HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED MACLEAR SAND MINING PERMIT, EASTERN CAPE PROVINCE.

Type of development:

Mining Permit

Client:

Greenmined Environmental

Applicant:

World Focus 1143 CC

Report Prepared by:

Beyond Heritage
Private Bag X 1049
Suite 34
Modimolle
0510
Tel: 082 373 8491
Fax: 086 691 6461
E-Mail: jaco@heritageconsultants.co.za

Report Author:
Mr. J. van der Walt
Project Reference:
Project number 22135
Report date:
November 2022

APPROVAL PAGE

Project Name	Maclear MP
Report Title	Heritage Impact Assessment for the proposed Maclear Mining Permit, Eastern Cape Province .
Authority Reference Number	To be confirmed
Report Status	Draft Report
Applicant Name	TBC

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork and reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	November 2022
Fieldwork	Ruan van der Merwe - Archaeologist	BA Hons Archaeology	November 2022

DOCUMENT PROGRESS

Distribution List

Date	Report Reference Number	Document Distribution	Number of Copies
28 November 2022	22135	Greenmined Environmental	Electronic Copy

Amendments on Document

Date	Report Reference Number	Description of Amendment

INDEMNITY AND CONDITIONS RELATING TO THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. Beyond Heritage reserves the right to modify aspects of the report including the recommendations if and when new information becomes available from ongoing research or further work in this field or pertaining to this investigation.

Although Beyond Heritage exercises due care and diligence in rendering services and preparing documents Beyond Heritage accepts no liability, and the client, by receiving this document, indemnifies Beyond Heritage against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Beyond Heritage and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

COPYRIGHT

Copyright on all documents, drawings and records, whether manually or electronically produced, which form part of the submission and any subsequent report or project document, shall vest in Beyond Heritage.

The client, on acceptance of any submission by Beyond Heritage and on condition that the client pays to Beyond Heritage the full price for the work as agreed, shall be entitled to use for its own benefit:

- The results of the project;
- The technology described in any report; and
- Recommendations delivered to the client.

Should the applicant wish to utilise any part of, or the entire report, for a project other than the subject project, permission must be obtained from Beyond Heritage to do so. This will ensure validation of the suitability and relevance of this report on an alternative project.

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 BA report
(q) Any other information requested by the competent authority	No other information requested at this time

Executive Summary

Greenmined Environmental has been appointed as the independent Environmental Assessment Practitioner (EAP) to apply for environmental authorization for the proposed Maclear sand Mining Permit (MP). 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. Key findings of the assessment include:

- The Project area is situated about 16 km northeast of Maclear along the R56 and consists of a narrow project area situated on the southern banks of the Tsitsa River. The objective of the Project is the extraction of sand from the Tsitsa River.
- The river and riverbanks are characterised by deep sand and has been eroded and previously excavated in some places. The study area is therefore considered to be of low archaeological potential and was confirmed during the field survey whereby no heritage resources were noted in the study area;
- According to the SAHRA Paleontological sensitivity map the study area is of very high paleontological significance and was assessed in an independent study by Prof Marion Bamford (2022) and she 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 in below the ground surface in the shales of the Molteno Formation so a Fossil Chance Find Protocol should be added to the EMPr

The impact on heritage resources is considered to be low, and the project can be authorised provided that the recommendations in this report are adhered to and based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- Implementation of a Chance Find Procedure for the project (minimum requirements outlined under section 10.2).

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	22/11/2022

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (CRM) archaeologist for 15 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focussing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited member of 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

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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)
Early Stone Age (~ 2.6 million to 250 000 years ago)
Middle Stone Age (~ 250 000 to 40-25 000 years ago)
Later Stone Age (~ 40-25 000, to 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 Maclear MP. The project is located of the farm Niagara No 380 in the Joe Gqabi Magisterial District of the Eastern Cape Province (Figure 1.1 to 1.3). The report forms part of the Basic Assessment (BA) and Environmental Management Programme (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial, and national context. It serves to assess the impact of the proposed project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology 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, no heritage sites were identified. The site was however inaccessible and will not be affected by the proposed sewer pipelines. 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 Maclear MP is outlined under Table 2 and 3.

Table 2: Project Description

Farm and Magisterial District	Farm Niagara No 380 in the Joe Gqabi Magisterial District of the Eastern Cape Province.
Central co-ordinate of the development	Property co-ordinates: 30°56'40.37"S; 28°26'35.23"E
Topographic Map Number	3028CD

Table 3: Infrastructure and project activities

Type of development	Mining Permit
Size of development	1,16 ha
Project Description	The objective of the project is the extraction of sand from the Tsitsa River and riverbanks. The proposed project will be of small scale where the mineral (sand) will be mined from the river with a TLB (and/or excavator) that will stockpile it on the nearby riverbank until it is loaded onto trucks that will transport it from the site to clients. There is no need to wash/screen the sand before it is sold to the clients. The existing roads on the property will be used to gain access to the proposed mining area. Where needed the Applicant will upgrade the roads and maintain it for the duration of the operational phase. No new roads need to be made. The proposed activity will not need electricity as no offices, workshops, processing plant or other infrastructure will be established on site. The sand mine will only feature the TLB and trucks transporting the sand from site. An excavator may be used periodically if needed. Chemical toilets will be placed on site to be used by the employees. No washing of sand is needed, and water requirements will mainly be for dust suppression on the access road (when needed). Any water required for the implementation of the project will be bought and transported to site in a water bowser. Employees will daily bring their drinking water to site.

1.3 Alternatives

Two alternatives were provided (Figure 1.3) for assessment. Neither options would affect any known heritage resources and both is acceptable from a heritage perspective.

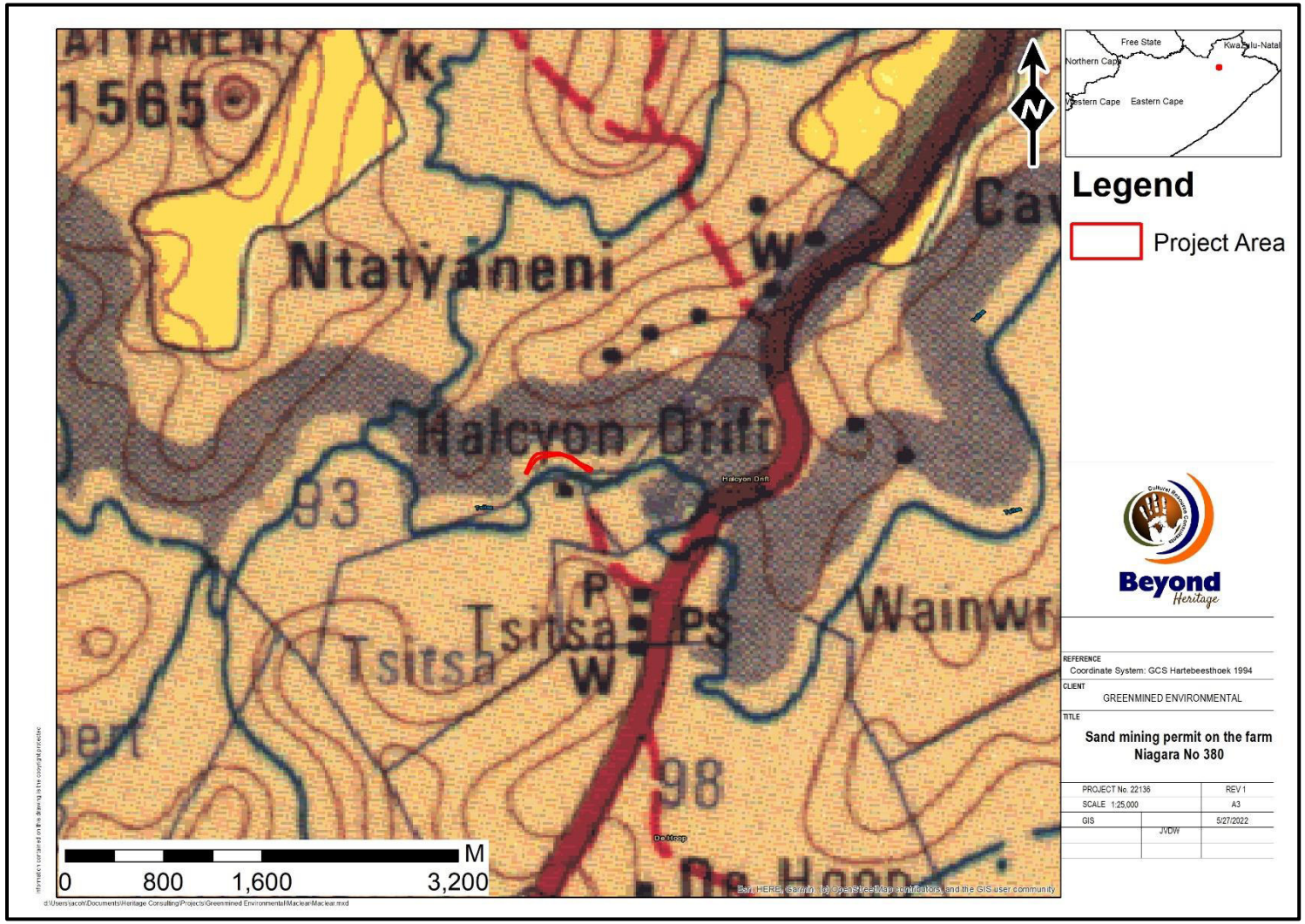

Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

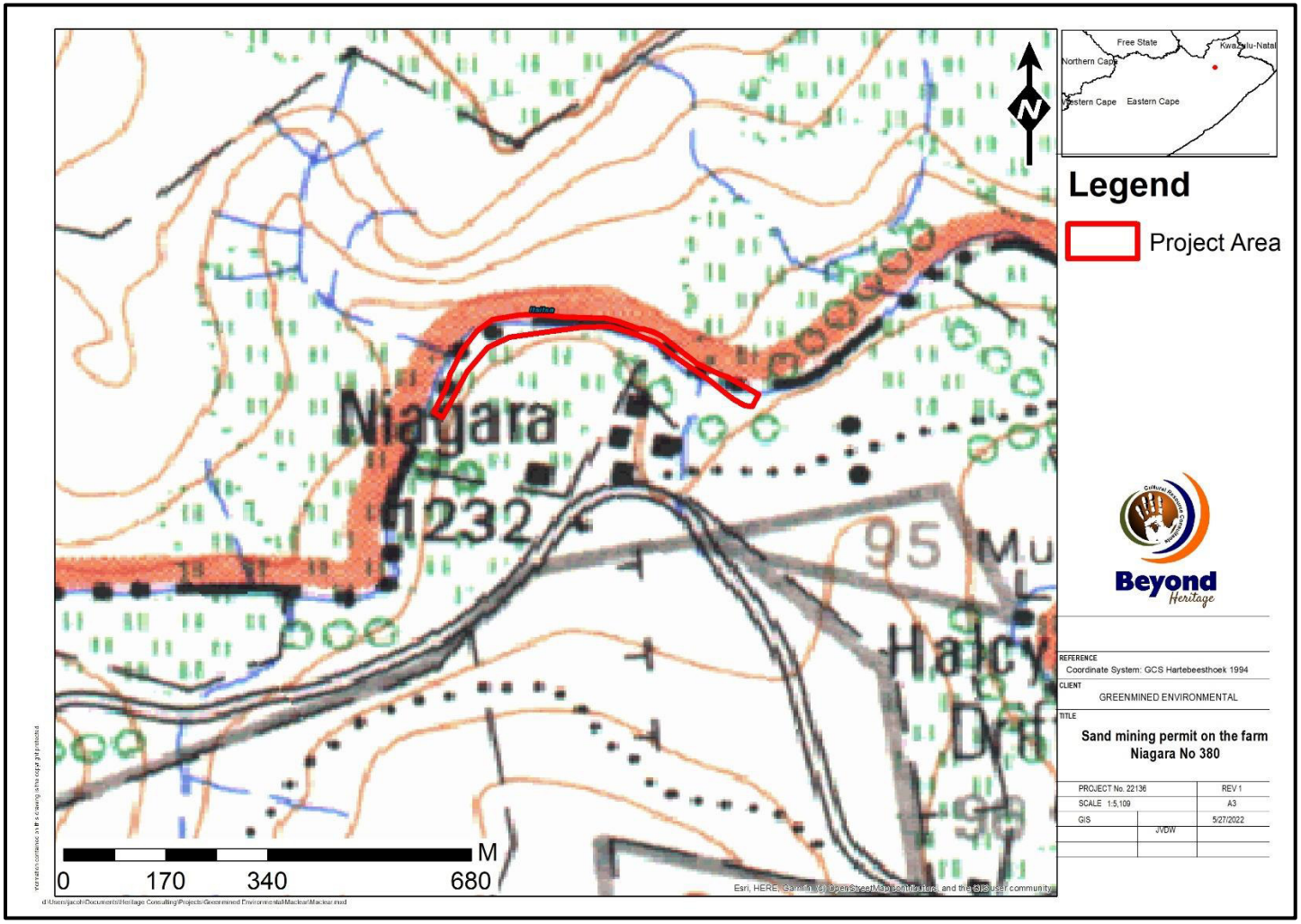

Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

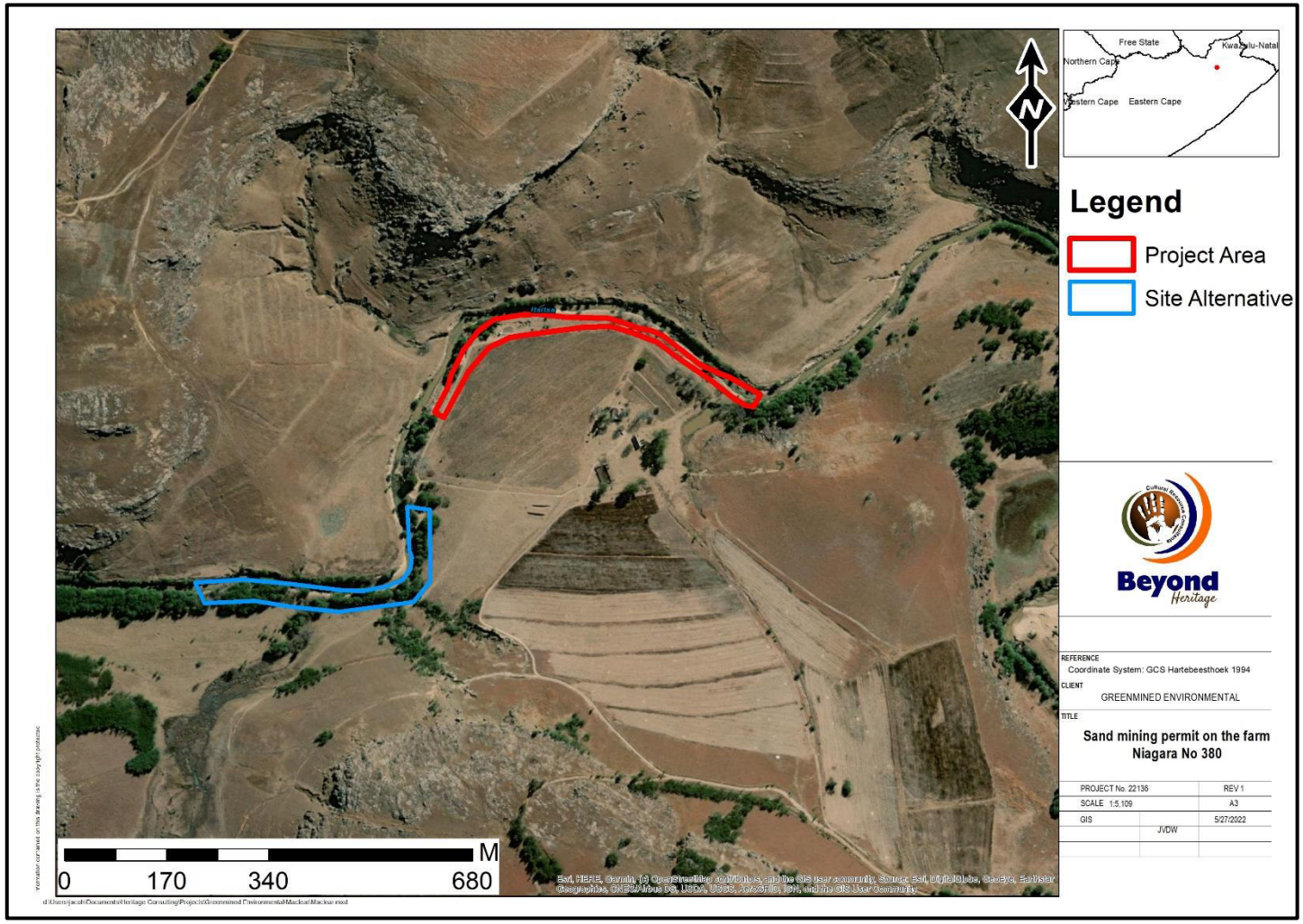

Figure 1.3. Aerial image of the Project area and Site Alternative.

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 BA 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	23 November 2022
Season	Summer – The thick wooded vegetation along the river made some areas difficult to access but the Project area was sufficiently covered to understand the heritage character of the area (Figure 3.1).

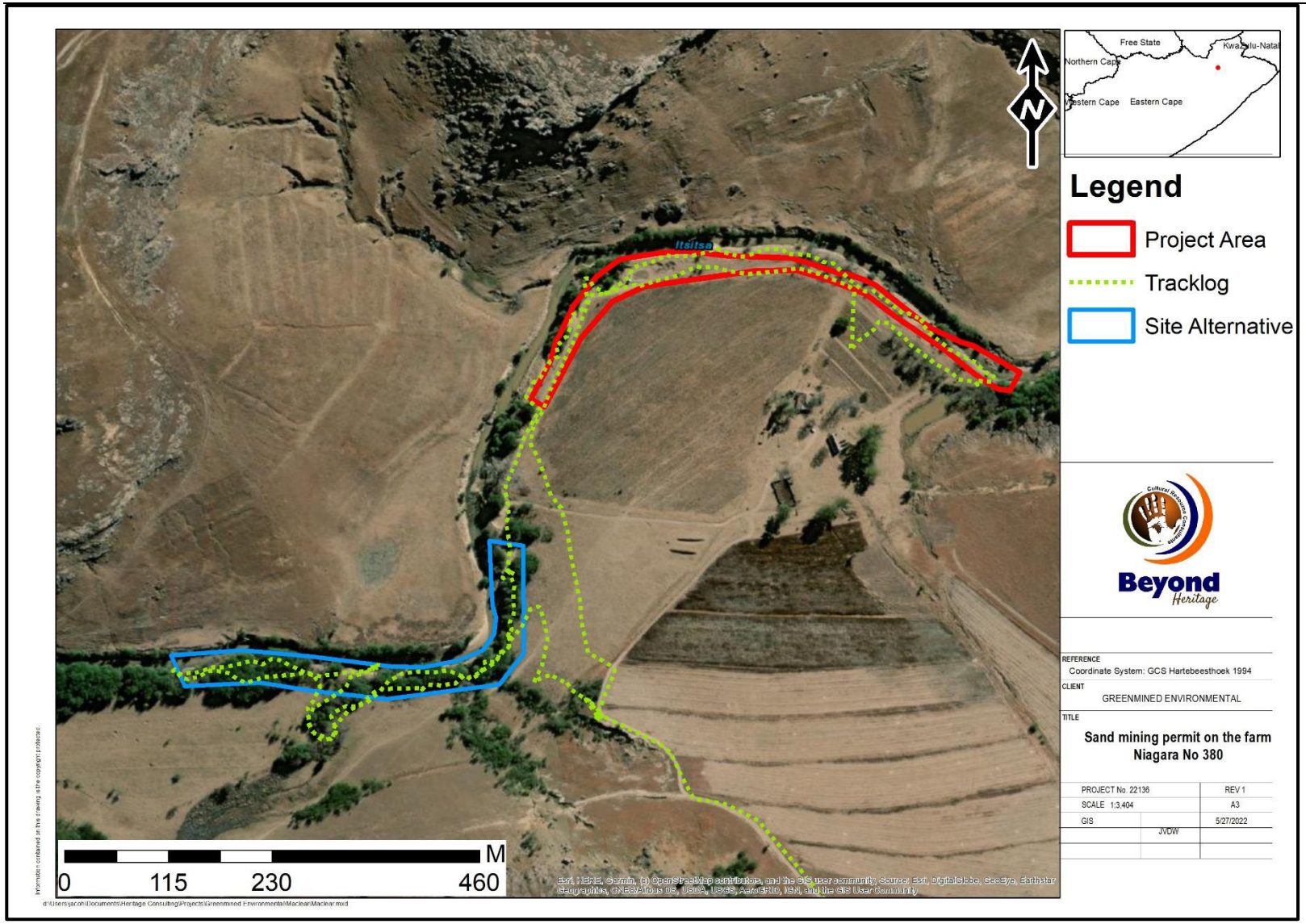

Figure 3.1. Tracklog of the survey path in green.

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

According to the IDP (2022 – 2023) the Joe Gqabi District municipality the Eastern Cape Province in the Republic of Province and country of Lesotho to the north The District is made up by three local municipalities; viz: Elundini, Walter Sisulu and Senqu. The JGDM covers an area of of landscapes, from deeply incised mountainous terrains to flat far Cities and towns that form the District are Aliwal North, Barkly East, Burgersdorp, Jamestown, Lady Grey, Maclear, Mount Fletcher, Sterkspruit, Steynsburg, Ugie and Venterstad. The majority of the population speak IsiXhosa (2011 Census). The population of the District slightly increased from 341 750 in 2001 to 372 192 in 2016 representing a 9% growth

5 Stakeholder Identification

Adjacent landowners and the public at large will be informed of the proposed activity as part of the BA process by the EAP. Site notices and advertisements notifying interested and affected parties will be 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)

The area under investigation was not previously assessed and few HIA's was conducted in the immediate area. Studies conducted in the greater area that were consulted is listed in Table 6.

Table 6. Studies conducted in the greater area.

Author	Year	Project	Findings
Rossouw, L	2017	Phase 1 Archaeological Impact Assessment of two borrow pits on communal ground near Musong, Herschel District, EC Province	No heritage resources were recorded, but the palaeontology of the area is of potential significance
Van Schalkwyk, J.	2015	Cultural Heritage Impact Assessment For The Proposed Special Maintenance Of Sections 6 And 7 Of Road R56 Between Maclear And Indwe, Eastern Cape Province	Stone Circle, Cemetery, Memorial, Battle site, historical structures.
Rossouw, L.	2015	Phase 1 Heritage Impact Assessment of the proposed new construction of a new Wastewater Treatment Works (WWTW) and associated pipe line infrastructure in the town of Sterkspruit, EC Province.	No archaeological resources were identified. A cemetery was recorded, and the paleontological significance of the area is rated as high.
Mngomezulu, M	2014	Application For Exemption On The Proposed Construction Of Further Education Training (FET) Colleges In Sterkspruit, Eastern Cape Province.	Exemption Application
Dreyer, C.	2008	First Phase Archaeological And Cultural Heritage Investigation Of The Proposed New Solid Waste Landfill Site At Sterkspruit, Eastern Cape	No Heritage Sites
Dreyer, C.	2004	First Phase Archaeological And Cultural Heritage Investigation Of The Proposed Erection Of A Weir At Oranjedraai 383, Zastron	No Heritage sites.

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 no known grave sites within the study area

6.2 Archaeological Background

6.2.1 Stone Age

The archaeological record for the greater study area consists of the Stone Age, Iron Age and Historical period.

6.2.1.1 Stone Age

The Stone Age is divided into the Earlier; Middle and Later Stone Age. It refers to the earliest period of occupation of South Africa when people mainly relied on stone for their tools.

Earlier Stone Age (ESA): The period from ± 2.5 million yrs. - ± 250 000 yrs. ago. Acheulean stone tools are dominant. The Early Stone Age in southern Africa is defined by the Oldowan complex, primarily found at the sites Sterkfontein, Swartkrans and Kromdraai, situated within the Cradle of Humankind, just outside Johannesburg (Kuman 1998). Within this complex, tools are more casual and expediently made and tools consist of rough cobble cores and simple flakes. The flakes were used for such activities as skinning and cutting meat from scavenged animals.

Middle Stone Age (MSA): The Middle Stone Age includes various lithic industries in SA dating from ± 250 000 yrs. – 25 000 yrs. before present. This period is first associated with archaic *Homo sapiens* and later *Homo sapiens sapiens*. Material culture includes stone tools with prepared platforms and stone tools attached to handles.

Later Stone Age (LSA): The period from ± 25 000-yrs before present to the period of contact with either Iron Age farmers or European colonists. This period is associated with *Homo sapiens sapiens*. Material culture from this period includes: microlithic stone tools; ostrich eggshell beads and rock art. Sites located in the open are usually poorly preserved and therefore have less value than sites in caves or rock shelters.

In terms of archaeological research very few sites in the area have been subjected to intensive academic investigations and most of the archaeological knowledge of the area is a result of HIA surveys. From an Archaeological perspective the sandstones of the Clarens Formation (found in the larger study area) are important as it contains many rock-shelters that provided shelter and suitable surfaces for painting for Stone Age people. Dolerite intrusions are associated with sources of hornfels, a major raw material for stone tools. Other materials used for this purpose, mainly tuff and crypto-crystalline silicas, derive ultimately from the Lesotho Formation lavas and are found principally as river-borne clasts (Mitchell 1992). Rock paintings have been recorded in the Maclear District (Pearce 2010) and a number of cave sites between Sterkspruit , Herschel and Zastron (Van Riet Lowe 1941).

Moving eastwards towards the coast Webley (2008) commented on the presence of ESA, MSA and LSA lithic scatters identified by amateur and professional archaeologists across the greater Ann Shaw, Middledrift area. In addition, LSA pastoralist presence on the landscape is well represented, confirming a Gonaqua-Khoekhoen settlement dating to before the 18th Century in the Ann Shaw area (Van Ryneveld 2016).

Along the coast are two important sites, the first is the Nahoon footprints site, where hominin / human footprints dating to 200,000BP have been discovered (Deacon 1966). The site is situated approximately 10km east north-east of Gonubie. The second site is the Klasies River Site (Singer and Wymer, 1982; Deacon, 1989, 1995) where the earliest Homo Sapien Sapien, or modern human remains, dating to 125,000BP was recorded. Deflated LSA coastal shell middens were reported on by Binneman & Webley (1996) also along the coast.

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

A number of Later Iron Age settlements are found in the Caledon Valley which appears to date from the 17th century (Maggs 1974, 1976). Caves and rock shelters were also occupied. Walton (1956) also identified cave dwellings in the region, including a mud-smeared cave at Dili-Dili, about 13 km due south-east from Musong on the Lesotho border. When these agriculturists moved into the eastern Free State they came into contact with hunter-gatherers (Macquarrie 1962; Wadley 1992, Rossouw 2015).

7 Description of the Physical Environment

The Project area is situated about 16 km northeast of Maclear along the R56 and consists of a narrow project area situated on the banks of the Tsitsa River. The Project footprint is located along the southern bank of the River within deep sandy soil.

The bank of the river is covered in a thickly wooded vegetation with the surrounding mountainous terrain consisting of mostly thick grass cover with dense vegetation in the Alternative area. The Project area shows signs of historical sand extraction that are scattered along the riverbanks along with high levels of erosion. General site conditions area illustrated in Figures 7.1 to 7.4.

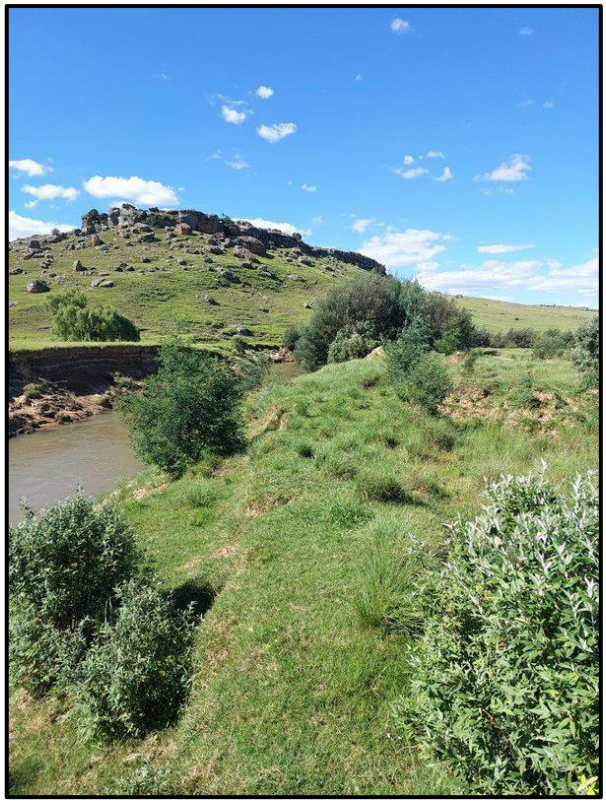

Figure 7.1. General view of the proposed project area running west to east along the riverbank.

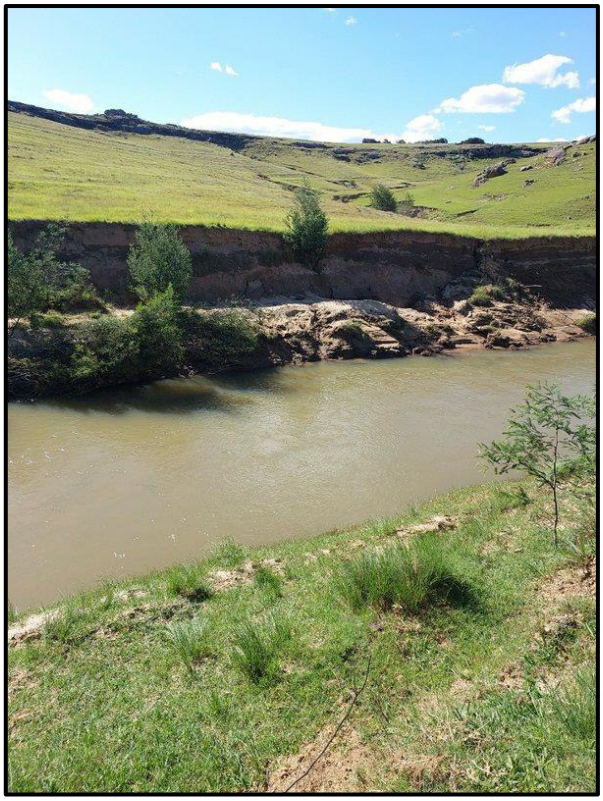

Figure 7.2. View of the western end of the proposed project area. Note the erosion.

Figure 7.3. Evidence of historical sand extraction are scattered across the banks of the river - Image taken in the central portion of the Project area.

Figure 7.4. The bank of the river is mostly covered in thickly wooded vegetations which is situated along most of the proposed project area.

8 Findings of the Survey

8.1 Heritage Resources

The study area is characterised by deep sandy soil, thick wooded vegetation and impacted on by sheet erosion with evidence of previous sand extraction along the river bank . The area is of low heritage potential and finds were limited to a degraded farmstead situated more than 100m south of the proposed project area. The farmstead will not be affected by the project and not further discussed here.

8.2 Paleontological Heritage

According to the SAHRA Paleontological map the study area is of very high paleontological significance (Figure 8.1) and this aspect was addressed in an independent paleontological assessment by Prof Marion Bamford (2022). Bamford (2022) concluded that based on the fossil record but confirmed by the site visit and walk through there are NO FOSSILS of the Molteno *Dicroidium* flora even though fossils have been recorded from rocks of a similar age and type in South Africa. The plant fossils have been recorded from siltstones and mudstones, not from sandstones or sands. 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 in below the ground surface in the shales of the Molteno Formation so 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 8.1. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

No heritage sites were recorded during the study and no adverse impacts to heritage resources are expected by the proposed project. 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 9 and 10 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 heritage features if any occur. 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

No impacts are expected during the operation phase.

9.4 Impact Assessment for the Project

Table 7. Impact assessment for the project.

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 and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**18 (Low)**	**18 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • Implementation of the Chance Find Procedure for the project;		
Cumulative impacts: Other authorised projects (e.g., farming developments) in the area could have a cumulative impact on the heritage landscape. The impact on physical heritage is low as no sites of significance will be impacted on by the new developments.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

10 Conclusion and recommendations

The Project area is situated along a narrow strip on the southern bank of the Tsitsa River. The study area is characterised by deep sandy soil, thick wooded vegetation and impacted on by sheet erosion with evidence of previous sand extraction along the river bank. The objective of the project is the extraction of sand from the Tsitsa River and riverbanks. The proposed project will be of small scale where the mineral (sand) will be mined from the river with a TLB (and/or excavator) that will stockpile it on the nearby riverbank until it is loaded onto trucks that will transport it from the site to clients. The existing roads on the property will be used to gain access to the proposed mining area.

The study area is considered to be of low archaeological potential and this was confirmed during the field survey whereby no heritage resources were noted in the study area. The study area is however of high paleontological significance according to the SAHRA Paleontological sensitivity map and was independently assessed by Prof Marion Bamford (2022), and she 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 in below the ground surface in the shales of the Molteno Formation so a Fossil Chance Find Protocol should be added to the EMPr

Two alternatives were provided for assessment and neither option would affect any known heritage resources and both is acceptable from a heritage perspective. The impact on heritage resources is considered to be low and the project can be authorised 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:

- Implementation of the Chance Find Procedure for the project as outlined under Section 10.2.

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 is considered to be low 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

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 8. 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.

10.6 Management Measures for inclusion in the EMPr

Table 9. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Construction	Throughout the project	Applicant	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

11 References

Bamford, M.K. 2022. Palaeontological Impact Assessment for the proposed Mining Right along the Tsitsa River, Farm Niagara 380, Maclear, Eastern Cape Province

Bergh, J.S., (ed.) *Geskiedenisatlas van Suid-Afrika.Die vier noordelike provinsies.* Pretoria: J. L. van Schaik Uitgewers. 1999.

Deacon, H.J. & Deacon, J. 1999. Human Beginnings in South Africa: Uncovering the Secrets of the Stone Age. Cape Town: David Phillips Publishers.

Dreyer, C. 2008. First Phase Archaeological And Cultural Heritage Investigation Of The Proposed New Solid Waste Landfill Site At Sterkspruit, Eastern Cape

Dreyer, C. 2004. First Phase Archaeological And Cultural Heritage Investigation Of The Proposed Erection Of A Weir At Oranjedraai 383, Zastron

Huffman, T.N. 2007. *Handbook to the Iron Age: The Archaeology of Pre-Colonial Farming Societies in Southern Africa*. University of KwaZulu-Natal Press, Scotsville.

Maggs, T. O'C. 1976. Iron Age Patterns and Sotho History on the Southern Highveld: South Africa. World Archaeology 7: 18-332. Macquarrie, J.W. 1962. *The reminiscences of Sir Walter Stanford*, Vol. 2, 1885-1929. Cape Town: Van Riebeeck Society.

Mitchell, P., 2002. *The Archaeology of Southern Africa*. Cambridge University Press, Cambridge.

Mngomezulu, M. 2014. Application For Exemption On The Proposed Construction Of Further Education Training (FET) Colleges In Sterkspruit, Eastern Cape Province. Exemption Application

Mucina, L. & Rutherford, M.C. 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute. Pretoria.

National Heritage Resources Act NHRA of 1999 (Act 25 of 1999)

Pearce, D. G. (2010). Conservation And Management Of Collapsing Rock Paintings: Three Sites In Maclear District, Eastern Cape Province, South Africa. *The South African Archaeological Bulletin*, *65*(191), 96–103. http://www.jstor.org/stable/40985514.

Rossouw, L.2017. Phase 1 Archaeological Impact Assessment of two borrow pits on communal ground near Musong, Herschel District, EC Province.

Rossouw, L. 2015. Phase 1 Heritage Impact Assessment of the proposed new construction of a new Waste Water Treatment Works (WWTW) and associated pipe line infrastructure in the town of Sterkspruit, EC Province.

SAHRA Report Mapping Project Version 1.0, 2009

SAHRIS. Referenced November 2022

Van Riet Lowe, C. 1941. *Prehistoric Art in South Africa*. Archaeological Series No. V. Bureau of Archaeology, Dept. of the Interior. Pretoria.

Wadley, L. 1992. Rose Cottage Cave: The Later Stone Age levels with European and Iron Age artefacts. *South African Archaeological Bulletin* 47:8-12.

Walton, J. 1956. Early Bafokeng settlement in South Africa. *African Studies* 15(1): 37 – 43.

Palaeontological Impact Assessment for the proposed Mining Permit along the Tsitsa River, Farm Niagara 380, Maclear, Eastern Cape Province

Site Visit Report (Phase 2)

For

Beyond Heritage

27 November 2022

Prof Marion Bamford
Palaeobotanist
P Bag 652, WITS 2050
Johannesburg, South Africa
Marion.bamford@wits.ac.za

Expertise of Specialist

The Palaeontologist Consultant: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 33 years research; 25 years PIA studies

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Beyond Heritage, Modimolle, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

Executive Summary

A Palaeontological Impact Assessment was requested for the mining permit application by World Focus 1143 (Pty) Ltd for sand along the Tsitsa River on Portion 1 of Farm Niagara 380, about 20 km northeast of Maclear (Nqanqarhu), Eastern Cape Province.

To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a site visit (Phase 2) Palaeontological Impact Assessment (PIA) was completed for the proposed development.

The proposed site lies on the potentially fossiliferous Molteno Formation that might preserve fossil plant impressions of the *Dicroidium* flora on siltstones or mudstones. .. The site visit and walk through in late November by the palaeontologist confirmed that only deep, unconsolidated sands occur in the project footprint. There were no outcrops of siltstone or mudstone and NO FOSSILS present. Since there is a very small chance that fossils might occur below the sands a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor or miners once excavations and mining activities have commenced. Since the impact will be low, as far as the palaeontology is concerned, the project should be authorised.

Table of Contents

1. Background

World Focus 1143 CC (hereinafter referred to as "the Applicant") intends applying for a sand mining permit over 1.16 ha of the farm Niagara No 380 in the Joe Gqabi Magisterial District of the Eastern Cape Province.

The Applicant plans to extract sand from the Tsitsa River and river banks along the southern bank of the river on Farm Niagara No 380 (Figures 1-3). The site is in the Joe Gqabi District Municipality, Elundini Local Municipality. The nearest town is Maclear, now called Nqanqarhu, and is about 20 km to the south-west of the project site.

The applicant requires a mining permit for the small scale operation where the mineral (sand) will be mined from the river with a TLB (and/or excavator) that will stockpile it on the nearby riverbank until it is loaded onto trucks that will transport it from the site to clients. There is no need to wash/screen the sand before it is sold to the clients. The existing roads on the property will be used to gain access to the proposed mining area. Where needed the Applicant will upgrade the roads and maintain it for the duration of the operational phase. No new roads need to be made.

The proposed activity will not need electricity as no offices, workshops, processing plant or other infrastructure will be established on site. The sand mine will only feature the TLB and trucks transporting the sand from site. An excavator may be used periodically if needed. Chemical toilets will be placed on site to be used by the employees. No washing of sand is needed, and water requirements will mainly be for dust suppression on the access road (when needed). Any water required for the implementation of the project will be bought and transported to site in a water bowser. Employees will daily bring their drinking water to site.

A Palaeontological Impact Assessment was requested for the Sand mining project. To comply with the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a site visit and walkthrough (Phase 2) Palaeontological Impact Assessment (PIA) was completed for the proposed development and is reported herein.

Table 1: National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) - Requirements for Specialist Reports (Appendix 6).

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
ai	Details of the specialist who prepared the report,	Appendix B
aii	The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	**Relevant section in report**
b	A declaration that the person is independent in a form as may be specified by the competent authority	Page 2
c	An indication of the scope of, and the purpose for which, the report was prepared	Section 1
ci	An indication of the quality and age of the base data used for the specialist report: SAHRIS palaeosensitivity map accessed – date of this report	Yes
cii	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 5
d	The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
f	The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 4
g	An identification of any areas to be avoided, including buffers	N/A
h	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
j	A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 4
k	Any mitigation measures for inclusion in the EMPr	Section 8, Appendix A
l	Any conditions for inclusion in the environmental authorisation	N/A
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8, Appendix A
ni	A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Section 6
nii	If the opinion is that the proposed activity 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	Sections 6, 8
o	A description of any consultation process that was undertaken during the course of carrying out the study	N/A
p	A summary and copies of any comments that were received during any consultation process	N/A
q	Any other information requested by the competent authority.	N/A

	A specialist report prepared in terms of the Environmental Impact Regulations of 2017 must contain:	Relevant section in report
2	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

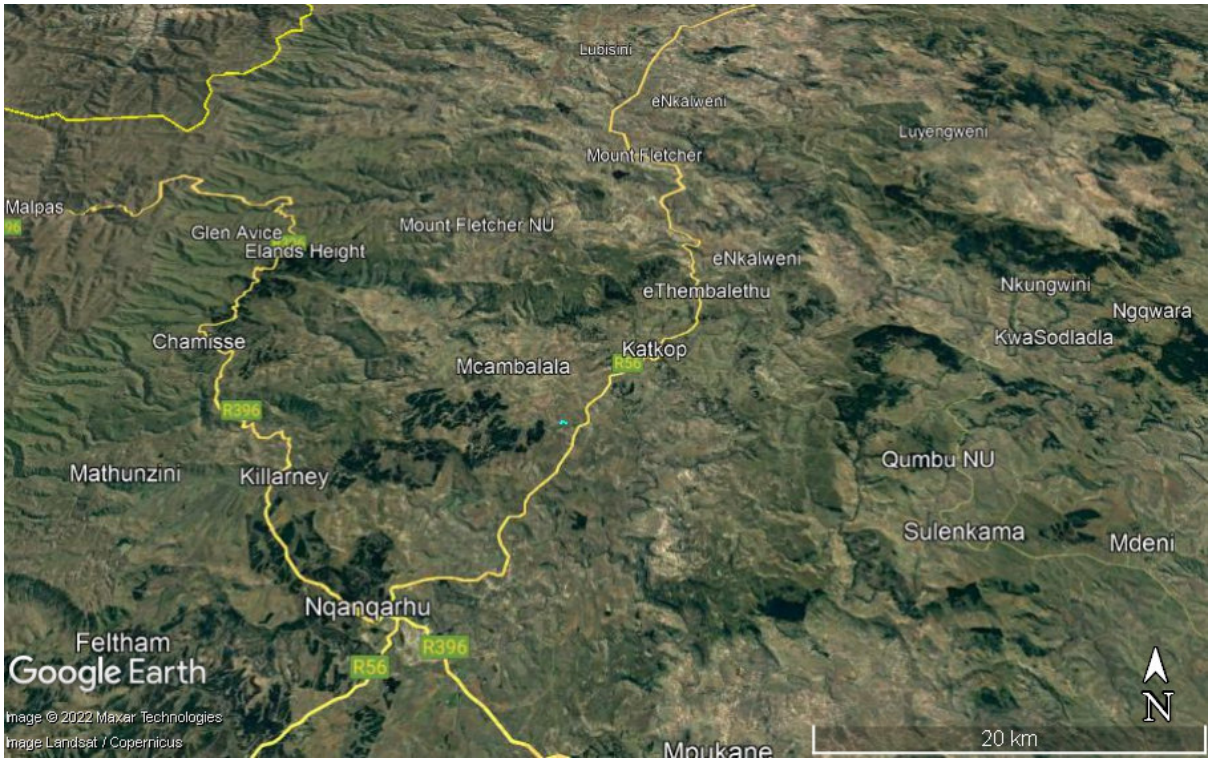

Figure 1: Google Earth map of the proposed development (turquoise in the centre) showing the relevant land marks.

Figure 2: Google Earth map for the proposed stretch along the Tsitsa River that will be mined for sand (turquoise band).

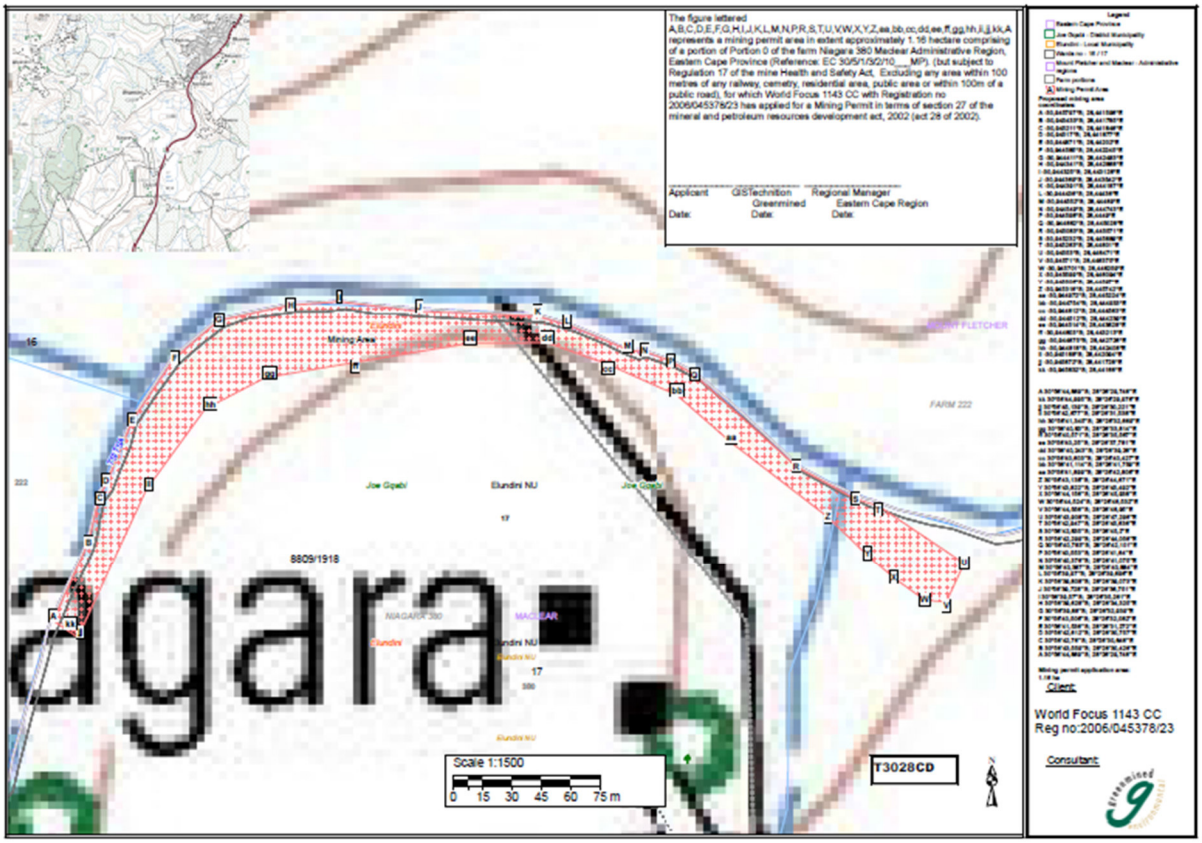

Figure 3: Regulation 2.2 map for the proposed sand mining along the Tsitsa River. Map supplied by Greenmined Environmental (Pty) Ltd.

2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.
The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance, as is the case here;
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

3. Geology and Palaeontology

i. Project location and geological context

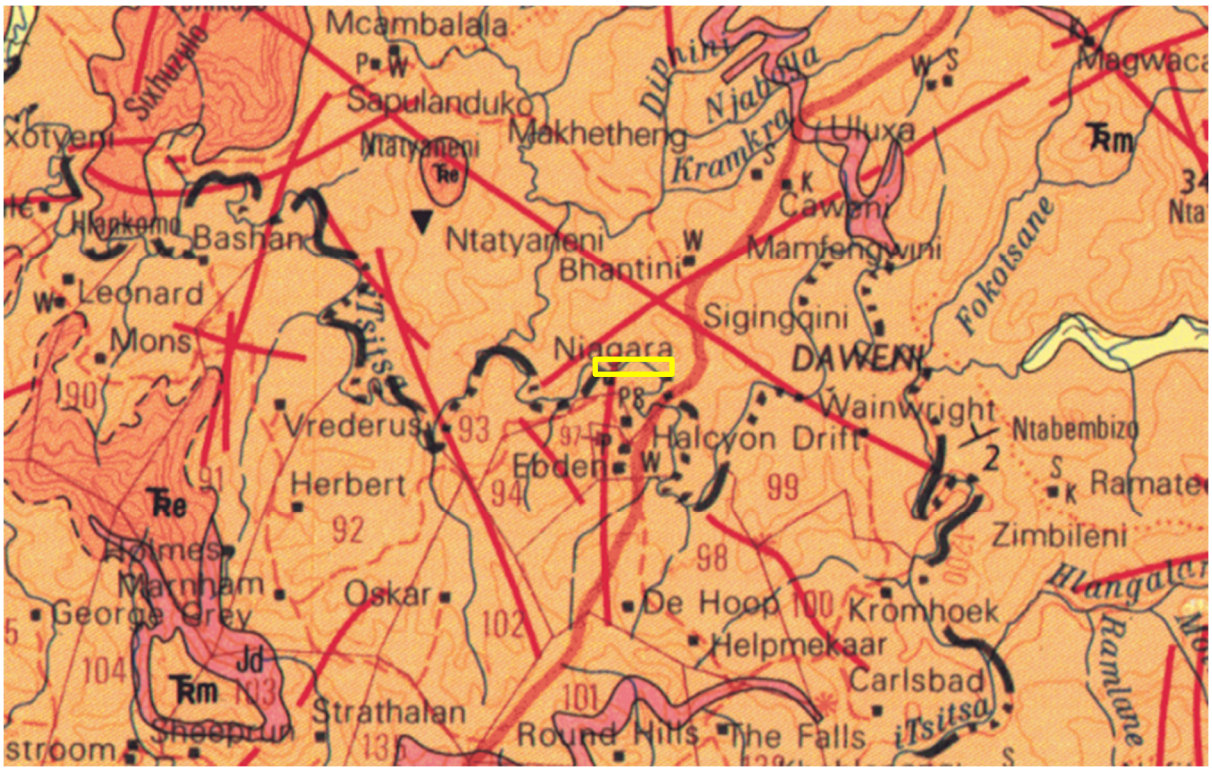

Figure 4: Geological map of the area around the Farm Niagara 380 and the Tsitsa River shown within the yellow outline. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 250 000 map 3028 Kokstad.

Table 2: Explanation of symbols for the geological map and approximate ages (Johnson et al., 2006; Partridge et al., 2006). SG = Supergroup; Fm = Formation; Ma = million years; grey shading = formations impacted by the project.

Symbol	Group/Formation	Lithology	Approximate Age
(white)	Recent	Alluvium and debris	Last few millenia
Q	Quaternary	Alluvium, sand, calcrete	Quaternery, ca 1.0 Ma to present
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 183 Ma
Tre	Elliot Fm, Stormberg Group, Karoo SG	Red to grey mudstone, siltstone	Triassic-Jurassic Ca 219-192 Ma
Trm	Molteno Fm, Stormberg Group, Karoo SG	Mudstone, buff-coloured shale, sandstone, rare coal seams	Late Triassic Ca 242 – 219 Ma

The site lies in the central part of the Karoo basin where the upper Karoo Supergroup strata are exposed. Along the rivers and streams much young reworked sands and alluvium overly the older strata.

The Karoo Supergroup rocks cover a very large proportion of South Africa and extend from the northeast (east of Pretoria) to the southwest and across to almost the KwaZulu Natal south coast. It is bounded along the southern margin by the Cape Fold Belt and along the northern margin by the much older Transvaal Supergroup rocks. Representing some 120 million years (300 – 183Ma), the Karoo Supergroup rocks have preserved a diversity of fossil plants, insects, vertebrates and invertebrates.

The basal Dwyka Group comprises diamictites, tillites and shales that were deposited by the receding glaciers and ice sheets. Then the Ecca Group shales and mudstones represent the gradual infilling of the Karoo Basin and in the northeast they include a number of coal seams. As the basin continued to fill and the environment slowly dried out the Beaufort Group sandstones and mudstones were deposited. Finally, the much reduced basin filled with Stormberg Group sediments that were capped by the massive outpourings of basalt, the Drakensberg Group. Associated with eh basalt outpourings are numerous intrusive dolerite dykes of Jurassic age.

Stormberg Group rocks are absent from the western part of the basin but are more uniform across the central and eastern part of the basin. The Stormberg Group formations are the lower Molteno Formation shales, the Elliot Formation that has recently been divided into the lower and upper Elliot Formation, and the upper Clarens Formation. Most of the rocks are covered by much younger sands and soils that have formed by the weathering of the old shales and sandstones.

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 5. The site for development is entirely in the Molteno Formation shales and sandstones. During the Late Triassic the climate was warm and humid and complex ecosystems of very diverse plants and insects colonised the landscape (Anderson and Anderson, 1985;

Bamford, 2004; Johnson et al., 2006). Intensive collecting of the Molteno flora over the last 50 years has produced an amazing abundance of plants from the very fine-grained shales and mudstones (ibid). No fossils plants occur in the sandstones and no vertebrate fossils occur in the Molteno, only footprints. This implies that animals were present but not preserved because the environment was not conducive to preserving bones. Plants require a fine-grained, low energy and reducing environment for preservation whereas bones can be preserved in more oxidising environments (Cowan, 1995).

Although dominated by the extinct pteridosperm *Dicroidium*, the Molteno flora includes many other species such as *Lepidopteris*, ferns, cycads, bennettitaleans, ginkgophytes, sphenophytes and many unusual gymnosperms.

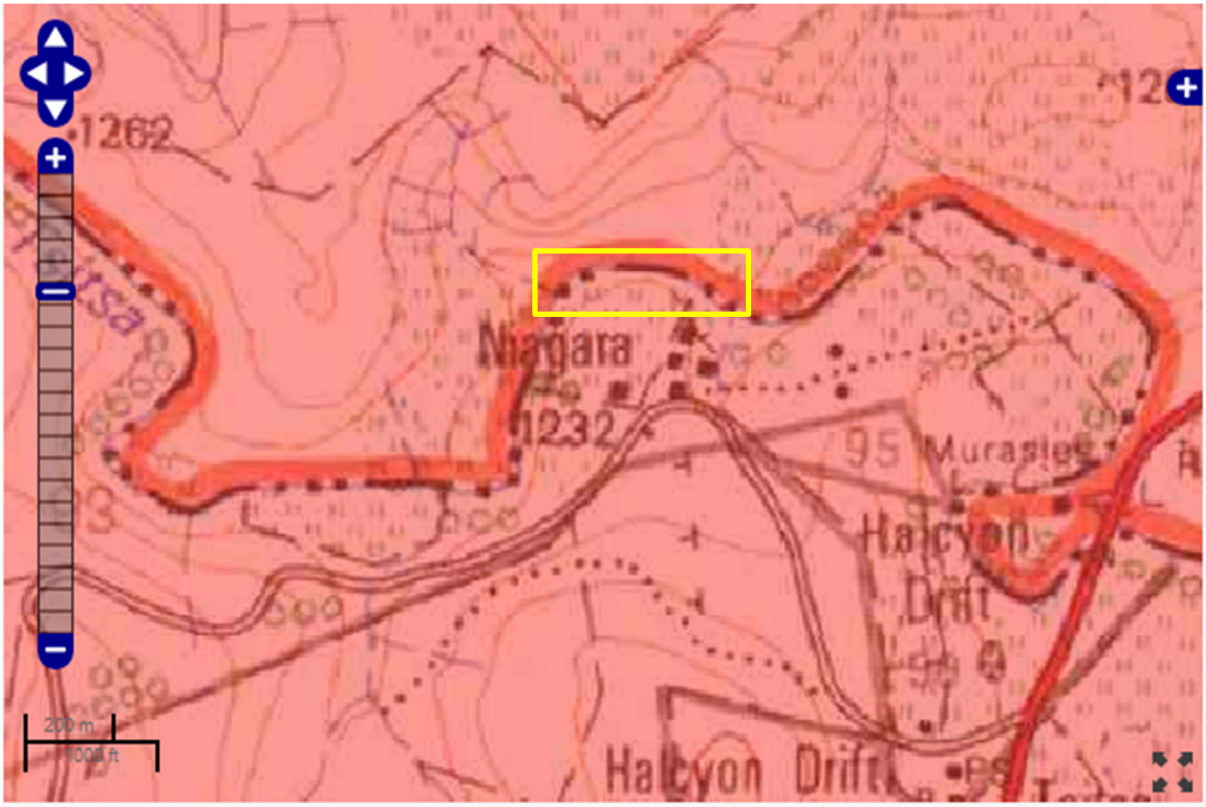

Figure 5: SAHRIS palaeosensitivity map for the site for the proposed sand mining project on the Tsitsa River, Farm Niagara 380 shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

From the SAHRIS map above the area is indicated as very highly sensitive (red) for the Molteno Formation so a site visit was carried out in late November to look for plant fossils.

iii. Site visit observations

The route along the river is highly disturbed by stands of invasive wattle trees, Acacia dealbata, that appear to have grown rapidly along the deep disturbed sands of the river banks. The present river level is about 3 m below the top bank but here are signs of recent heavy rainfall and erosion of the sands and land adjacent to the river. Away from the river the land rapidly becomes more mountainous and is covered by thick grasslands, with some outcrops of trees in the valleys

The proposed project area shows signs of past excavations that are scattered along the river banks, along with high levels of erosion. A degraded farmstead is situated about 100m south of the proposed project area. This may indicate past agricultural activities (unknown) along the river. The farmstead will not be affected by the project.

There are two sections to the project, the Maclear Main site centred around GPS co-ordinate 30.9470 S and 28.4414 E, and the Maclear Alternative around 30.9486 S and 28.4419 E.

Where accessible, the route along the river was surveyed, but only thick sand was found. There were no rocky outcrops, no siltstones or shales that could potentially preserve fossil plants of the Molteno Formation (Figures 6-9). NO FOSSILS were seen.

Figure 6: Access road to the Maclear sand mining site showing thick grassland on either side of the sandy road.

Figure 7: Site photographs for the Maclear sand mining project on the Tsitsa River. Main site. A – view of the western end of the river showing the steep cut banks from recent floods. Dense grassland adjacent to the river and grasslands stretching to the hills. B – closer view of river cutbank. C – recent erosion in the central section. Note deep unconsolidated sands and lack of rocks and pebbles. D – dense stands of wattles along much of the river.

Figure 8: Site visit photographs for the Maclear sand mining project on the Tsitsa River. Main section. A – central section showing another erosion gully in thick, unconsolidated sands. B – view away from the river showing gentle topography, probably cleared previously for agriculture. C – eastern part of the main section with a partly vegetated erosion gully. D – view from the central section looking west – note almost impenetrable dense stands of wattle along the river banks.

Figure 9: Site visit photographs for the Maclear sand mining project on the Tsitsa River. Alternative section. A – view away from the river with rolling grasslands all the way to the foothills. No rocky outcrops. B – small erosion gully that is undermining the wattles. C – looking westwards; river actively eroding the sandy banks that are only partially stabilised by clumps of grass and alien trees. D – eastern part with an unstable access route in deep unconsolidated sand. No rocky outcrops present and no fossils found.

4. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table :

Table 4a: Criteria for assessing impacts

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	**H**	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

Table 4b: Impact Assessment

PART B: Assessment		
SEVERITY/NATURE	**H**	-
	M	-
	L	Loose sands do not preserve plant fossils; so far there are no records from the Molteno Fm of plant or animal fossils in this region so it is very unlikely that fossils occur on the site. The impact would be very unlikely.
	L+	-
	M+	-

PART B: Assessment		
	H+	-
DURATION	**L**	-
	M	-
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	**L**	Since the only possible fossils within the area would be fossil plants from the *Dicroidium* flora in the shales, the spatial scale will be localised within the site boundary.
	M	-
	H	-
PROBABILITY	**H**	**-**
	M	**-**
	L	It is extremely unlikely that any fossils would be found in the loose sand that will be mined as they are young and transported. Nonetheless, a Fossil Chance Find Protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks are the correct age and type to preserve fossils. The site visit and walk through confirmed that there were NO FOSSILS in the project footprint. Furthermore, the material to be mined is sand and this does not preserve fossils. Since there is an extremely small chance that fossils from the Molteno Formation may have been washed down with the sands and may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The site visit and walk through in late November by the palaeontologist confirmed that there are NO FOSSILS and no potential rocky outcrops of siltstones or shales that could preserve fossils. Only unconsolidated, transported sands occur along the river. The overlying soils of the Quaternary period would not preserve fossils.

6. Recommendation

Based on the fossil record but confirmed by the site visit and walk through there are NO FOSSILS of the Molteno *Dicroidium* flora even though fossils have been recorded from rocks of a similar age and type in South Africa. The plant fossils have been recorded from siltstones and mudstones, not from sandstones or sands. 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 in below the ground surface in the shales of the Molteno Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the contractor or miners, or other responsible person once excavations and removal of sand have commenced, then they should be rescued and a palaeontologist called to assess and collect a representative sample.

7. References

Anderson, J.M., Anderson, H.M., 1985. Palaeoflora of Southern Africa: Prodromus of South African megafloras, Devonian to Lower Cretaceous. A.A. Balkema, Rotterdam. 423 pp.

Bamford, M.K. 2004. Diversity of woody vegetation of Gondwanan southern Africa. Gondwana Research 7, 153-164.

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 461 – 499.

Plumstead, E.P., 1969. Three thousand million years of plant life in Africa. Geological Society of southern Africa, Annexure to Volume LXXII. 72pp + 25 plates.

8. Chance Find Protocol

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

1. The following procedure is only required if fossils are seen on the surface and when excavations/mining commence.
2. When excavations begin the rocks and discard 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 (for example see Figure 10). 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 contractor/miners 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.

9. Appendix A – Examples of fossils from the Molteno Formation

Figure 10: Photographs of fossil plants from the Molteno Formation.

10. Appendix B – Details of specialists

Marion Bamford (PhD)

Short CV for PIAs – July 2022

I) **Personal details**

Present employment: Professor; Director of the Evolutionary Studies Institute. Member Management Committee of the NRF/DST Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa

Telephone : +27 11 717 6690
Fax : +27 11 717 6694
Cell : 082 555 6937
E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) **Academic qualifications**

Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) **Professional qualifications**

Wood Anatomy Training (overseas as nothing was available in South Africa):
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) **Membership of professional bodies/associations**

Palaeontological Society of Southern Africa
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards
International Association of Wood Anatomists - First enrolled: January 1991
International Organization of Palaeobotany – 1993+
Botanical Society of South Africa
South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
SASQUA (South African Society for Quaternary Research) – 1997+
PAGES - 2008 –onwards: South African representative
ROCEEH / WAVE – 2008+
INQUA – PALCOMM – 2011+onwards

vii) **Supervision of Higher Degrees**

All at Wits University

Degree	Graduated/completed	Current
Honours	11	0
Masters	14	1
PhD	11	6
Postdoctoral fellows	12	2

viii) **Undergraduate teaching**
Geology II – Palaeobotany GEOL2008 – average 65 students per year
Biology III – Palaeobotany APES3029 – average 25 students per year
Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology; Micropalaeontology – average 12 - 20 students per year.

ix) **Editing and reviewing**
Editor: Palaeontologia africana: 2003 to 2013; 2014 – Assistant editor
Guest Editor: Quaternary International: 2005 volume
Member of Board of Review: Review of Palaeobotany and Palynology: 2010 –
Associate Editor: Cretaceous Research: 2018-2020
Associate Editor: Royal Society Open: 2021 -
Review of manuscripts for ISI-listed journals: 25 local and international journals

x) **Palaeontological Impact Assessments**

Selected from recent project only – list not complete:

- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipoortjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
- Remhoogte PR 2019 for A&HAS
- Bospoort Agriculture 2019 for Kudzala
- Overlooked Quarry 2019 for Cabanga
- Richards Bay Powerline 2019 for NGT
- Eilandia dam 2019 for ACO
- Eastlands Residential 2019 for HCAC
- Fairview MR 2019 for Cabanga
- Graspan project 2019 for HCAC
- Lieliefontein N&D 2019 for Enviropro
- Skeerpoort Farm Mast 2020 for HCAC
- Vulindlela Eco village 2020 for 1World
- KwaZamakhule Township 2020 for Kudzala
- Sunset Copper 2020 for Digby Wells
- McCarthy-Salene 2020 for Prescali
- VLNR Lodge 2020 for HCAC
- Madadeni mixed use 2020 for Enviropro

- Frankfort-Windfield Eskom Powerline 2020 for 1World
- Beaufort West PV Facility 2021 for ACO Associates
- Copper Sunset MR 2021 for Digby Wells
- Sannaspos PV facility 2021 for CTS Heritage
- Smithfield-Rouxville-Zastron PL 2021 for TheroServe
- Glosam Mine 2021 for AHSA

Xi) **Research Output**
Publications by M K Bamford up to July 2022 peer-reviewed journals or scholarly books: over 165 articles published; 5 submitted/in press; 10 book chapters.
Scopus h-index = 30; Google Scholar h-index = 36; -i10-index = 95
Conferences: numerous presentations at local and international conferences.