Walt, J.	2008	A Report on A Heritage Impact Assessment for Proposed Opencast Coal Mining Operations for The Klippan Colliery on The Farm Klippan 452 JS (Emachibini), Wonderfontein, Mpumalanga	Graves were recorded.
Pelser, A.	2012	A Report on a Heritage Impact Assessment (HIA) For the Proposed Motshaotshele Colliery Project, Close to Hendrina, Mpumalanga Province	Cemeteries
Van der Walt, J.	2019	Heritage Impact Assessment For The Proposed Dunbar Opencast Coal Mine Mpumalanga Province	Stone cairn, a farmstead and a structure
Van der Walt, J.	2019	Heritage Impact Assessment For The Proposed Kranspan Colliery Mpumalanga Province	Stone cairns, farmsteads and structures, archaeological sites and burial sites
Van der Walt, J.	2022	Heritage Impact Assessment for the Hendrina North Wind Energy Facility	Ruins and Graves

6.1.1 Google Earth and The Genealogical Society of South Africa (Graves and burial sites)

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located. The database of the Genealogical Society of South Africa indicated the Vaalbank cemetery, 273 m from the impact area with 5 graves.

6.2 Archaeological Background

6.2.1 Stone Age

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

Very few Early Stone Age (ESA) 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 Middle Stone Age (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 (LSA) 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 LSA 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).

6.2.2 Iron Age

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).

6.2.3 Anglo-Boer War

Figure 6.1. The Witkloof Monument (http://www.boerenbrit.com).

The Witkloof Monument (Figure 6.2) stands testament to an interesting battle that took place in the larger area namely the battle of Leliefontein. According to the map (Figure 6.3) from J.S. Bergh, (red), Geskiedenisatlas van Suid-Afrika, Die vier noordelike provinsies, p. 54, there were two concentration camps located to the north of the study area close to Belfast. These sites will not be impacted by the development.

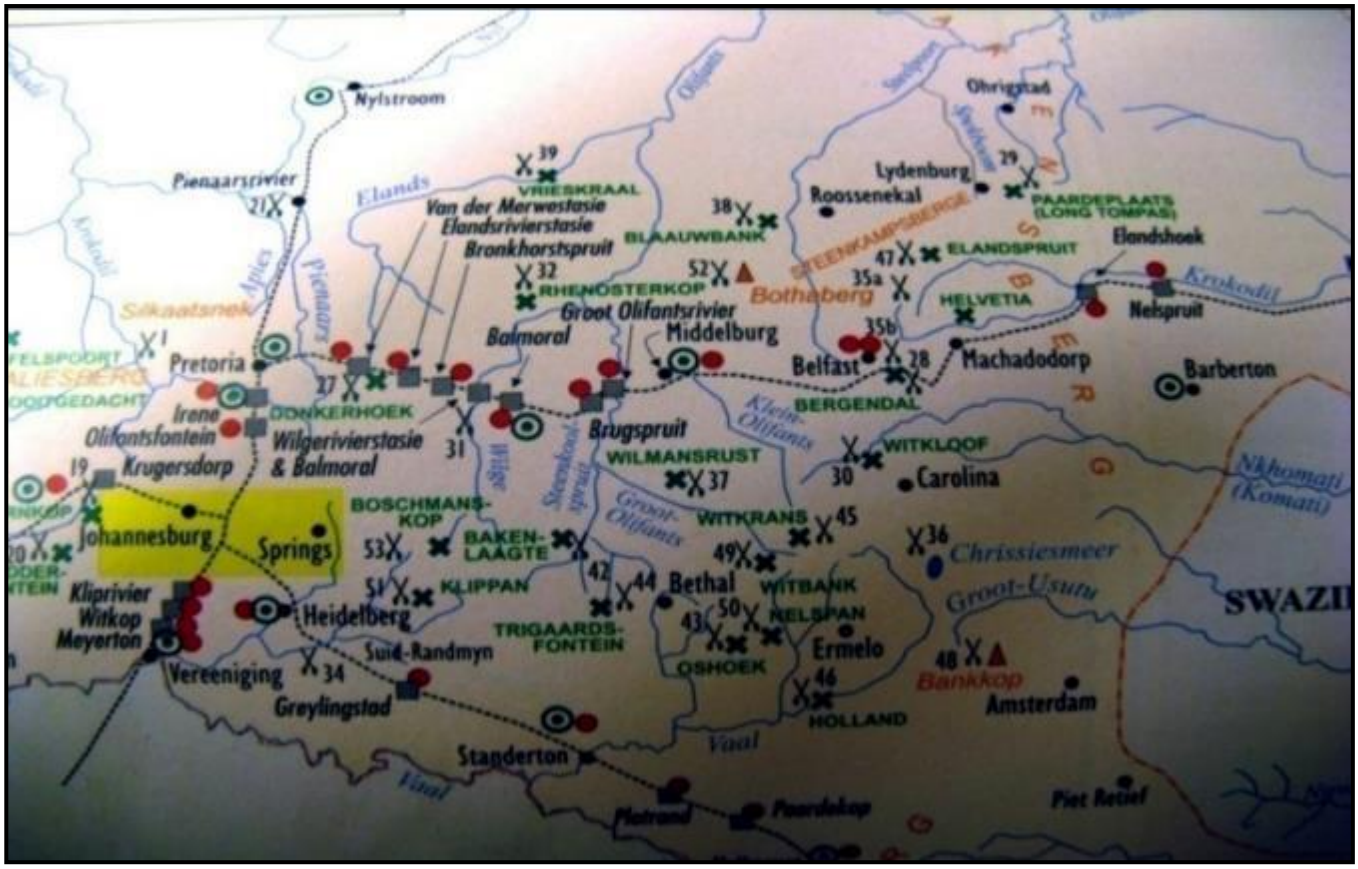

Figure 6.2. Concentration camps represented by red dots and railway stations with grey squares (Bergh 1999).

7 Description of the Physical Environment

The Project area is in the Mpumalanga Province of South Africa, some 13 km southwest of Carolina. The Project can be accessed via the R36 paved provincial road if travelling from the north or the south. The nearest sizeable towns are Carolina, 13 km to the northeast. Agricultural activities include livestock like cattle and sheep farming as well as cultivated crops such as maize. Mining activities also occur in the larger area. Large thickets of trees are scattered across the project area. These thickets are mostly made up off 'Black Wattle' as well as 'Eucalyptus' trees. The areas not being cultivated is covered by a dense layer of tall grass.

Evidence of previous mining activities seems to have taken place on the farm Roodebloem, marked by several sinkholes scattered over the landscape. The vegetation of the general area and the proposed site consists of Eastern Highveld Grassland (Mucina & Rutherford 2006). General site conditions area illustrated in Figures 7.1 to 7.4.

Figure 7.1. General view of the landscape around the farm Roodebloem east of the R36.

Figure 7.2. General site conditions on the farm Roodebloem showing the dense grass cover as well as some of the thickets of trees that are scattered across the area.

Figure 7.3. Large, cultivated crops dominate the landscape within the farm, Vaalbank

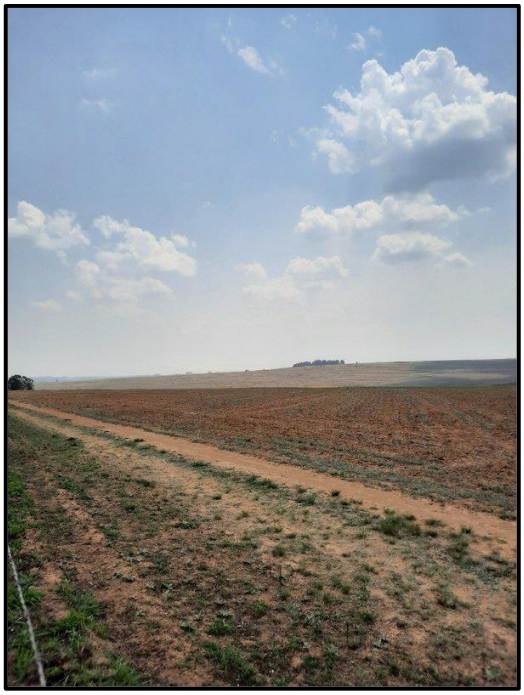

Figure 7.4. Extensive cultivated fields occur throughout the study area.

Figure 7.5. Large sinkholes are scattered across the area east of the R36, possibly indicating previous mining activities.

Figure 7.6. General view of the landscape within the area west of the R36.

8 Findings of the Survey

8.1 Heritage Resources

The project area is characterised by agricultural activities and has been extensively cultivated. The area has been used for agricultural purposes from prior to the 1960's (Van der Walt 2018) and evidence of historical occupation of the area manifests in the form of historical buildings and burial sites. Indicators of occupation in antiquity of the study area include archaeological sites such as a shelter, Stone Age artefacts and potential rock art (Van der Walt 2019).

Heritage resources recorded during the current assessment were numbered numerically with the pre-fix C (for Carolina) and resources recorded in a previous study (van der Walt 2019) were given the prefix KP (for Kranspan). The KP sites were recorded in the approved HIA Assessment (SAHRIS case number 13302) and are included in this report (Table 7). For detailed descriptions please refer to Van der Walt (2019). Features recorded in the current study are detailed in Table 8 and selected features illustrated in Figure 8.2 to 8.11.

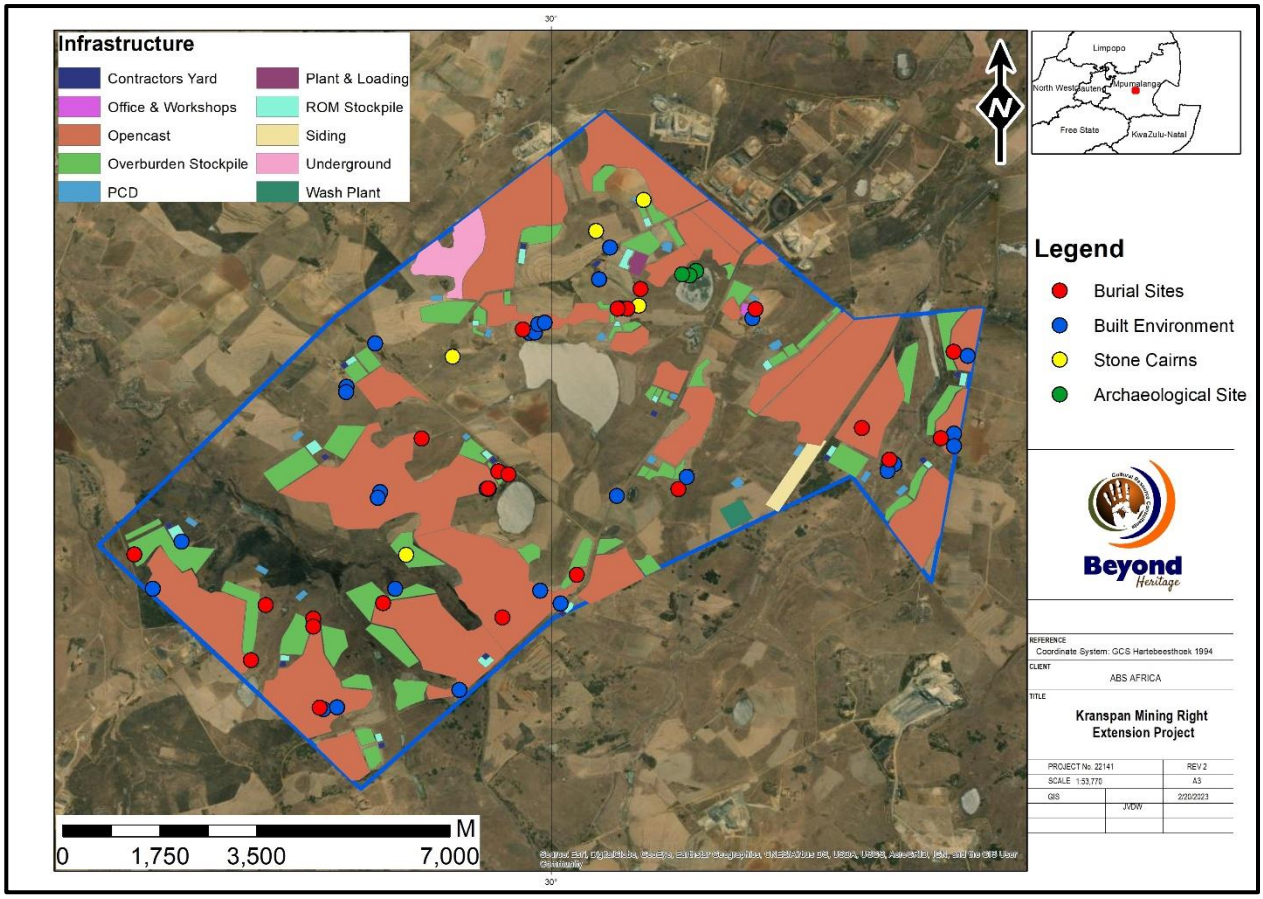

Figure 8.1. Site distribution map in relation to the current layout.

Table 7. Recorded Heritage features in the Van der Walt (2019) study located on the farm *Kranspan.

Label	Longitude	Latitude	Description	Impact	Heritage Significance	Elevation
KP 1	30° 01' 24.7261" E	26° 09' 31.9931" S	Small Shelter	No Direct Impact	Low Significance GP C	1662,3
KP 2	30° 01' 20.9747" E	26° 09' 34.8084" S	Possible Rock Art	No Direct Impact	Low to medium Heritage Significance GP B	1660,549
KP 3	30° 01' 16.4856" E	26° 09' 34.0812" S	Miscellaneous Stone Tools	No Direct Impact	Low Significance GP C	1668,148
KP 4	30° 00' 52.1028" E	26° 09' 42.6708" S	Graves	No Direct Impact	High Significance GP A	1682,619
KP 5	30° 00' 44.4671" E	26° 09' 54.2413" S	Graves	No Direct Impact	High Significance GP A	1682,058
KP 6	30° 00' 39.9780" E	26° 09' 53.9927" S	Ruin	Indirect impact Pit	Low Significance GP C	1684,427
KP 7	30° 00' 38.7179" E	26° 09' 54.1547" S	Graves	Direct impact - Overburden Stock Pile and Open Cast Pit	High Significance GP A	1684,759

KP 8	30° 00' 51.0877" E	26° 09' 52.3693" S	Stone Cairn	No Direct Impact	Low significance unless the site is confirmed to be a grave in which case it is of High Social Significance Field Rating: GP C - if confirmed to be a grave, GP A	1678,484
KP 9	30° 00' 27.8640" E	26° 09' 36.8425" S	Ruin	Direct Impact - Open Cast Pit	Low to medium Heritage Significance GP B	1701,185
KP 10	30° 00' 26.1325" E	26° 09' 08.5608" S	Stone Cairn	No Direct Impact	Low significance unless the site is confirmed to be a grave in which case it is of High Social Significance Field Rating: GP C - if confirmed to be a grave, GP A	1684,331
KP 11	30° 00' 34.3440" E	26° 09' 18.2376" S	Ruin	No Direct Impact	Low Significance GP C	1693,044
KP 12	29° 59' 52.1701" E	26° 10' 03.1800" S	Ruin	Direct impact - Open Cast Pit	Low to medium Heritage Significance GP B	1683,174
KP 13	29° 59' 56.0041" E	26° 10' 02.3303" S	Ruin	Direct Impact - Open Cast Pit	Low to medium Heritage Significance GP B	1683,329
KP 14	30° 01' 59.4588" E	26° 09' 54.4284" S	Graves	Indirect impact buffer zone offices and workshops, overburden stockpile	High Significance GP A	1658,352
KP 15	30° 01' 19.2252" E	26° 11' 32.7984" S	Ruin	No Direct Impact	Low Significance GP C	1674,719
KP 16	30° 01' 14.2213" E	26° 11' 39.7897" S	Graves	No Direct Impact	High Significance GP A	1676,932
KP 17	30° 01' 57.6712" E	26° 09' 59.8100" S	Ruin	Indirect impact offices and workshops	Low to medium Heritage Significance GP B	
KP 18	29° 59' 43.0999" E	26° 10' 06.3001" S	Grave	Direct Impact - Open Cast Pit	High Significance GP A	0
KP 19	30° 00' 54.0144" E	26° 08' 50.5465" S	Stone Cairn	Direct impact – overburden stocpile	Low significance unless the site is confirmed to be a grave in which case it is of High Social Significance Field Rating: GP C - if confirmed to be a grave, GP A	1682,18

KP 20	29° 59' 02.0219" E	26° 10' 22.3393" S	Stone Cairn	No Direct Impact	Low significance unless the site is confirmed to be a grave in which case it is of High Social Significance Field Rating: GP C - if confirmed to be a grave, GP A	1687,47
KP 21	29° 59' 47.2199" E	26° 10' 08.3028" S	Ruin	Direct impact - Open Cast Pit	Low to medium Heritage Significance GP B	1676,41
KP 22	29° 59' 50.3557" E	26° 10' 08.1408" S	Ruin	Direct impact - Open Cast Pit	Low to medium Heritage Significance GP B	1674,49

*Please refer to the report that is included as Annexure A for the site descriptions.

Table 8. Heritage features recorded during the current study on the farms Vaalbank and Roodebloem*.

LABEL	LONGITUDE	LATITUDE	Category	Description	Significance	Impact	ELEVATION
C001	30° 00' 05.4000" E	26° 12' 46.8575" S	Built Environment	Small, degraded foundation or the remains of a small structure. The feature was built from brick and cement and has been almost demolished. The site measures 3 x 4 m.	Low Significance - GP C	Direct impact - Open Cast Pit	1693,856
C002	30° 00' 14.7204" E	26° 12' 30.1213" S	Burial Site	Small overgrown and degraded cemetery situated within a cultivated field. The cemetery is situated about 100 west of the R36 in the middle of an active field. The area is generally avoided by heavy machinery. The cemetery contains 10 - 15 graves made of packed stone and cement and measures 5 x 15 m.	High significance - GP A	Direct impact - Overburden Stockpile and Open Cast Pit	1679,898
C003	29° 59' 53.2535" E	26° 12' 39.4225" S	Built Environment	Large historical farm structure situated near a modern farmstead. The structure forms part of the original farm infrastructure and is currently being used for storage. The site measures 45 x 10m.	Medium significance - GP B	Direct impact - Open Cast Pit	
C004	29° 59' 31.2215" E	26° 12' 55.1375" S	Burial Site	Small overgrown and degraded cemetery situated under a small thicket of trees. The graves are extremely overgrown and sunken into the ground. Some graves are difficult to define due to the high level of degradation. The graves were mainly built from packed stone. There are approximately 10 - 15 graves and the site measures about 10 x 10 m.	High significance - GP A	Direct impact - Open Cast Pit	1718,919
C005	29° 58' 43.8853" E	26° 11' 10.2047" S	Burial Site	Large informal cemetery measuring 50 x 50 m situated on the side of a hill near a fence line. A small community is situated nearby and are probably responsible for the cemetery. The cemetery contains 45 - 50 graves built from different materials including packed stone, cement, and granite.	High significance - GP A	Direct impact - Open Cast Pit	1716,063
C006	29° 58' 19.6824" E	26° 11' 41.6077" S	Built Environment	Large historical farm structure that has mostly been broken down. The structure was built with large cut stone blocks and some brick additions. The structure is situated on the edge of a large thicket of trees. The feature may be part of a larger historical farmstead. A metal kraal is built next to the structure indicating agricultural purposes.	Medium significance - GP B	Direct impact - Open Cast Pit	1716,418

C007	29° 58' 18.1456" E	26° 11' 44.9564" S	Built Environment	Large (100 x 100 m) historical farmstead with multiple stone-built structures situated within a large thicket of Eucalyptus trees. The farmstead is disused and degraded with the older structures partially destroyed. Modern additions have been added to the farmstead which are still being occupied by the local community. The various historical structures include a large stone-built farmhouse which is fairly degraded, various associated structures from the original farmstead such as the large stone built barn\store, as well as multiple foundations and remnants of already demolished structures.	Medium significance - GP B	Direct impact - Open Cast Pit	
C008	29° 59' 28.7375" E	26° 11' 29.4180" S	Burial Site	Small fenced off cemetery containing 3 packed stone graves near a large pan/dam. The graves are situated near a small informal settlement that seems to have been abandoned.	High significance - GP A	Direct Impact - Overburden stock pile	1692,168
C009	29° 59' 34.7641" E	26° 11' 31.2613" S	Burial Site	Small informal cemetery containing about 4 packed stone graves near a large dam/pan. The cemetery is situated on the slope leading down to the large body of water. The graves are fairly degraded due to continuous trampling from cattle and other livestock. Some of the graves are difficult to define due to the degraded nature of the cemetery. More graves may be found at this location.	High significance - GP A	Direct Impact - Overburden stock pile	1685,972
C010A	29° 59' 21.8502" E	26° 11' 39.6569" S	Built Environment	Large stone-built enclosures or structures. The site is a series of square enclosures built from packed stone. These features may have been enclosures for livestock and/or the boundaries of a small settlement. The site is fairly degraded and overgrown making it difficult to assess the structure. Various other disturbances can be seen near the features as well as on google imagery possibly indicating a small informal settlement. These include multiple remnants of stone-built foundations situated near the main site. A small cemetery is also located within one of the smaller square enclosures on the northern edge of the site.	High significance - GP A	Direct impact - Open Cast Pit	1691,682

C010B	29° 59' 22.7401" E	26° 11' 39.3981" S	Burial Site	Multiple graves located within and around site C010. The graves seem to have been constructed after the site had been abandoned. Two graves are situated within a smaller section of the stone walled site on the northern edge of the main enclosure and one grave is situated on the eastern edge of the main stone walled feature. The graves are severely degraded and difficult to define as a result of continuous trampling from livestock. No inscriptions were visible on the graves. The general site is severely degraded due to animal trampling and may cause multiple graves to be hidden under the overgrown vegetation. A total of three graves were noted and the site extent is approximately 15 x 15 m.	Generally Protected A - High	Direct impact - Open Cast Pit	
C010C	29° 59' 23.2801" E	26° 11' 39.7497" S	Burial Site	Graves	High significance - GP A	Direct impact - Open Cast Pit	
C011	29° 58' 16.6691" E	26° 10' 14.5883" S	Built Environment	Large (100 x 50 m) historical farmstead situated on the eastern edge of the proposed project area near a large gravel road used to access the landscape. The farmstead includes a large historical farmhouse and various associated structures that form part of the original farmstead. The farmstead is fairly degraded but mostly intact with modern additions to the area still visible.	Medium significance - GP B	No direct impact	1747,685
C012	29° 57' 59.7923" E	26° 10' 39.9900" S	Built Environment	Large (4 x 2 m) stone built foundation. The feature is mostly degraded and overgrown. Possibly the remnants of a small structure	Low Significance - GP C	Direct impact - PCD	1713,488
C013	29° 57' 59.5835" E	26° 10' 43.0428" S	Built Environment	3 x 2 m stone-built foundation or the remnants of a small structure. The site is severely degraded with only the foundation remaining. The site is also overgrown.	Low Significance - GP C	Indirect impact - PCD	1710,484
C014	29° 57' 03.8844" E	26° 13' 20.1757" S	Burial Site	Three packed stone graves situated near the western edge of the proposed project area. The graves sit near a small gravel road on a large open field. The graves are overgrown and degraded with no visible inscriptions.	High significance - GP A	Direct impact - Overburden stock pile Open Cast Pit	1718,779

C015A	29° 57' 46.4933" E	26° 13' 48.8675" S	Built Environment	Large farmstead that may contain original historical structures. Most structures within the farmstead are recent or have been modified into more modern styles. A single grave is situated within the farmstead. This grave belongs to the husband of the current farm owner (Petra Butter).	Low Significance - GP C (Structures)	Direct impact - Open Cast Pit	
C015B	29° 57' 44.3015" E	26° 13' 47.9999" S	Burial Site	Single grave situated within a modern fenced off farmstead. The grave belongs to the previous farm owner. The grave consists of granite headstone and skirting with a gravel fill. The current owner (Petra Butter) was the wife of the diseased.	High significance - GP A	Direct impact - Open Cast Pit	1698,568
C016	29° 57' 54.4644" E	26° 13' 47.7371" S	Built Environment	Large agricultural structure or store built near the farmstead comprising 10 x 4 m. A large kraal has been built onto the southern side of the structure. The main structure is built from cut stone with some modern brick features added onto the structure such as newer windows.	Medium significance - GP B	Direct impact - Open Cast Pit	1691,113
C017	29° 56' 06.5147" E	26° 12' 38.2679" S	Built Environment	Series of packed stone features or the remnants of packed stone foundations measuring 20 x 20 m. The site may have been a small homestead consisting of multiple small stone built structures. The site is situated on the side of a large thicket of trees and a freshly ploughed field.	Low Significance - GP C	Direct impact - Open Cast Pit	1700,808
C018	29° 55' 55.6645" E	26° 12' 18.1980" S	Burial Site	Small historical cemetery with 8 - 10 graves situated near the western edge of the proposed project area. The cemetery is next to a small gravel road running towards a historical farmstead and measures 10 x 10 m. The cemetery contains multiple packed stone graves that are fairly degraded and overgrown. One grave shows signs of recent disturbance due to heavy machinery.	High significance - GP A	Direct impact - Overburden stock pile	1710,913
C019	29° 57' 12.5424" E	26° 12' 47.8837" S	Burial Site	Small historical cemetery containing approximately 6 stone packed graves is situated on a large open field of tall and thick grass near an agricultural land. The graves are degraded and overgrown with no visible inscriptions.	High significance - GP A	No impact	1695,396
C020	30° 03' 01.8396" E	26° 11' 04.0273" S	Burial Site	Small degraded cemetery with approximately 11 to 15 graves situated on a large open field near the railway line that runs through the farm Roodebloem on the eastern edge of the proposed project area. The cemetery consists of multiple packed stone graves that are degraded and somewhat destroyed due to various burrowing animals.	High significance - GP A	Direct impact overbruden stock pile	1704,176

C021	30° 03' 18.0181" E	26° 11' 22.6464" S	Burial Site33333	Small historical cemetery containing 3 visible graves within a built stone boundary wall. The cemetery is situated near various historical farm features such as a large stone kraal and small farmstead with various stone-built structures. The cemetery, kraal and farmstead is most likely associated with one another. The small cemetery contains three graves with headstones and brick and stone skirting. Only two graves have visible inscriptions.	High significance - GP A	Indirect impact bufferzone of PCD	1681,428
C022	30° 03' 20.7936" E	26° 11' 25.2276" S	Built Environment	Large historical farmstead including multiple stone-built structures, foundations and associated agricultural features such as the large, packed stone kraal. The visible sections of the packed stone kraal measures about 40 x 30 m in size and is situated east of the main farmstead. The small cemetery at C021 is situated a few meter north of the large kraal structure. . West of the kraal sits the main farmstead which includes multiple remnants of structures and the packed stone foundations of various broken down or degraded structures. The main farmhouse is mostly destroyed with some of the walls still standing. The house was built with cut stone of a high quality. The entire site measures 100 x 150 m.	Medium significance - GP B	No direct impact	1675,307
C022/1	30° 03' 16.8588" E	26° 11' 29.3821" S	Built Environment	Stone Kraal	Medium significance - GP B	No direct impact	1676,772
C023	30° 03' 47.9917" E	26° 11' 10.0249" S	Burial Site	Small, degraded cemetery with 7 graves situated on a large open field near a rocky ridge line that runs along the shoulder of the slope. The cemetery is situated near a stream that runs along the bottom of the valley. High amounts of spring water run out of the rocky ridge line towards the stream and may be of cultural significance.	High significance - GP A	Indirect impact - bufferzone opencast pit	1702,422
C024	30° 03' 55.7352" E	26° 11' 07.4652" S	Built Environment	Small series of packed stone foundations situated on a large open field near the main access road on the eastern edge of the farm Roodebloem. The site includes various remnants of packed stone foundations as well as some metal artefacts that indicate a possible homestead. The site may have been a small workers homestead and measures 5 x 10 m.	Low Significance - GP C	Direct impact Open Cast Pit	1709,84

C025	30° 03' 55.7207" E	26° 11' 14.6148" S	Built Environment	Small series of mounds or the remnants of packed stone foundations, possibly indicating the remains of an informal settlement or worker's homestead. The site is situated neat the main access road along the eastern edge of the proposed project area.The site measures approximately 5 x 5 m.	Low Significance - GP C	Direct impact Open Cast Pit	1711,902
C026	29° 56' 23.3520" E	26° 12' 10.5695" S	Built Environment	Large historical farmstead situated on a large open field on a highly elevated portion of the landscape. Large agricultural fields are situated west of the farmstead and are still being cultivated. The farmstead includes multiple degraded structures such as the main farmhouse and a store or garage structure situated south of the main farmstead. The main building is mostly intact with only the roof missing and some of its walls showing signs of degradation. The structure is built from cut stone blocks and the site extent is 50 x 150 m	Medium significance - GP B	No impact	1712,238
C027	29° 57' 40.5073" E	26° 13' 00.4908" S	Burial Site	Small modern cemetery situated near a small informal settlement nearby. The cemetery contains multiple modern graves with granite headstones, covers and skirting. The cemetery is also fenced off with a wire fence. Various other graves are visible within the small settlement itself. Access to the cemetery was difficult due to community members moving through the area. 10 - 15 graves were noted and the site measures approximately 10 x 15 m.	High significance - GP A	Direct impact - Overburden stockpile Open Cast Pit	1706,612
C028	29° 57' 40.3282" E	26° 12' 55.7461" S	Burial Site		High significance - GP A	Indirect Overburden stockpile Open Cast Pit (Buffer Zone)	
C101	29° 59' 06.0575" E	26° 13' 37.5349" S	Built Environment	Large existing farmstead situated near the main road running along the southern edge of the Project area. The site includes multiple structures that are scattered around the main farmstead. Some of the structures seem to be of historical age having been built from large cut sandstone blocks.	Medium significance - GP B	Direct impact - Open Cast Pit	1729.294
C102	29° 58' 34.9032" E	26° 12' 18.4608" S	Stone cairn	Stone cairn near exposed bedrock measuring ~2x1 meter and is oval in shape	Low significance unless the site is confirmed to be a grave in which case it is of High Social Significance Field Rating: GP C - if confirmed to be a grave, GP A	Direct impact - Overburden stockpile	1689.742

C103	29° 58' 21.3671" E	26° 12' 46.6668" S	Burial Site	Small informal burial site with ~30-40 graves. The cemetery is marked by degraded and extremely overgrown graves with stone packed grave dressings.	High significance - GP A	Direct impact - Overburden stockpile Open Cast Pit	1712.751
C104	29° 58' 28.4916" E	26° 12' 38.2067" S	Built Environment	Ephemeral remains of farming infrastructure possibly part of irrigation system	Low Significance - GP C	No impact	1703.187
C105	30° 03' 55.6199" E	26° 10' 19.4195" S	Burial Site	Small informal burial site with ~31 graves located west of the farmstead at site C106. The cemetery includes various graves of different ages. These include packed stone graves as well as graves that have granite headstones and covers dating to the early 2000.	High significance - GP A	Direct impact - Overburden stockpile Open Cast Pit	1676.809
C106	30° 04' 03.7451" E	26° 10' 21.8676" S	Built Environment	Modern farmstead situated in the eastern edge of the Project area. The site includes multiple structures and agricultural features such as a large kraal. The site includes the main farmhouse, a secondary house south of the main yard and a small informal community just north of the farmstead	Low Significance - GP C	Direct impact - Overburden stockpile Open Cast Pit	1686.83
C107	30° 00' 38.3509" E	26° 11' 43.9369" S	Built Environment	Large existing farmstead that is partially demolished and degraded. The site consist of multiple partially demolished structures scattered across the farmstead. The site is situated next to the main access road into the Project area along the south eastern boundary	Low Significance - GP C	No Impact	1708.59

*Full site descriptions and photographs are available on request. These were not included in the report for brevity.

Figure 8.2. Stone packed grave at C002.

Figure 8.3. Farmstead at C003.

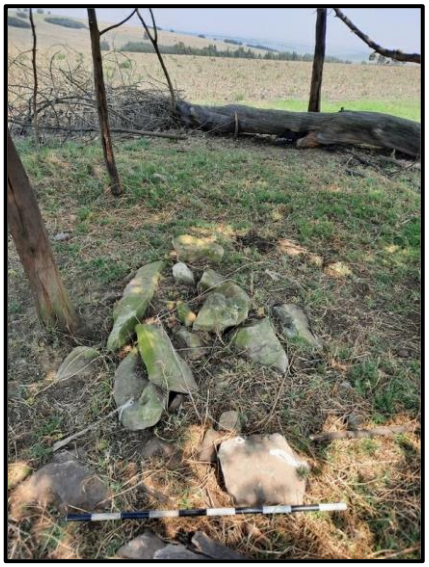

Figure 8.4. Grave dressing at a grave at C004.

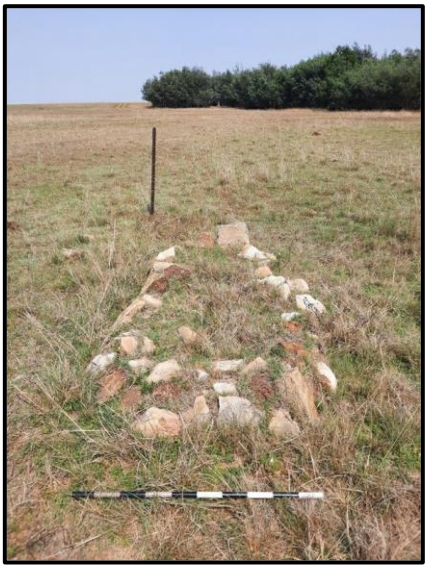

Figure 8.5. Stone packed grave at C008.

Figure 8.6. General view of the remains of a farmstead at C011.

Figure 8.7. Modern grave with formal grave dressing at C015.

Figure 8.8. General view of a cemetery with 8 – 10 stone packed graves at C018.

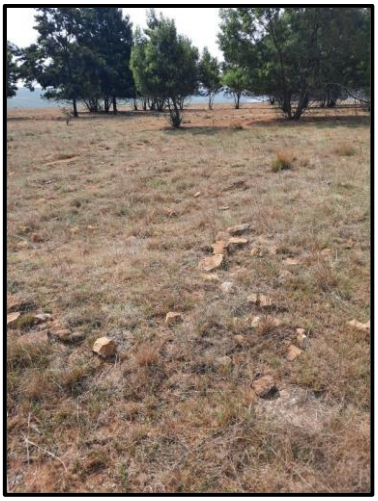

Figure 8.9. Ephemeral remains of stone packed foundations at C025.

Figure 8.10. North facing walls of the remains of a farmstead at C026.

Figure 8.11. Small, modern cemetery at C027 and C028.

8.2 Cultural Landscape

The study area is rural in character surrounded by agricultural and mining developments and although it is not a significant cultural landscape the proposed mining can have a negative impact on the sense of place. From a heritage point of view the area has been extensively disturbed through years of cultivation and this would have impacted on heritage resources if any ever occurred in these areas. Visual impacts to scenic routes and sense of place are also considered to be low due to the existing developments in the area.

8.3 Paleontological Heritage

According to the SAHRA Paleontological map the study area is of very high paleontological significance (Figure 8.12) and this aspect was addressed in an independent paleontological assessment by Prof Marion Bamford (2022). The study found that the proposed sites lie entirely on potentially very highly sensitive rocks of the Vryheid Formation (Ecca Group, Karoo Supergroup) that could preserve impressions of fossil plants of the *Glossopteris* flora. The site visit and walk through by the palaeontologist confirmed that there are NO FOSSIL PLANTS of the *Glossopteris* flora present on the surface. The area is flat and open with secondary grassland or glades of invasive trees. Most of the area has been cultivated previously. It is unknown if there are fossils below the ground surface, therefore, a Fossil Chance Find Protocol should be added to the EMPr

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

Figure 8.12. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

Heritage impacts to heritage sites are irreversible and permanent. During the combined surveys for the project large farmsteads (historical and modern) as well as stone packed ruins and foundations were recorded. While often degraded or modernised (depending on use) the features add to our understanding of historical occupation of the area. The historical farmsteads are of medium significance and if impacted on the impacts will be medium to high (the latter due to associated graves at some of the farmsteads such as C10B). Ruins that have been degraded to the extent that its architectural value have been compromised is of low significance and the impact to these features will be low to medium. Modern farmsteads (younger that 60 years) are not considered heritage resources. The 2019 study (Van der Walt 2019) recorded three archaeological sites of low to medium significance and based on the current layout these sites will not be impacted on.

Numerous burial sites have been recorded in the study area. Graves are always of high social significance. Due to the extensive impact of mining activities SAHRA requires a buffer zone of 100 m (Burial Grounds and Graves Permitting Policy 2020**)** around recorded graves and based on this, impacts to recorded burial sites will be high.

Impacts to heritage resources without mitigation within the project footprint will be permanent and negative and occur during the pre-construction and construction activities. It is assumed that the pre-construction and construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can impact on heritage features and impacts include destruction or partial destruction of non-renewable heritage resources. Impacts during the operation phase is considered to affect the cultural landscape and sense of place.

The main cause of impacts to heritage resources is physical disturbance of the material itself and its context during removal of topsoil and vegetation as well as the excavations associated with the establishment of infrastructure. In terms of this project the main source of impacts could happen during the following activities:

- Establishment of new roads and upgrade of existing roads;
- Influx of people that could vandalise grave sites etc;
- Visual impact of the Project on the landscape and sense of place;
- Establishment of laydown areas;
- Excavation and levelling;
- Trenches for cables and erection of powerlines;

The best way to mitigate impacts to the recorded sites is through avoidance.Based on the current lay out the site-specific impacts on heritage sites are summarised in Table 9 and illustrated in Figure 9.1 to 9.6. Impact assessments are included in Table 10 to 12 for sites within the impact areas.

Table 9.Site specific impacts on heritage sites and proposed mitigation measures based on the current layout

LABEL	Category	Impact of current lay out	Significance	Impact Rating	Mitigation
C001	Built Environment	Direct - open cast pit.	Generally Protected C - Low	Low	Monitoring during construction
C002	Burial Site	Direct - Open Cast and Overburden stockpile	Generally Protected A - High	High	Avoid. 100 m buffer required
C003	Built Environment	Direct - open cast pit.	Generally Protected B - Medium significance	Medium	Recording before destruction (destruction permit will be required)

C004	Burial Site	Direct - open cast pit.	Generally Protected A - High	High	Avoid. 100 m buffer required
C005	Burial Site	Indirect - Opencast Pit	Generally Protected A - High	High	Avoid. 100 m buffer required
C006	Built Environment	Direct - open cast pit.	Generally Protected B - Medium significance	Medium	Recording before destruction (destruction permit will be required)
C007	Built Environment	Direct -Open Cast pit	Generally Protected B - Medium significance	Medium	Recording before destruction (destruction permit will be required)
C008	Burial Site	Direct - overburden stock pile	Generally Protected A - High	High	Avoid. 100 m buffer required
C009	Burial Site	Direct - overburden stock pile	Generally Protected A - High	High	Avoid. 100 m buffer required
C010A	Built Environment	Direct - Opencast Pit	Generally Protected A - High	High	Avoid. 100 m buffer required
C010B	Burial Site	Direct - Opencast Pit	Generally Protected A - High	High	Avoid. 100 m buffer required
C010C	Burial Site	Direct - Opencast Pit	Generally Protected A - High	High	Avoid. 100 m buffer required.
C012	Built Environment	Direct - PCD	Generally Protected C (GP.C) - Low significance Destruction	Low	Monitoring during construction
C013	Built Environment	Indirect - PCD	Generally Protected C (GP.C) - Low significance Destruction	Low	Monitoring during construction
C014	Burial Site	Direct - open cast pit.	Generally Protected A - High	High	Avoid. 100 m buffer required
C015A	Built Environment	Direct - open cast pit.	Generally Protected C - Low significance	Low	Monitoring during construction
C015B	Burial Site	Direct - open cast pit.	Generally Protected A - High	High	Avoid. 100 m buffer required
C016	Built Environment	Direct - open cast pit.	Generally Protected B - Medium	Medium	Recording before destruction (destruction permit will be required)
C017	Built Environment	Direct - open cast pit.	Generally Protected C - Low significance	Low	Monitoring during construction
C018	Burial Site	Direct - overburden stock pile	Generally Protected A - High	High	Avoid. 100 m buffer required
C020	Burial Site	Direct - open cast pit.	Generally Protected A - High	High	Avoid. 100 m buffer required
C023	Burial Site	Indirect - Opencast Pit	Generally Protected A - High	High	Avoid. 100 m buffer required
C024	Built Environment	Direct - open cast pit.	Generally Protected C - Low	Low	Monitoring during construction
C025	Built Environment	Direct - open cast pit.	Generally Protected C - Low	Low	Monitoring during construction
C027	Burial Site	Direct - open cast pit.	Generally Protected A - High	High	Avoid. 100 m buffer required
C028	Burial Site	Indirect - Opencast Pit		High	
C101	Built Environment	Direct impact - Open Cast Pit	Medium significance - GP B	Medium	Recording before destruction (destruction permit will be required)

C102	Stone Cairn	Direct impact - Overburden stockpile	Low significance unless the site is confirmed to be a grave in which case it is of High Social Significance Field Rating: GP C - if confirmed to be a grave, GP A	Low	Confirm the presence of graves prior to construction. If the features are confirmed to be graves the sites should be avoided with the required 100 m buffer.
C103	Burial Site	Direct impact - Overburden stockpile Open Cast Pit	High significance - GP A	High	Avoid. 100 m buffer required
C104	Built Environment	No impact	Low Significance - GP C	Low	No mitigation required.
C105	Burial Site	Direct impact - Overburden stockpile Open Cast Pit	High significance - GP A	High	Avoid. 100 m buffer required
C106	Built Environment	Direct impact - Overburden stockpile Open Cast Pit	Low Significance - GP C	Low	Monitoring during construction
C107	Built Environment	No Impact	Low Significance - GP C	Low	No mitigation required.
KP 12	Ruin	Direct - Open cast Pit	Low to medium Heritage Significance GP B	Low to medium	Monitoring during construction
KP 13	Ruin	Direct - Open cast Pit	Low to medium Heritage Significance GP B	Low to medium	Monitoring during construction
KP 14	Graves	Direct - Underground	High Significance GP A	High	Avoid. 100 m buffer
KP 17	Ruin	Direct - Underground	Low to medium Heritage Significance GP B	Low to medium	Monitoring during construction
KP 18	Grave	Direct - Open cast Pit	High Significance GP A	High	Avoid. 100 m buffer
KP 19	Stone Cairn	Direct impact – overburden stockpile	Low significance unless the site is confirmed to be a grave in which case it is of High Social Significance Field Rating: GP C - if confirmed to be a grave, GP A	Low	Confirm the presence of graves prior to construction. If the features are confirmed to be graves the sites should be avoided with the required 100 m buffer.
KP 21	Ruin	Direct - Open cast Pit	Low to medium Heritage Significance GP B	Low to medium	Monitoring during construction
KP 22	Ruin	Direct - Open cast Pit	Low to medium Heritage Significance GP B	Low to medium	Monitoring during construction

Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Monitoring procedures and management guidelines outlined in Table 13 and 14 will ensure that no potential subsurface heritage resources will be negatively impacted on.

Cumulative impacts considered as an effect caused by the proposed action that results from the incremental impact of an action when added to other past, present, or reasonably foreseeable future actions. (Cornell Law School Information Institute, 2020). 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. In the case of this project, impacts can be mitigated to an acceptable level. However, this and other projects in the area can have a negative impact on heritage sites in the area where these sites have been destroyed unknowingly.

9.1 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. These activities can have a negative and irreversible impact on the recorded heritage features. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.2 Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. Potential impacts include destruction or partial destruction of non-renewable heritage resources.

9.3 Operation Phase

Limited impacts are expected during the operation phase.

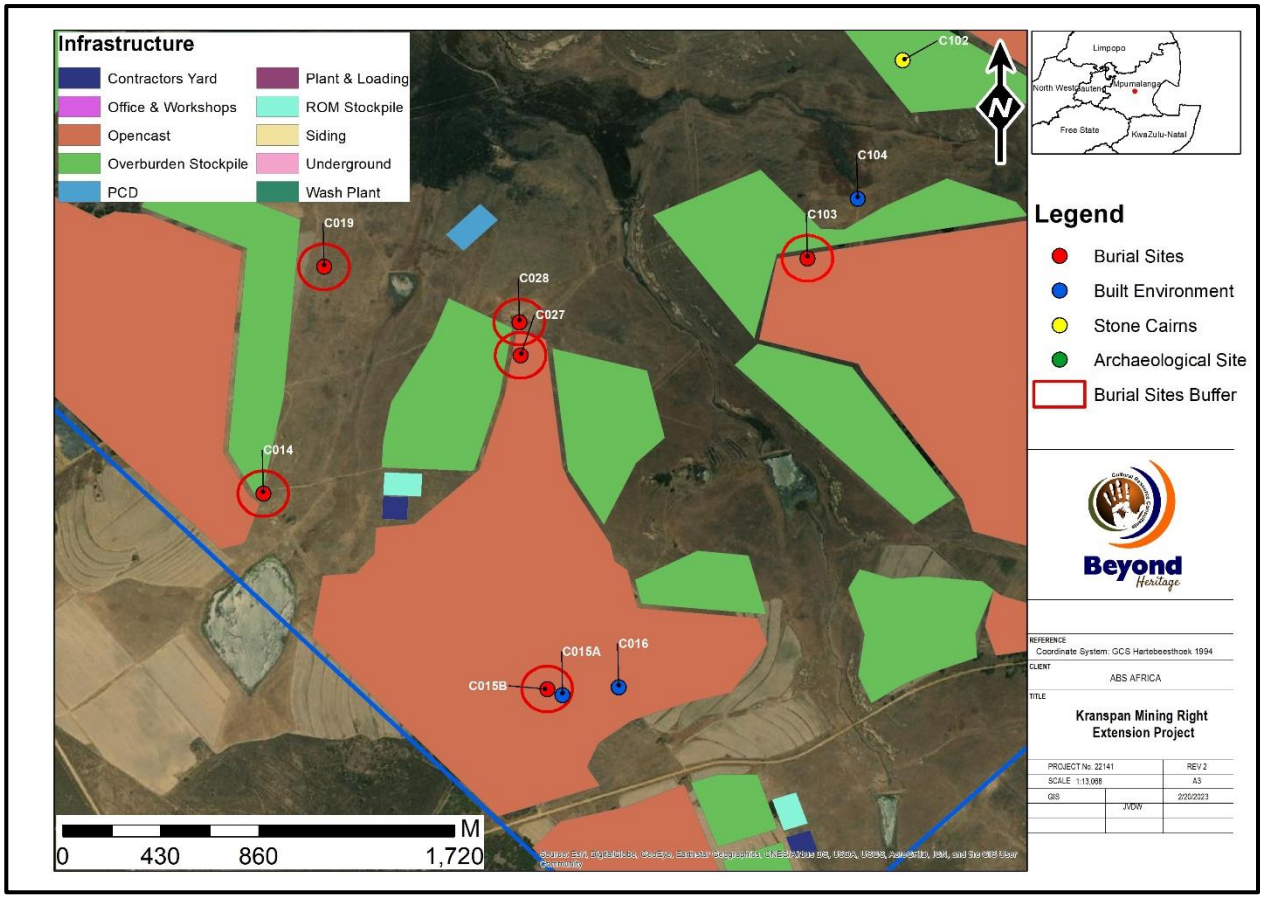

Figure 9.1. Direct impacts are expected on burial sites at C014, C015B, C027 with indirect impacts to C028 by the opencast pit. Impacts will be high. C019 will not be directly impacted by the current lay out.

A direct impact by the opencast pit is also expected on built environment sites at C015A and C016. Prior to mitigation the impact will be low to medium.

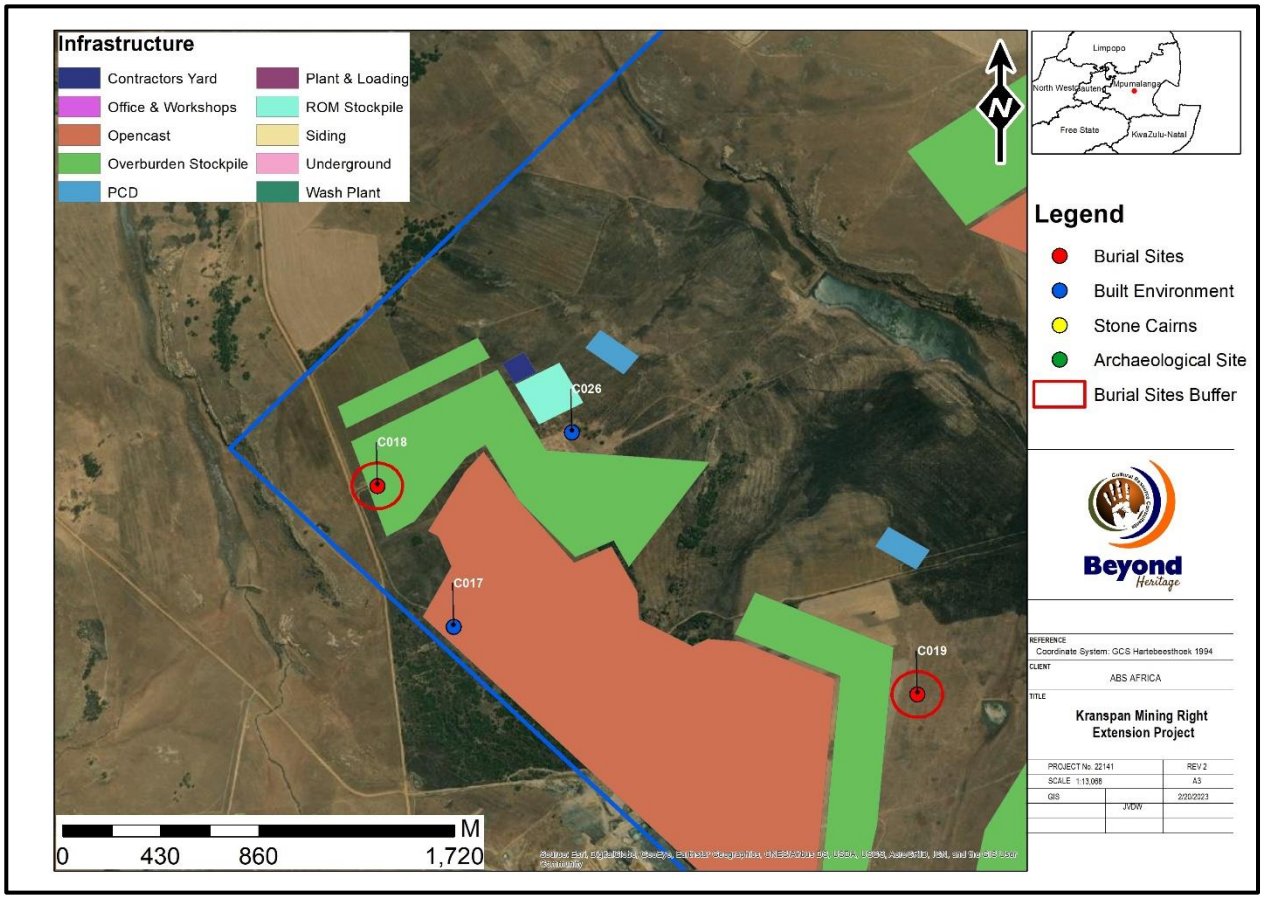

Figure 9.2. Based on the current lay out the burial site at C018 will be directly impacted on by the overburden stockpile with no impact expected on C019. Built environment sites at C017 will be directly impacted on by the opencast pit and C026 will not be impacted on.

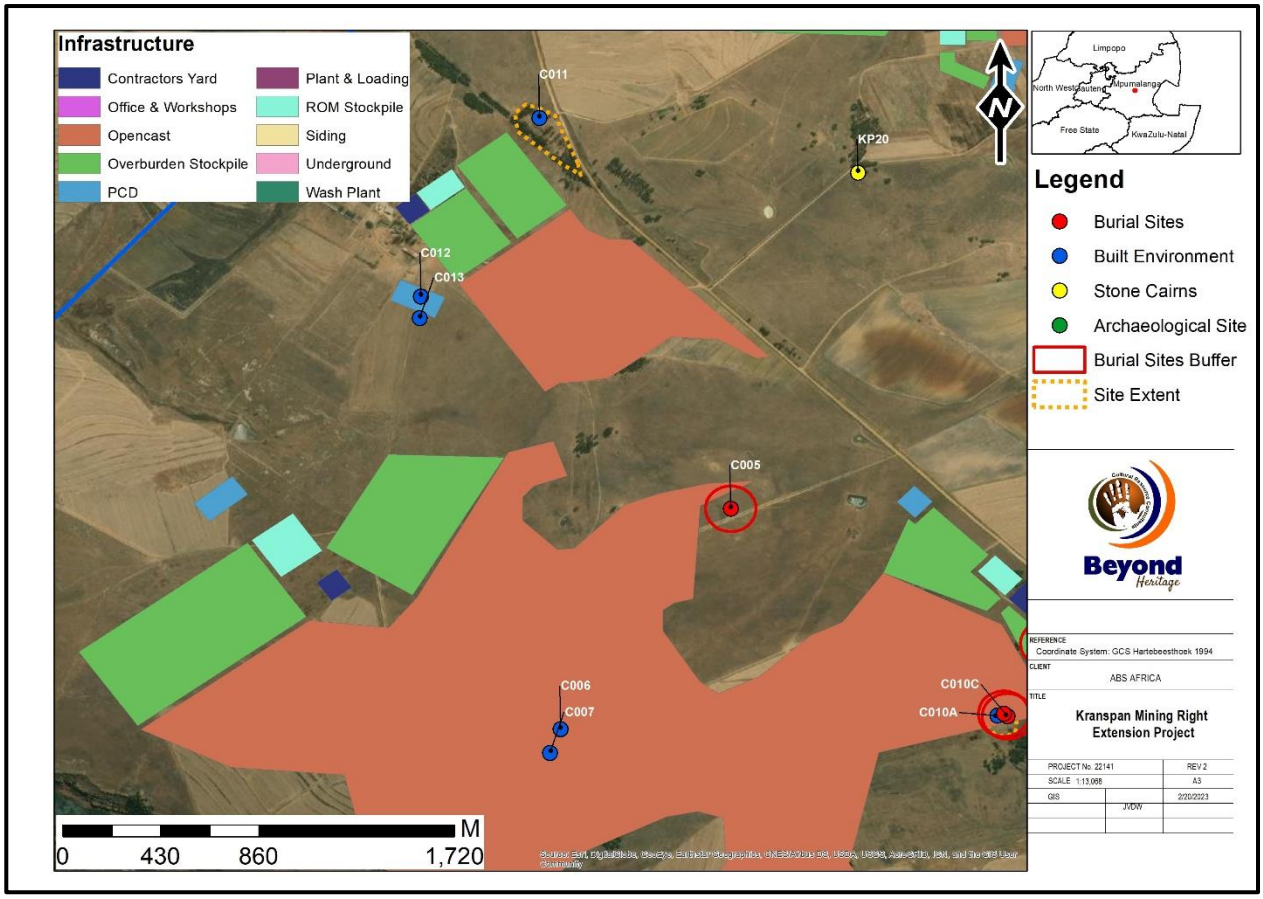

Figure 9.3. Built environment features at C006, C007 will be directly impacted on by the Opencast pit and C012 by the PCD with a possible indirect impact to C013 by the PCD.

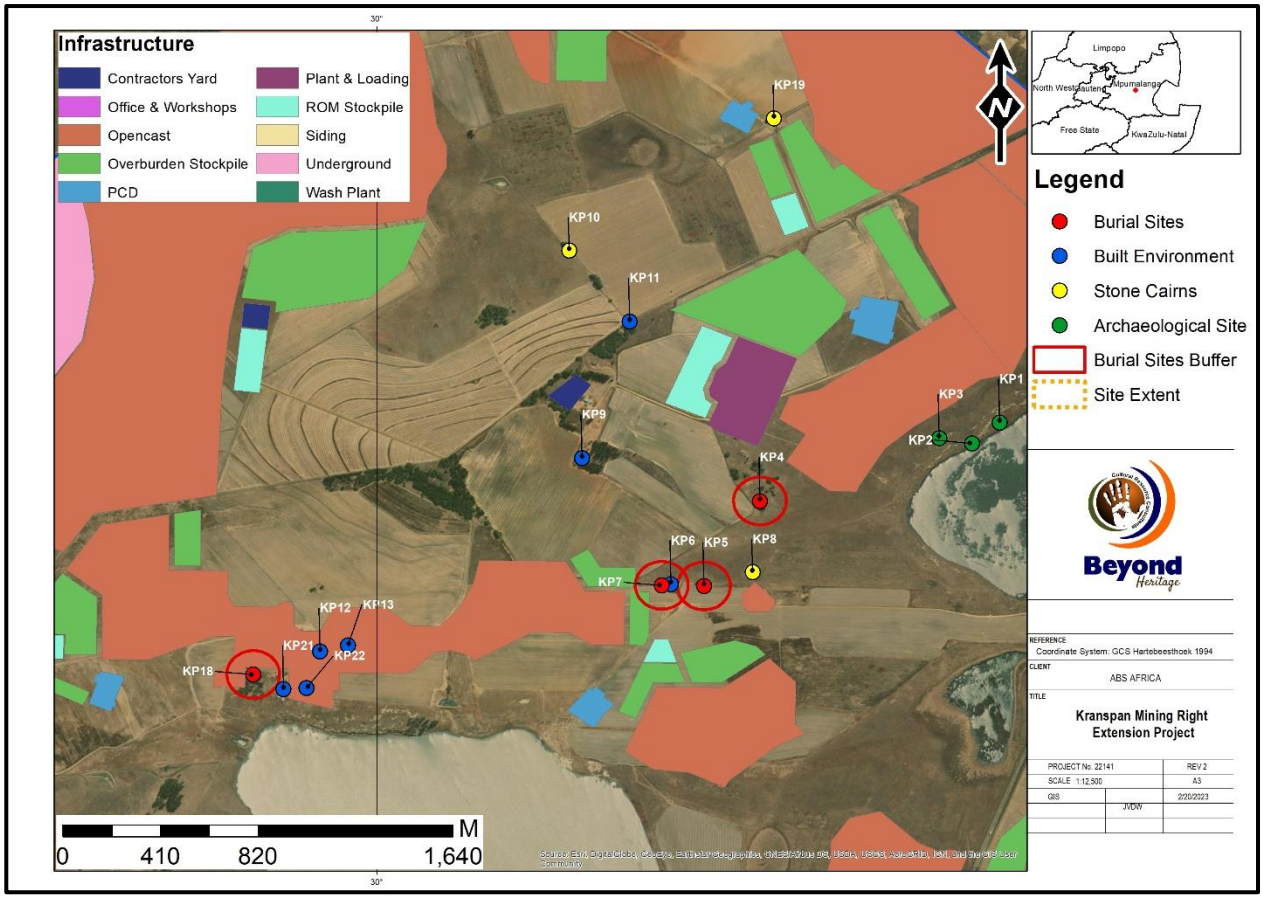

Figure 9.4. The burial site at KP018 will be directly impacted on by the opencast pit and no impact is expected on KP7, KP5, KP4. Similarly Stone Cairns at KP10, KP8 and KP19 will not be impacted on. Built environment sites at KP12, KP13, KP21, KP22 will be directly impacted on by the opencast pit and KP6, KP9 and KP11 will not be impacted on.

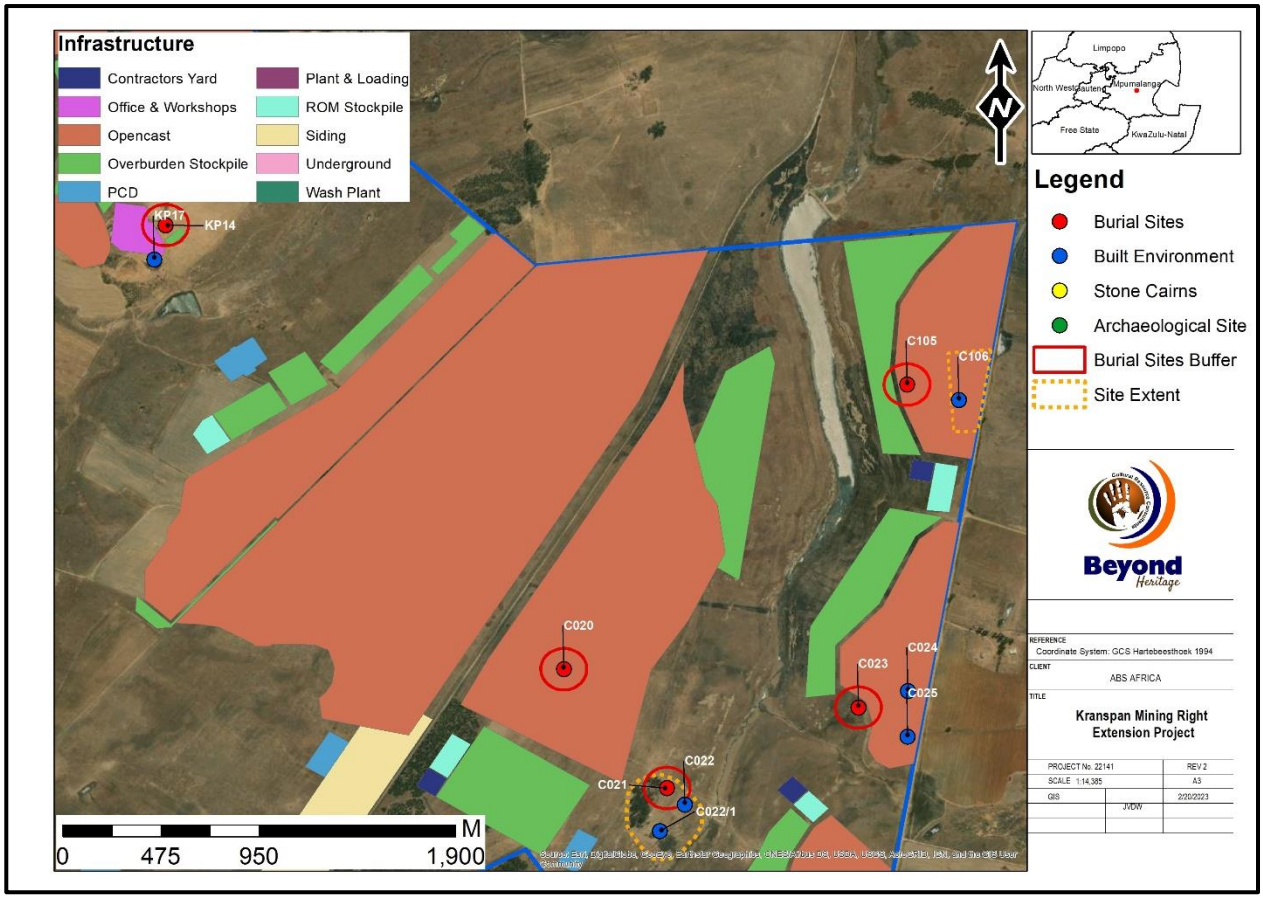

Figure 9.5. An indirect impact is expected by the underground infrastructure to the graves at KP14 and the ruin at KP17 and a direct impact to the burial site by the opencast mine at C020 C105 and C023. The opencast pit will indirectly impact the burial site at C023. The built environment features will also be directly impacted at C024 and C025. No impact is expected on C21, C22 and C22/1

9.4 Impact Assessment for the Project

Table 10. Impact assessment for the proposed project on recorded structures (C003, C006, C007, C010A, C015A, C016, C101)

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects.		
	Without mitigation	**With mitigation (Preservation/ recording)**
Extent	Site specific (1)	Site specific (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Not Probable (2)
Significance	**36 (Medium)**	**16 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes

Mitigation:

- The preferable course of action is avoidance of the features to prevent impacts to the recorded sites. If this is not possible Phase 2 mitigation will be required which will require an assessment by a conservation architect before a destruction permit can be applied for.
- The study area should be monitored by the ECO during construction to implementation the Chance Find Procedure for the project.
- Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures;

Residual Impacts:

If sites are destroyed this results in the depletion of heritage record of the area and even though surface features can be avoided or mitigated, there is a chance that completely buried sites would still be impacted but this cannot be quantified. However, if sites are recorded and preserved or mitigated this adds to the record of the area.

Table 11. Impact assessment of the project on ruins (KP 12,KP 13, KP 17, KP 21, KP 22, C001, C012, C013, C017, C024, C025)

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects.		
	Without mitigation	**With mitigation (Preservation/ recording)**
Extent	Site specific (1)	Site specific (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**30 (Low to Medium)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: • The study area should be monitored by the ECO during construction to implementation the Chance Find Procedure for the project as there is a risk of unmarked graves at these sites. • Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures;		
Residual Impacts: If sites are destroyed this results in the depletion of archaeological record of the area and even though surface features can be avoided or mitigated, there is a chance that completely buried sites would still be impacted but this cannot be quantified. However, if sites are recorded and preserved or mitigated this adds to the record of the area.		

Table 12. Impact assessment of the project on stone cairns (KP19 and C102)

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects.		
	Without mitigation	**With mitigation (Preservation/ recording)**
Extent	Site specific (1)	Site specific (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**30 (Low to Medium)**	**24 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: • Confirmation of the presence of graves at these features. If confirmed to be graves the cairns should be avoided with a 100m buffer zone and access for family members. • Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures;		
Residual Impacts: If sites are destroyed this results in the depletion of archaeological record of the area and even though surface features can be avoided or mitigated, there is a chance that completely buried sites would still		

be impacted but this cannot be quantified. However, if sites are recorded and preserved or mitigated this adds to the record of the area.

Table 13.Impacts of the project on burial sites (KP 14, KP 18, C004, C010B, C010C, C014, C015B, C020, C027, C103 and C105).

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects.		
	Without mitigation	**With mitigation (Preservation/ recording)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate to high (7)	Moderate (6)
Probability	Highly Probable (4)	Not Probable (2)
Significance	**56 (Medium to high)**	**26 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: • Burial sites and stone cairns (that could potentially be graves until proven otherwise) should be avoided with a 100 m buffer zone. Access for the family members should be ensured; • Recorded heritage features should be indicated on development plans and construction crews should be made aware of expected resources and applicable mitigation measures;		
Residual Impacts: If sites are destroyed this results in a negative social impact and even though surface features can be avoided or mitigated, there is a chance that completely buried sites would still be impacted but this cannot be quantified. However, if sites are recorded and preserved or mitigated this adds to the record of the area.		

10 Conclusion and recommendations

Most of the project area and surrounding environment consists of agricultural land scattered across a large landscape of rolling hills, shallow valleys and small streams. Large pans are also scattered across the landscape. Indicators of previous occupation of the study area include archaeological sites such as a shelter, Stone Age artefacts and rock art (Van der Walt 2019), with historical occupation marked by ruins, historical farmsteads and burial sites across the Project area. According to the SAHRA Paleontological sensitivity map the study area is of very high significance and was independently assessed. The study by Bamfoed (2022) concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary. There is a very small chance that fossils may occur below the ground surface in the shales of the Vryheid Formation so a Fossil Chance Find Protocol should be added to the EMPr.

The impact on heritage resources is high but can be mitigated to an acceptable level, provided that the recommendations in this report are adhered to and based on the South African Heritage Resource Authority (SAHRA) 's approval.

10.1 Recommendations for condition of authorisation

The following recommendations for Environmental Authorisation apply and the project may only proceed based on approval from SAHRA:

Recommendations based on impacts from the current layout:

- All recorded heritage features should be indicated on development plans and construction crews and employees should be made aware of heritage features and the requirements for each type of heritage feature;
- Graves and cemeteries impacted on (KP 14, KP 18, C004, C010B, C010C, C014, C015B, C020, C027, C103 & C105) should be avoided with a 100 m buffer zone (following the SAHRA Burial Grounds and Graves permitting policy 2020) and access for families should be ensured. If this is not possible graves can be relocated adhering to all legal requirements;
- Stone cairns (KP19 & C102) that are of unknown purpose but could potentially be graves should be verified during the social consultation process and could require further testing like GPR and test excavations;
- Historical structures (C003, C006, C007, C010A, C015A, C016, C101) should be assessed by a conservation architect who will make suitable recommendations for mitigation, after which a destruction permit can be applied for from the relevant heritage authority;
- Ruins (KP 12, KP 13, KP 17, KP 21, KP 22, C001, C012, C013, C017, C024, C025 &) should be monitored during initial mining activities or construction as these could contain unmarked graves;
- The final layout must be subjected to a heritage walkdown prior to development;
- Development of a heritage site development plan that addresses access protocols for safe access to burial sites for family members;
- The presence of additional graves should be confirmed during the social consultation process;
- Implementation of Chance Find Procedure for the project; and
- The study area should be monitored by the ECO during construction.

10.2 Chance Find Procedures

10.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as 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 therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines for this procedure are provided in Section 10.5.
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.

10.2.2 Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, fossils of plants, insects, bone or coalified material) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

10.3 Reasoned Opinion

The overall impact of the project can be mitigated to an acceptable level and residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the project.

10.4 Potential risk

Based on the current layout the numerous graves and burial sites that have been recorded pose a risk for the project due to the extensive mitigation and lay out changes that will be required to mitigate impacts to sites of high social significance to an acceptable level. Additionally, it is expected that more graves occur in the Project area, and this should be confirmed through social consultation and mitigated prior to development. Potential risks to the proposed project are the occurrence of intangible features and unrecorded cultural resources (of which graves and subsurface cultural material are the highest risk). This can cause delays during construction, as well as additional costs involved in mitigation and possible layout changes.

10.5 Monitoring Requirements

Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief*: As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are from pre-construction and construction activities. The ECO should monitor all such activities. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 14. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Cultural Heritage Resources chance finds	Entire project area	EO & ECO	Weekly (Pre construction and construction phase)	Proactively	• If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 1. Cease all works immediately; 2. Report incident to Site Manager 3. EPC (Engineering Procurement and Construction) Contractor to contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to SAHRA; as advised by specialist and 5. Employ site specific mitigation measures recommended by the specialist after

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
					assessment in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.
Ruins that could have unmarked burials	KP 12, KP 13, KP 17, KP 21, KP 22, C001, C012, C013, C017, C024, C025	ECO	During active mining and construction activities the features should be monitored weekly.	Pro Active	• Ruins should be monitored during initial mining activities or construction as these could contain unmarked graves

10.6 Management Measures for inclusion in the EMPr

Table 15. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General project area	All recorded heritage features should be indicated on development plans and construction crews and employees should be made aware of heritage features and the requirements for each type of heritage feature;	Pre-Construction and construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Pre Construction and Construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General project area	The study area should be monitored by the ECO during construction.	Construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General project area	Any layout changes must be subjected to a heritage walkdown prior to development	Pre-Construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General project area	Development of a heritage site development plan that address access protocols for safe access to burial sites.	Pre-Construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General project area & Stone cairn KP19 & C102	The presence of additional graves should be confirmed during the social consultation process	Pre-Construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
KP 14, KP 18, C004, C010B, C010C, C014, C015B, C020, C027, C103 & C105	Graves and cemeteries should be avoided with a 100 m buffer zone following the SAHRA Burial Grounds and Graves permitting policy 2020) and access for families should be ensured. If this is not possible graves can be relocated adhering to all legal requirements	Pre-Construction and construction as well as mining	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under 36 and 38 of NHRA	ECO Checklist/Report
C003, C006, C007, C010A, C015A, C016 and C101	Historical structures should be assessed by a conservation architect who will make suitable recommendations for mitigation, after which a destruction permit can be applied for from the relevant heritage authority;	Construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34, 36 and 38 of NHRA	ECO Checklist/Report
KP 12, KP 13, KP 17, KP 21, KP 22, C001, C012, C013, C017, C024, C025	Ruins should be monitored during initial mining activities or construction as these could contain unmarked graves;	Construction	Throughout the project	Applicant EPC Contractor	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34 and 38 of NHRA	ECO Checklist/Report

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ANNEXURE A