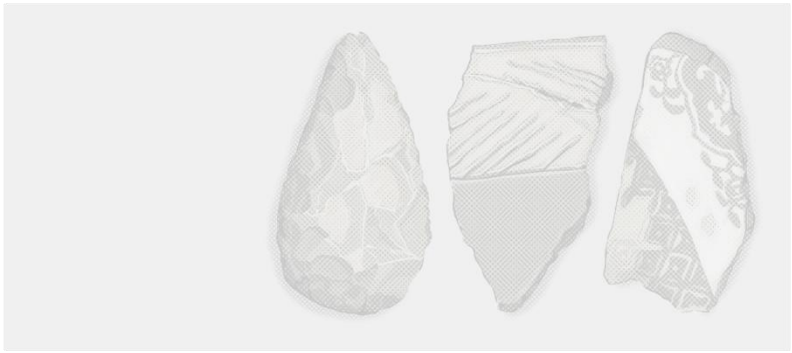

PHASE 1 HIA WWTP AT KAKAMAS NORTHERN CAPE

PHASE 1 HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED
THE PROPOSED DEVELOPMENT OF A WWTP (WASTE WATER TREATMENT PLANT)
AT KAKAMAS SOUTH SETTLEMENT PARCEL 1654, KAKAMAS,
KAI !GARIB LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY,
NORTHERN CAPE PROVINCE.

PREPARED FOR:

ENVIROAFRICA CC

PREPARED BY:

JAN ENGELBRECHT, SKY-LEE FAIRHURST-BOOYSE & HEIDI FIVAZ
ELIZE BUTLER
UBIQUE HERITAGE

30 MAY 2025

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Declaration of Independence:

UBIQUE Heritage hereby, as the appointed independent specialists, declare that:

- We act as independent specialists in this application;
- We 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;
- We regard the information contained in this report as it relates to our specialist input/study to be accurate and correct, and do not have and will not have any financial interest in the undertaking of the activity other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 (as amended) and any specific Environmental Management Act;
- We declare that there are no circumstances that may compromise my objectivity in performing such work;
- We 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;
- We will comply with the Act, Regulations and all other applicable legislation;
- We have no, and will not engage in, conflicting interests in the undertaking of the activity;
- We have no vested interest in the proposed activity proceeding;
- We 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;
- We have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- We have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- All the particulars furnished by me in this specialist input/study are true and correct, and
- We realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signed: Date: 2025-05-30

J.A.C. Engelbrecht, H. Fivaz & S. Fairhurst-Booyse

UBIQUE Heritage Specialists (Pty) Ltd

SUMMARY OF SPECIALIST EXPERTISE

SKY-LEE FAIRHURST-BOOYSE

ARCHAEOLOGIST

Sky-Lee Fairhurst-Booyse has been part of UBIQUE Heritage since 2019. Mrs Fairhurst-Booyse obtained her BA in Archaeology and Biblical archaeology in 2016 and her BA Hons in Archaeology (cum laude) at the University of South Africa (UNISA) in 2018, focussing on research themes of gender, households and Late Iron Age settlements. She successfully attained her MA in Archaeology from UNISA in 2023. She is skilled at artefacts and archaeological illustrations. Over the past twelve years, she has obtained considerable excavation and survey experience and worked on various sites, including historical, Iron Age, and Paleontological sites.

HEIDI FIVAZ

CRM ARCHAEOLOGIST & OBJECT CONSERVATOR

Heidi Fivaz has been a part of UBIQUE Heritage since 2016. She holds a B.Tech. Fine Arts degree (2000) from the Tshwane University of Technology, a BA in Culture and Arts Historical Studies degree (2012) from UNISA and received her BA (Hons) in Archaeology in 2015 (UNISA). She has received extensive training in object conservation from the South African Institute of Object Conservation and specialises in glass and ceramics conservation. Ms Fivaz was awarded her MA in Archaeology (with distinction) in 2021 by the University of South Africa (UNISA), focusing on historical and industrial archaeology. She is a professional member of the Association of South African Archaeologists and has worked on numerous archaeological excavation and surveying projects over the past twenty years. Ms Fivaz is an accredited CRM Field Director.

JAN ENGELBRECHT

CRM ARCHAEOLOGIST

Jan Engelbrecht is accredited by the Cultural Resources Management section of the Association of Southern African Professional Archaeologists (ASAPA) to undertake Phase 1 AIAs and HIAs in South Africa. He is also a member of the Association for Professional Archaeologists (ASAPA). Mr Engelbrecht holds an honours degree in archaeology (specialising in the history of early farmers in southern Africa (Iron Age) and the Colonial period) from the University of South Africa. He has over fifteen years of experience in heritage management. Mr Engelbrecht established Ubique Heritage in 2012. He is currently studying for his MA Degree in Archaeology.

EXECUTIVE SUMMARY

Project description

UBIQUE Heritage was appointed as independent heritage specialists under Section 38 of the NHRA to conduct a cultural heritage assessment to determine the impact of the proposed development of a WWTP (Wastewater Treatment Plant) at Kakamas South Settlement, Parcel 1654, Kakamas, in the Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

Findings and Impact on Heritage Resources

UBIQUE Heritage assessed the development footprint from the **8th to the 9th April 2025.**

Three instances (KSS/1654/001, KSS/1654/004, and KSS/1654/005) of Middle Stone Age (MSA) lithic scatters/occurrences were recorded. These resources are given a 'General' Protection C (Field Rating IVC) and are considered to be of low significance. The impact is negligible. The impact would be NEGATIVE LOW before and after mitigation during the construction phase and NEGATIVE LOW, before and after mitigation during the operational phase.

One instance of a possible grave was recorded (KSS/1654/007) as well as a cemetery (KSS/1468/008). All graves are of High significance and should be protected. However, none of the grave sites fall within the proposed development footprint, so neither will be impacted. However unlikely, if an impact occurs, the impact would be NEGATIVE HIGH before mitigation, NEGATIVE LOW after mitigation during the construction phase, and NEGATIVE MEDIUM before and NEGATIVE LOW after mitigation during the operational phase.

The study area is entirely underlain by unfossiliferous Riemvasmaak Gneiss (RMG) and Kenhardt Magmatite (MK), as well as potentially fossiliferous Quaternary deposits. The PalaeoMap of SAHRIS indicates that the Palaeontological Sensitivity of the study area is Moderate (green) and Zero (grey), while that of the DFFE Screening Report indicates a medium (yellow) and Unknown (white) Sensitivity. Due to the Moderate (SAHRIS) and Medium (DFFE Screening report) Sensitivities, no site investigation was undertaken for this study. However, desktop research has indicated that the Paleosensitivity of the study area is low. **An Exemption for a Palaeontological Impact Assessment is recommended for the WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province, as it is underlain by unfossiliferous Riemvasmaak Gneiss (MRM) as well as the Kenhardt Magmatite (MKM) and potentially fossiliferous Quaternary alluvium (QG). However, the Quaternary sediments are not highly fossiliferous** (Butler 2025, Appendix B).

Recommendations

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

1. The Middle Stone Age Period surface scatters/occurrences (KSS/1654/001, KSS/1654/004, and KSS/1654/005) show various degrees of weathering and are without substantial archaeological context or matrix. Therefore, it is deemed to be of minor scientific importance. These resources are given a '**General' Protection C (Field Rating IVC)** and are considered **low significance**. **The impact is negligible. Therefore, no further mitigation is recommended.**

2. One instance of a possible grave was recorded (KSS/1654/007) as well as a cemetery (KSS/1468/008). All graves are of **High significance** and should be protected. However, none of the grave sites fall within the proposed development footprint, so **neither will be impacted.** Although the probability of **impact occurring is extremely low** (less than a 25% chance of occurrence):
    - **Implementing a precautionary 30 m buffer (no-go) zone around the grave sites can avoid any possible impact.**

3. Should it be impossible to avoid graveyard(s), grave(s) or burial(s) sites during development, mitigation in the form of grave relocation could be undertaken. This is, however, a lengthy and costly process. Grave relocation specialists should be employed to manage the liaison process with the communities and individuals who, by tradition or familial association, might have an interest in these graves or burial grounds, as well as manage the permit acquisition from the SAHRA Burial Grounds and Graves (BGG) Unit and the arrangements for the exhumation and re-interment of the contents of the graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

4. An **Exemption for a Palaeontological Impact Assessment is recommended** for the WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province, as it is underlain by unfossiliferous Riemvasmaak Gneiss (MRM) as well as the Kenhardt Magmatite (MKM) and potentially fossiliferous Quaternary alluvium (QG). However, the Quaternary sediments are not highly fossiliferous (Appendix B).

5. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA must be alerted immediately as per section 36(6) of the NHRA. Depending on the

nature of the finds, a professional archaeologist or palaeontologist must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources are of archaeological or palaeontological significance, a Phase 2 rescue operation may be required, subject to permits issued by SAHRA. UBIQUE Heritage and its personnel will not be held liable for such oversights or costs incurred due to such oversights.

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ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
CRM:	Cultural Resource Management
EIA:	Early Iron Age
EMP:	Environmental Management Plan
ESA:	Earlier Stone Age
GPS:	Global Positioning System
HIA:	Heritage Impact Assessment
HWC:	Heritage Western Cape
IA:	Iron Age
IMP:	Integrated Management Plan
LSA:	Later Stone Age
MIA:	Middle Iron Age
MSA:	Middle Stone Age
NEMA:	National Environmental Management Act
NHRA:	National Heritage Resources Act
PHRA:	Provincial Heritage Resource Agency
PIA:	Palaeontological Impact Assessment
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System

1. INTRODUCTION

1.1 Scope of Study

UBIQUE Heritage was appointed as independent heritage specialists following Section 38 of the NHRA to conduct a cultural heritage assessment to determine the impact of the proposed development of a WWTP (Waste Water Treatment Plant) at Kakamas South Settlement Parcel 1654, Kakamas, in the Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

The assessment aims to identify and report any heritage resources that may fall within the development footprint; to determine the impact of the proposed development on any sites, features, or objects of cultural heritage significance; to assess the significance of any identified resources; and to assist the developer in managing the documented heritage resources in an accountable manner, within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

South Africa's heritage resources are rich and widely diverse, encompassing sites from all periods of human history. Resources such as buildings, archaeological artefacts, landscapes, and living heritage may be tangible or intangible. Their significance is based on their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic, or technological values, representation of a time or group, rarity, and sphere of influence.

Natural (e.g. erosion) and human (e.g. development) activities can jeopardise the integrity and significance of heritage resources. In the case of human activities, a range of legislation exists to ensure the timely and accurate identification and effective management of heritage resources for present and future generations.

This heritage impact assessment report presents the result of this investigation. It comprises the recording of present/ absent heritage resources and offers recommendations for managing them within the proposed development context.

Depending on SAHRA's acceptance of this report, the developer will receive permission to proceed with the proposed development, considering any proposed mitigation measures.

1.2 Assumptions and Limitations

It is assumed that the description of the proposed project, as provided by the client, is accurate. Furthermore, it is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is comprehensive and does not have to be repeated as part of the heritage/archaeological impact assessment.

The significance of the sites, structures, and artefacts is determined by their historical, social, aesthetic, technological, and scientific value in relation to their uniqueness, condition of preservation, and research potential. The various aspects are not mutually exclusive, and any site is evaluated with reference to any of these aspects. Cultural significance is site-specific and relates to the site's content and context.

The comprehensive field survey and intensive desktop study have taken all possible care to identify sites of cultural importance within the development areas. However, it is essential to note that some heritage sites may have been missed due to their subterranean nature or dense vegetation cover. No subsurface investigation (i.e. excavations or sampling) was undertaken since an SAHRA permit is required for such activities. Therefore, should any heritage features and/or objects, such as architectural features, stone tool scatters, artefacts, human remains, or fossils, be uncovered or observed during construction, operations must be stopped, and a qualified archaeologist must be contacted to assess the find. Observed or located heritage features and/or objects may not be disturbed or removed in any way until the heritage specialist has been able to assess the significance of the site (or material) in question.

2. STUDY APPROACH AND METHODOLOGY

2.1 Desktop Study

The first step in the methodology was to conduct a desktop study of the area's and the proposed development site's heritage background. This entailed scoping and scanning historical texts and records, as well as previous heritage studies and research in the study area.

The study area is contextualised by incorporating data from previous HIA/AIA reports and a digital archival search. The objective is to extract data and information on the area in question by studying archaeological sites, historical sites, and graves.

No archaeological site data was available for the project area. A concise account of the archaeology and history of the broader study area was compiled (sources listed in the bibliography).

2.1.1 Literature Review

A literature survey was undertaken to obtain background information regarding the area. Through researching the SAHRA APM Report Mapping Project records and the SAHRIS online database (http://www.sahra.org.za/sahris), it was determined that several other archaeological or historical studies had been performed within the broader vicinity of the study area. Sources consulted in this regard are indicated in the bibliography.

2.2 Field Study

Phase 1 (AIA/HIA) requires the completion of a field study to establish and ensure the following:

2.2.1 Systematic Survey

A systematic survey of the proposed project area was completed to locate, identify, record, photograph, and describe archaeological, historical or cultural interest sites.

2.2.2 Recording Significant Areas

The survey was tracked, and GPS points of identified significant areas were recorded with a handheld GPS and an Android smartphone using a Locus Map application. Photographs of the environment and identified heritage resources were taken, and detailed field notes were taken to describe observations. The layout of the area and plotted GPS points, tracks and coordinates were transferred to Google Earth, and QGIS and maps were created.

2.2.3 Definitions of Heritage Resources

The NHRA defines a heritage resource as any place or object of cultural significance, i.e., aesthetic, architectural, historical, scientific, social, spiritual, linguistic, or technological value or significance. These include, but are not limited to, the following wide range of places and objects:

- Living heritage as defined in the National Heritage Council Act No 11 of 1999 (cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships);
- Ecofacts (non-artefactual organic or environmental remains that may reveal aspects of past human activity; definition used in KwaZulu-Natal Heritage Act 2008);
- places, buildings, structures and equipment;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds;
- public monuments and memorials;
- sites of significance relating to the history of slavery in South Africa;
- movable objects, but excluding any object made by a living person; and
- battlefields.

2.3 Determining Significance

Heritage resources are considered of value if the following criteria apply:

a.	It is important in the community or pattern of South Africa's history;
b.	It has uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
c.	It has the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
d.	It is vital in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
e.	It exhibits particular aesthetic characteristics valued by a community or cultural group;
f.	It is essential in demonstrating a high degree of creative or technical achievement at a particular period;
g.	It has a strong or unique association with a particular community or cultural group for social, cultural or spiritual reasons;
h.	It has a strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
i.	It is of significance relating to the history of slavery in South Africa.

Levels of significance of the various types of heritage resources observed and recorded are determined by the following criteria:

CULTURAL & HERITAGE SIGNIFICANCE	
LOW	A cultural object found out of context, not part of a site or without any related feature/structure in its surroundings.
MEDIUM	Any site, structure or feature is regarded as less important due to several factors, such as date, frequency and uniqueness. Likewise, any important object found out of context.
HIGH	Any site, structure or feature is regarded as important because of its age or uniqueness. Graves are always categorised as of a high importance. Likewise, any important object found within a specific context.

Field Ratings or Gradings are assigned to indicate the level of protection required and who is responsible for national, provincial, or local protection.

FIELD RATINGS & GRADINGS	
National Grade I	Heritage resources with exceptional qualities to the extent that they are of national significance and should, therefore, be managed as part of the national estate.
Provincial Grade II	Heritage resources with qualities provincial or regional importance, although it may form part of the national estate, it should be managed as part of the provincial estate.
Local Grade IIIA	Heritage resources are of local importance and worthy of conservation. Therefore, it should be included in the heritage register and not be mitigated (high significance).
Local Grade IIIB	Heritage resources are of local importance and worthy of conservation. Therefore, it should be included in the heritage register and mitigated (high/ medium significance).
General Protection Grade IVA	The site/resource should be mitigated before destruction (high/ medium significance).
General protection Grade IVB	The site/resource should be recorded before destruction (medium significance).
General protection Grade IVC	Phase 1 is considered sufficient recording and may be demolished (low significance).

2.4 Determining Impact

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves, or enhances a heritage resource by minimising natural site erosion or facilitating non-destructive public use. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting and/or
- introduction of physical, chemical or visual elements out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect and cumulative, as implied by the examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process.

2.4.1 Impact Rating System

Impact assessment must take account of the nature, scale, and duration of impacts on the environment, whether such impacts are positive or negative. Impact assessment is completed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact is detailed. A brief discussion of the impact and the rationale behind assessing its significance is included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the impact mitigation. In assessing the significance of each impact, the following criteria are used:

NATURE		
Loss of Archaeological & Cultural Heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.

4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	The impact will undoubtedly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development. However, they will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process, will not occur in such a way or such a period that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component, but the system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	The impact affects the continued viability of the system/ component, and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease—high costs of rehabilitation and remediation.
4	Very high	The impact affects the continued viability of the system/component, and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation are often impossible. If possible, rehabilitation and remediation are often unfeasible due to extremely high costs.

REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with the implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible, but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in a marginal loss of resources.
3	Significant loss of resources	The impact will result in a significant loss of resources.
4	Complete loss of resources	The impact results in a complete loss of all resources.

CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant. However, it may become significant if added to other existing or potential impacts emanating from similar or diverse activities due to the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects.

SIGNIFICANCE
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale and, therefore, indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula:
(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.
The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

POINTS	IMPACT SIGNIFICANCE RATING	DESCRIPTION
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

2.5 Report

The desktop research and field survey results are compiled in this report. The identified heritage resources and anticipated direct, indirect, and cumulative impacts of the proposed project's development on the identified heritage resources will be presented objectively. Alternatives are offered if any significant sites are impacted adversely by the proposed project. All efforts will be made to ensure that all studies, assessments, and results comply with relevant legislation, the code of ethics, and the Association of South African Professional Archaeologists (ASAPA) guidelines. The report aims to assist the developer in responsibly managing the documented heritage resources and protecting, preserving, and developing them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

3. PROJECT OVERVIEW

UBIQUE Heritage was appointed as independent heritage specialists following Section 38 of the NHRA to determine the heritage impact of the proposed development of a WWTP (Wastewater Treatment Plant) at Kakamas in the Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

The applicant proposes the development of new wastewater treatment facilities in Kakamas and surrounding areas. The proposed scope of work for this project entails the construction of the following components:

- Construction of a new 2000m³/day Conventional Oxidation Pond WWTP for the town of Kakamas, comprising the following:
  - Operational Building/Shelter
  - Inlet Works (inclusive of Tanker Truck discharge facility)
  - Screening Removal
  - Grit Channels
  - Flow measurement
  - Anaerobic Ponds x 2 (lined with HDPE membrane)
  - Facultative Ponds x 2 (lined with HDPE membrane)
  - Aerobic Ponds x 3 (lined with HDPE membrane)
  - Final Storage Pond (lined with HDPE membrane)
  - Horizontal Flow Reedbed (to filter out TSS to achieve General Limit)
  - Disinfection facility
  - 3.57km x 250mm dia Wastewater Rising Main pipeline
  - 3.87km x 300mm dia Treated Effluent Gravity Main from WWTP to Orange River
  - 22kV x 2.5km overhead Electrical Power supply line + Transformer

3.1 Technical Information

PROJECT DESCRIPTION	
Project name	Proposed WWTP at Kakamas, Northern Cape
Description	PHASE 1 Heritage Impact Assessment for the proposed development of a WWTP (Waste Water Treatment Plant) at Kakamas South Settlement Parcel 1654, Kakamas, in the Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.
DEVELOPER	
BVi Engineering Consultants	
Development type	Services=Water Services=Treatment and Waste Water
PROPERTY DETAILS	
Province	Northern Cape

District municipality	ZF Mgcawu District Municipality
Local municipality	Kai !Garib Local Municipality
Topo-cadastral map	1: 50 000 2820DC
Farm name	Kakamas South Settlement Parcel 1654
Closest town	Kakamas
GPS Coordinates	28° 47' 23" S 20° 35' 40" E
PROPERTY SIZE	N/A
DEVELOPMENT FOOTPRINT SIZE	Approximately 500 ha
ASSESSED AREA	Approximately 500 ha
LAND USE	
Previous	Municipal/Agriculture
Current	Municipal/Agriculture
Rezoning required	No
Sub-division of land	No

DEVELOPMENT CRITERIA IN TERMS OF SECTION 38(1) NHRA	YES/NO
Construction of a road, wall, power line, pipeline, canal or other linear forms of development or barrier exceeding 300 m in length.	Yes
Construction of bridge or similar structure exceeding 50 m in length.	No
Construction exceeding 5000m ².	Yes
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000 m ².	No
Any other development category, public open space, squares, parks, recreation grounds.	Yes

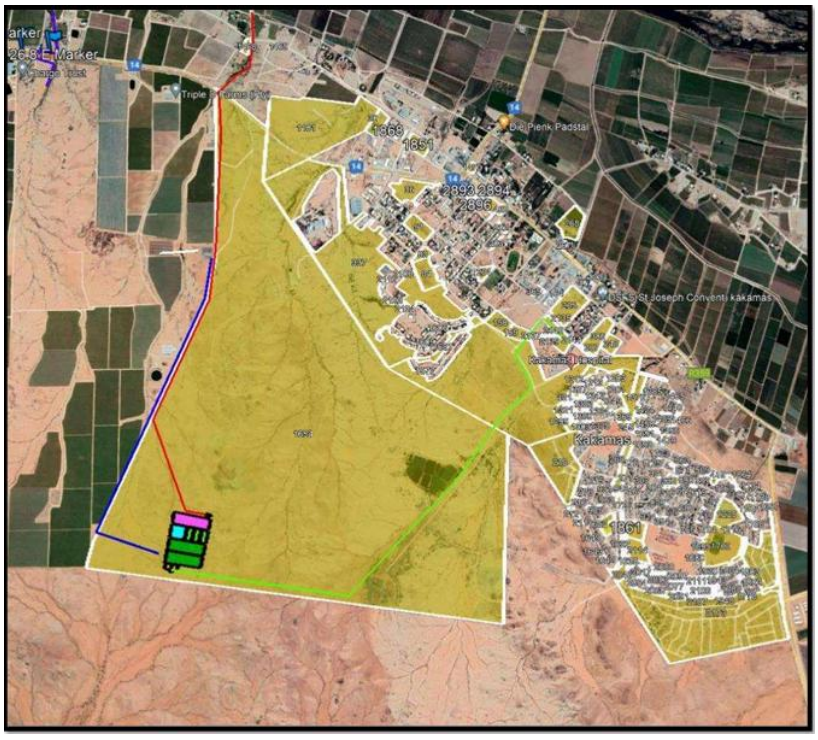

Figure 1 *Proposed development layout. Image: client*

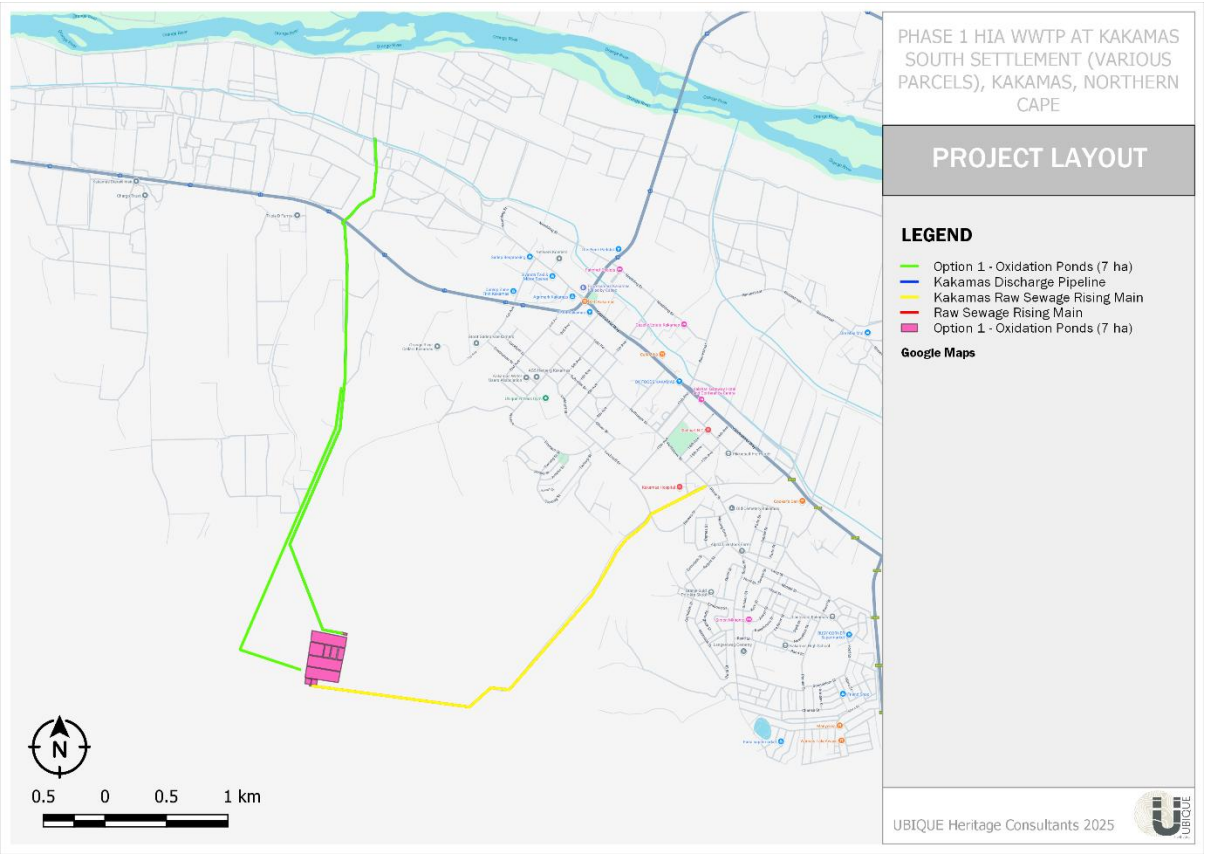

Figure 2 *Project Layout indicated on Google Maps.*

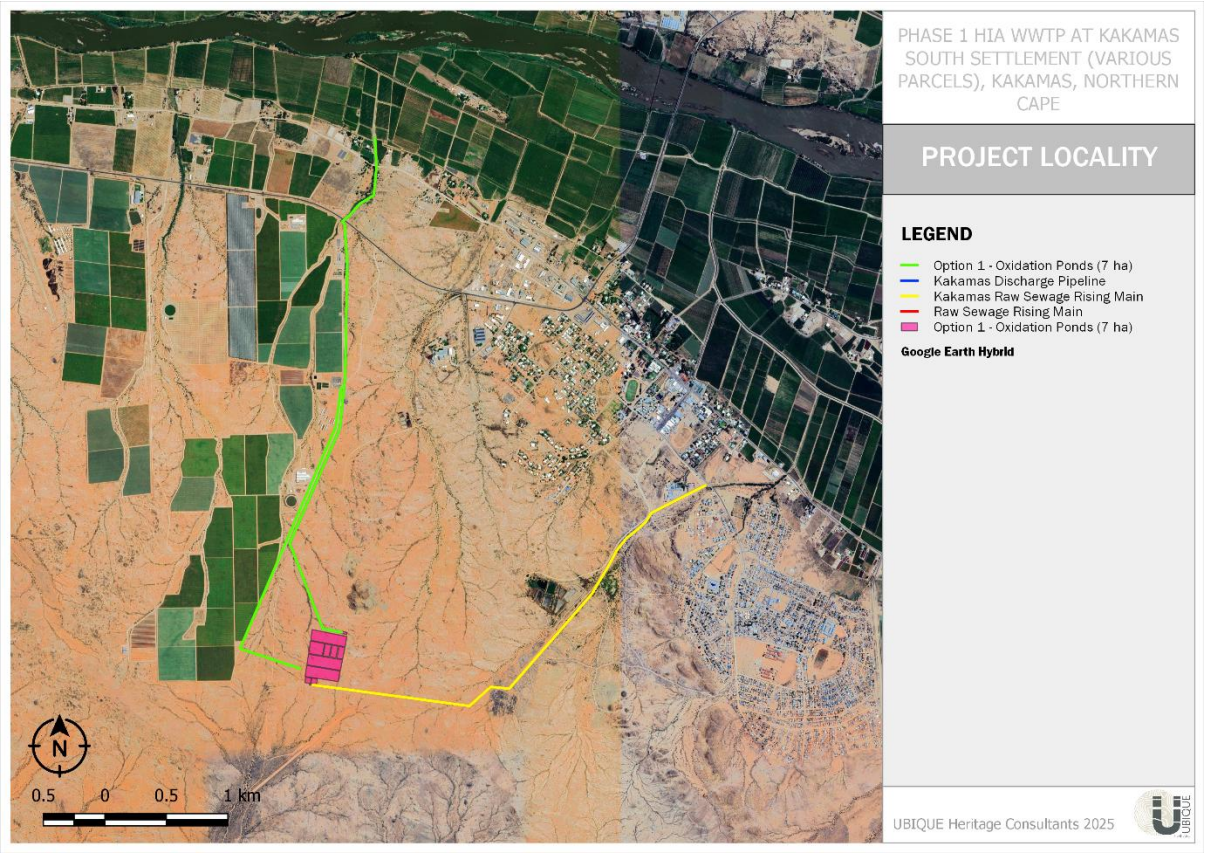

Figure 3 *Site locality indicated on Google Earth Satellite Imagery.*

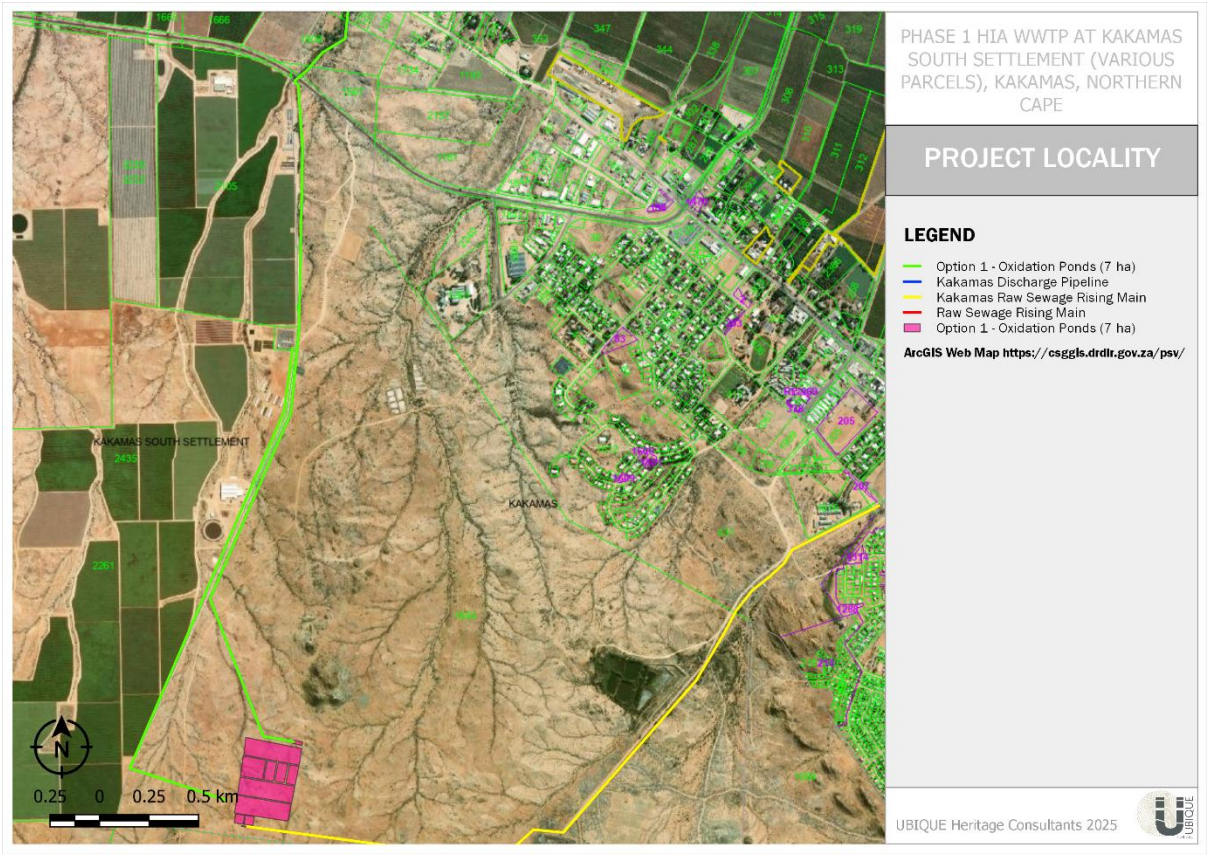

Figure 4 *Site locality indicated Chief-Surveyor General ArcGIS Web Map (https://csggis.drdlr.gov.za/psv/).*

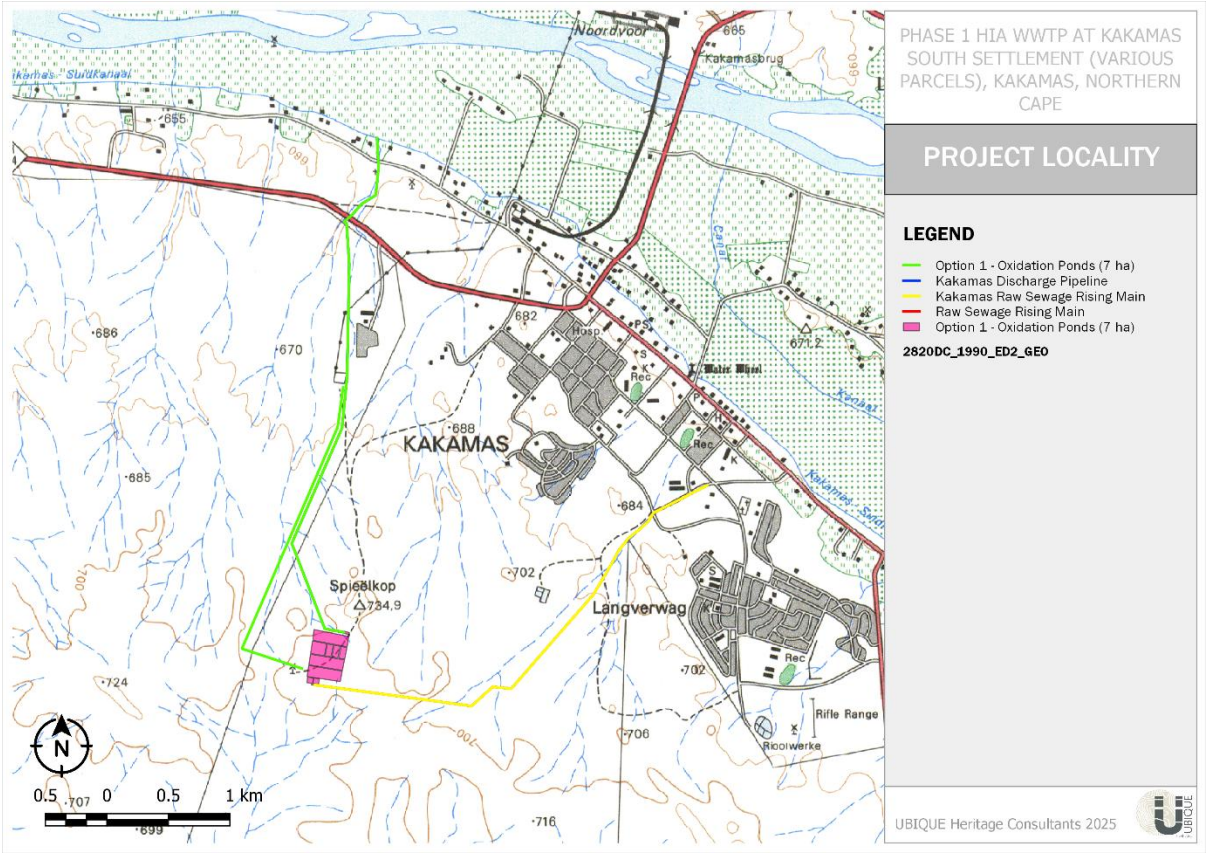

Figure 5 *Site locality indicated on 1: 50 000 2820DC 1990 map.*

4. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

4.1 Region: Northern Cape

South Africa has a long and varied history of human occupation (Deacon & Deacon 1999). This occupation dates to approximately 2mya (million years ago) (Mitchell 2002). Briefly, the archaeology of South Africa can be divided into three "major" periods: the Stone Age, the Iron Age and the Historical Period. Additionally, numerous archaeological and historical sites have been identified and documented throughout South Africa, including those in the Northern Cape Province.

4.1.1 Stone Age

The history of the Northern Cape Province is reflected in a rich archaeological landscape with a wealth of pre-colonial archaeological sites. Numerous sites have been identified and documented across the region, dating to the earlier, middle, and later Stone Ages.

In southern Africa, the Stone Age can be divided into three periods. It is, however, critical to note that dates are relative and only provide a broad framework for interpretation. The division of the Stone Age, according to Lombard et al. (2012), is as follows:

- Earlier Stone Age (ESA): >2 000 000 - >200 000 years ago
- Middle Stone Age (MSA): <300 000 - >20 000 years ago
- Later Stone Age (LSA): <40 000 - until the historical period

In short, the Stone Age refers to humans mainly utilising stone as a technological marker. Each sub-division is formed by industries where the assemblages share attributes or common traditions (Lombard et al. 2012). The ESA is characterised by flakes produced from pebbles, cobbles, percussive tools, and objects created later during this period, such as large hand axes, cleavers, and other bifacial tools (Klein 2000). The MSA is associated with small flakes, blades and points. The aforementioned is generally suggested to have been made and utilised for hunting activities and had numerous functions (Wurz 2013). Hunter-gatherer lifeways are attested to in the Middle Stone Age record for at least the last 100,000 years (Wadley 2015). Such foraging groups continued to occupy the landscape throughout the Later Stone Age between 40,000 and 20,000 years ago, lasting until a couple of centuries.

About 2000 years ago, during the final ceramic Later Stone Age, the first evidence of goats/sheep was found in southern Africa, possibly associated with Khoekhoe herding groups (e.g., Sadr 2008). These groups came into being as a combination of the migration of East African pastoralists who mixed with local hunter-gatherers (e.g., Choudhury et al. 2021). However, it is almost impossible to differentiate between the San and Khoekhoe groups based on archaeological or genetic records. Presently, these populations are referred to as Khoisan (Barnard 1992). Furthermore, the LSA is

characterised by microlithic stone tools, scrapers and flakes (Binneman 1995; Lombard et al. 2012). The LSA is also associated with rock art. These sites are commonly found on slopes, hilltops, rocky outcrops and occasionally in riverbeds (Kruger 2018).

4.1.2 Iron Age

Archaeologically, the arrival of African farming communities from West Africa about 1700 years ago and their subsequent settlement, first in the northeastern parts and later in much of southern Africa, is known as the Iron Age (Huffman 2007). These farmers encountered Khoisan communities (Mitchell 2002). The archaeology of farming communities of southern Africa encompasses three phases. The Early Iron Age, dated 200 – 900 CE, represents the arrival of farmers in southern Africa. The Middle Iron Age (900 – 1300 CE) is best associated with the onset of state formation in the Limpopo Valley of South Africa. Finally, the Late Iron Age (1300 – 1840 CE) marked the arrival and spread of ancestral Nguni- and Sotho-Tswana communities into southern Africa and the development of state-level societies, such as Great Zimbabwe and Mutapa (Huffman 2007; Badenhorst 2010).

The Iron Age (IA) is characterised by the use of metal (Coertze & Coertze 1996: 346). There is some controversy about the periods within the IA. Van der Ryst & Meyer (1999) have suggested that there are two phases within the IA, namely:

- Early Iron Age (EIA) 200 – 1000 A.D
- Late Iron Age (LIA) 1000 – 1850 A.D

However, Huffman (2007) suggests instead that there are three periods within the Iron Age, these periods are:

- Early Iron Age (EIA) 250 – 900 A.D
- Middle Iron Age (MIA) 900 – 1300 A.D
- Late Iron Age (LIA) 1300 – 1840 A.D

Thomas Huffman believes that the Middle Iron Age should be included within this period; his dates have been widely accepted in the IA field of archaeology.

The South African Iron Age is generally characterised by farming communities with domesticated animals, cultivated plants, manufactured and used ceramics and beads, and smelted iron for weapons and manufactured tools (Hall 1987). Iron Age people were often mixed farmers/agropastoralists. These agropastoralists generally lived in areas with sufficient water for domestic use and arable soil that could be cultivated with an iron hoe. Most Iron Age (IA) settlements built by agropastoralists were permanent settlements (with a few exceptions). They comprised houses, raised grain bins, storage pits and animal kraals/byres, contrasting with pastoralists' and hunter-gatherers' temporary camps (Huffman 2007). It is evident in the archaeological record that IA groups had migrated with their material culture (Huffman 2002).

4.1.3 Historical Period

The Historical/Colonial period generally refers to the last 500+ years when European settlers and colonialism entered southern Africa (Binneman et al. 2011). During the colonial frontier period, place names started becoming fixed on maps and farm names, specifically in a cadastral sense. Numerous names have Khoekhoegowab origin and, as Morris (2017a) states, encapsulate vestiges of pre-colonial/indigenous social geography. Morris (2017a) also states that genocide against the Indigenous people is documented in the wider area. Historical literature confirms that San hunter-gatherers occupied Bushmanland early in the 19th century. During the 19th century, people of mixed descent lived around the salt pans in Bushmanland. They were, however, driven away from the land as the farms were surveyed and made available to European farmers (Webley & Halkett 2012). In the late 18th and early 19th centuries, with the introduction and implementation of the commando system, the Karoo 'Bushmen' were eventually destroyed or indentured into farm labour (ACRM 2015). Certain mountainous areas (e.g. Gamsberg near Aggeneys and Namies) are known massacre sites (Morris 2017a).

The development of a rich colonial frontier can be seen in the archaeological record (Kruger 2018). However, it was not until relatively recently (because of its distance from the Cape Colony) that this arid part of South Africa's interior was colonised. The Historical period of the Northern Cape coincides with the incursion of white traders, hunters, explorers, and missionaries into the interior of South Africa (Engelbrecht & Fivaz 2019). The historical period started with the first recorded oral histories (Van Vollenhoven 2014). The documented records of this region dating from the 18th- and 19th - centuries mainly pertain to areas south of and along the Orange River (Morris 2018a, b & c). Hendrick Wikar and Robert Gordon, who, according to Morris (2018a, b & c) and Morris & Beaumont (1991), were two of the earliest travellers, had followed the river as far as and beyond the region during the 1770s. Wikar and Gordon provided descriptions of the terrain and the communities living along the river (Morris 2018a, b & c; Morris & Beaumont 1991). Some other early travellers, traders, and missionaries who arrived in the region during the 19th century include PJ Truter, William Somerville, Cowan, Donovan, Burchell and Campbell (De Jong 2010). The London Mission Society (LMS) station near Kuruman was established in 1817 by James Read (De Jong 2010; Van Vollenhoven 2014). Various buildings and structures that have been documented and recorded can be associated with early travellers, traders, and missionaries. There is also evidence of the settlements of the first white farmers and towns in the Northern Cape. These historical buildings and structures have been captured on the SAHRIS database in areas such as Kakamas, Kenhardt, Keimoes and Upington.

De Jong (2010) classifies the cultural landscape along the Gariep/Orange River as predominantly historic farmland. From the 1880s onwards, irrigation of the Orange River played a central role in the area's economy in the vicinity of Upington (Legassick 1996). Hunter-gatherers shared the river's resources (Morris 1992). The beginning of irrigation in this area has been attributed to the *Basters*. By the 18th century, the Basters had focused on the Orange River (and Namaqualand) as a sanctuary from colonial rule (Mlilo 2019; Van der Walt 2015). They were regarded as "primitive pastoral people" who had "crude" ways to divert the river to their "little gardens" (Van der Walt 2015). The term "Basters" characterises a group of people of mixed percentage (white and

Khoekhoe or slave and Khoekhoe). According to Van der Walt (2015), the term also implies an economic category that implies possessing property and being culturally European.
The surveying, division and transference of Government-owned land to farmers mark the initial distribution of land to colonial farmers from the 1880s onward (De Jong 2010). It is believed that most farms were still government farms and were leased to farmers in 1875. The farms were only later sold to individuals (Van Vollenhoven 2014). The introduction of the windpump to South Africa in the 1870s made the arid lands accessible and suitable for grazing (Webley & Halkett 2012).

During the late 1920s, more permanent and large-scale settlements and possibly some of the first farmsteads started to appear in the region, and the first significant influx of people began in the 1930s. Extensive irrigation networks and channels supplied water for the development of vineyards and other cash crops (e.g. grain crops), cultivated in a narrow band along the Orange River leading to the region known as the Green Kalahari. Van Schalkwyk (2019) comments that this has resulted in numerous smaller hamlets and villages. These hamlets/villages had churches, cemeteries and shops.

The region has been the backdrop to various incidents of conflict. Numerous factors such as population growth, increasing pressure on natural resources, the emergence of power blocs' attempts to control trade, the emergence of the Griquas, and penetration of the Korana and early white communities from the southwest resulted in a period of instability in South Africa. Furthermore, with the introduction of loan farms in the second half of the 18th century, an influx of newcomers such as trekboers, European game hunters and livestock thieves contributed to the region's volatility and sociocultural stress and transformation (Mlilo 2019).

The period known as the Difaqane/Mfecane began in the late 18th century and effectively ended with the settlement of white farmers in the interior (De Jong 2010; Mlilo 2019). The Difaqane/Mfecane period also affected the Northern Cape Province around the 1820s, relatively later than the rest of southern Africa (De Jong 2010). This period was prompted by the incursion of displaced refugees associated with the Fokeng, Tlokwa, Hlakwana and Phuting groups (De Jong 2010). Between 1879 and 1880, the region was caught up in the Koranna War. With the arrival of the Dutch settlers in the Cape in the mid-17th century, clashes between the Europeans and Khoi tribes in the Cape Peninsula resulted in the Goringhaiqua and Goraxouqua migrating north towards the Gariep/Orange River in 1680. These tribes became known as the Korannas, living as small tribal entities in separate areas (Penn 2005). It is believed that any military settlement related to the Koranna Wars would have been closer to the Orange River (Webley & Halkett 2014).

Further military activity in the area included the rise of the ‘rebels’ during the Anglo-Boer War and again in 1915 with the incursion of German troops (Morris 2018a, b & c). Numerous graves can be linked to the battles fought during the 1914 Rebellion (Engelbrecht & Fivaz 2019).

4.2 Local

The town of Kakamas was formally laid out in 1931 and attained full municipal status in 1964 (Kitto 2019, Van Schalkwyk 2013). The name Kakamas originated with the Einiqua. There are several theories about the meaning of the word:

- Bad Grazing: before the canals and irrigation schemes were developed, the area was notorious for its poor grazing pastures.
- Angry/Charging Cow/Chasing Cows: this may derive from the Korana word kagamas, which could have become associated with the place because the river banks nearby had sloping banks, making it an easy crossing place for cattle herds. Most herds were reluctant to enter the river and would turn on their herders.
- Thakemas, meaning drink place. This would refer to the ease with which livestock could be herded to the area to drink.
- Swimming water: Possibly the San word given to the place because it was possible to swim across the river at this point (De Jong 2010).

The towns of Kakamas, Marchand and Alheit have an intertwined history. The town of Marchand was named after one of its founding members, Rev B. P. J. Marchand, also known as the 'father of Kakamas'. Kakamas was started as the first labour colony by the N. G Church in 1898 to uplift poor whites in rural communities. These people were victims of the Industrial Revolution, and their lack of even elementary education made them inferior to the European immigrants flooding into South Africa at that time. The labour colonies envisaged to equip these people with the necessary skills to adapt and survive in the modern economy. Kakamas was identified to establish the first colony, and one and a half hectares of land was allocated to each family. The land did not belong to the families but to the church, and the families had to pay a meagre yearly rent. This was done to curb any debt collectors trying to seize and sell the land to recoup the money owed. The town soon grew to be inhabited by 800 families. Kakamas grew so quickly that the church had to bring in assistant reverends to minister to all the people in the wards of Alheit and Marchand. The assistant reverend who was asked to take the lead declined, whereafter, the decision was taken to establish Marchand and Alheit's entire congregations independently (AF Wikipedia 2025, SA Venues 2025, Gemeentegeskiendenis 2025; Kitto 2019).

It is the people who lived in this labour colony whose hard physical work can still be seen in the Kakamas area's water-related infrastructure that was essential for agricultural development. The town of Kakamas originated out of an irrigation scheme established in 1898 for farmers who were left destitute by severe drought (1895-1897). Several water wheels, excavated tunnels, and irrigation furrows have been declared Provincial Heritage Sites. The hand-dug tunnels were remarkable engineering feats for the early 20th century (Orton 2012). The irrigation scheme was led by Rev. Schroder, which included canals dug by hand, beginning at the upper end of Neus Island (Hopkins 1978; Van Vuuren 2011). The development of canal systems played an essential role in irrigating extensive vineyards and orchards within the region and developing substantial agricultural initiatives within the area. The Kakamas settlement is also known for its pioneering development of a hydroelectric power generator, which was completed in 1914 and accommodated the first hydroelectric power station in South Africa (Hopkins 1978, SA Venues 2025). The building, located on Voortrekker Street, housed the old transformer and was earmarked

as a museum (Morris 2010; SAHRA database). These water furrows are still used today and supply the town with water. Eleven waterwheels are still used and can be seen in Voortrekker Street and on the canals running through the vineyards, lucerne, and cotton fields (Kakamas 2025).

De Jong (2010) classifies the cultural landscape of Kakamas as predominantly historic farmland. The affected area consists of operating irrigation and grazing farms located in a typical Lower Orange River environment. These farms display heritage features that typically occur in the district, such as their large size, irrigation furrows and pipelines, fences, tracks, farmsteads, and irrigated fields. Farmsteads are clustered close to rivers and primary roads. According to De Jong, this landscape class is of relatively low heritage sensitivity because it can absorb the adverse effects of new development through some mitigation.

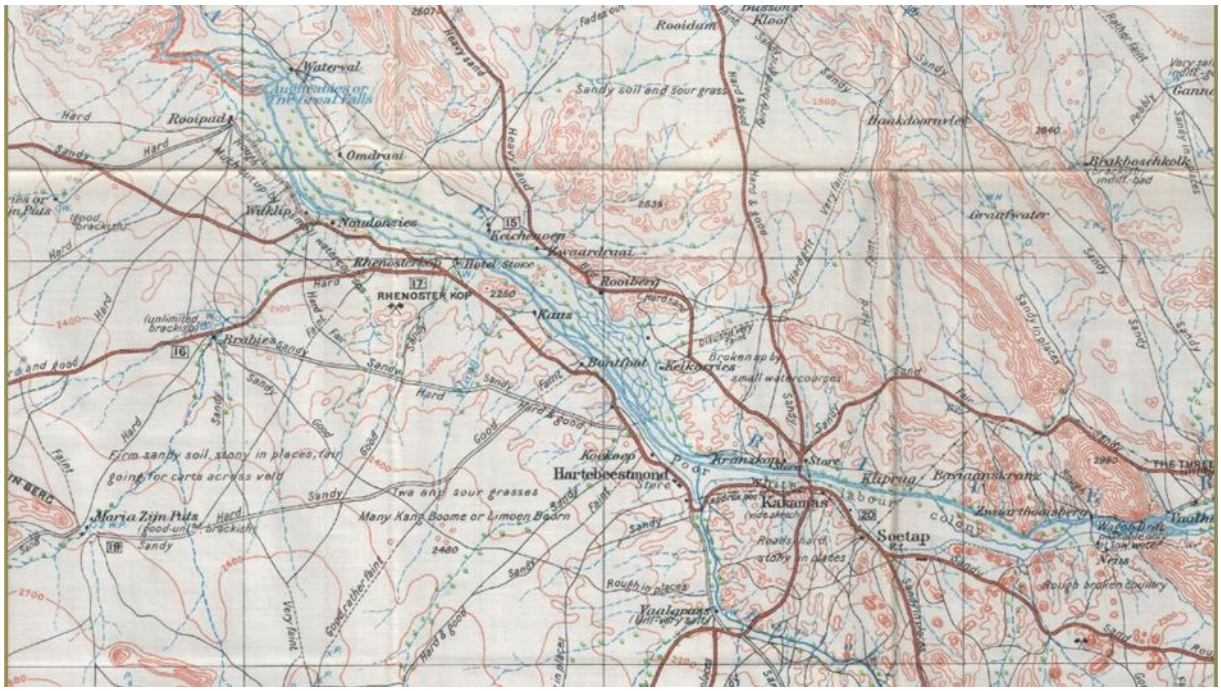

Figure 6 *1910-1911 Imperial Map of Kakamas and Augrabies, with the wagon routes indicated. Image from UCT digital collections, https://digitalcollections.lib.uct.ac.za/*

5. SITE SENSITIVITY: ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME

5.1 Site Verification

The site sensitivity verification was completed through a desktop analysis, satellite imagery and literature research, and on-site inspection.

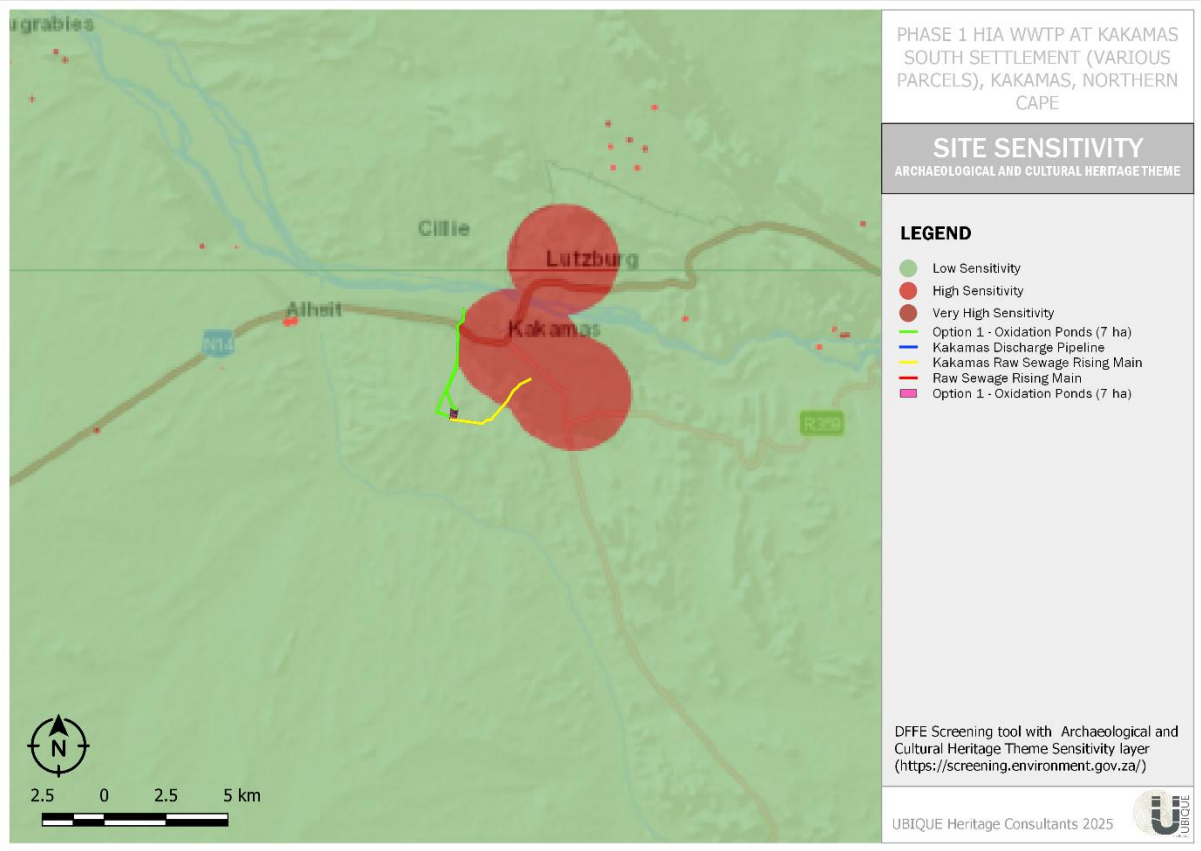

Figure 7 *The Project area indicated on the DFFE Screening tool with Archaeological and Cultural Theme Sensitivity layer (https://screening.environment.gov.za/)*

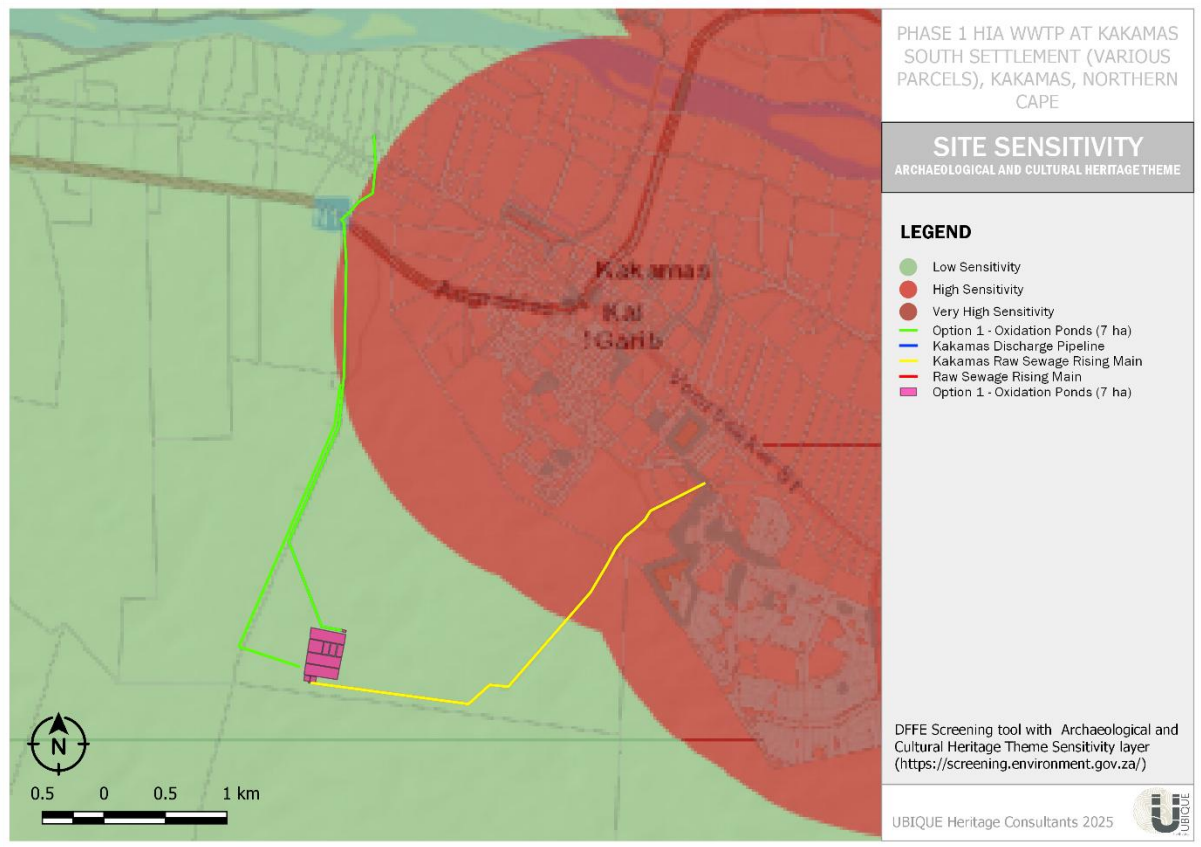

Figure 8 *The Project area indicated on the DFFE Screening tool with Archaeological and Cultural Theme Sensitivity layer (https://screening.environment.gov.za/)*

Our findings confirm the predominantly Low Heritage Sensitivity indicated on the DFFE Screening Tool. Apart from the cemetery and the possible grave outside the proposed footprint, no medium- to high-significance resources were recorded within the footprint. Thus, a Low Sensitivity for the footprint itself is verified. The DFFE Screening Tool (https://screening.environment.gov.za/) indicates a Low to Very High Archaeological and cultural theme sensitivity at the Kakamas site. The study area's consulted HIA and AIA reports predominantly reported on low-significance resources. However, medium to high-significance resources are located on surrounding properties and within a 30 km study area. These were mainly resources related to the historical and Stone Age periods, as well as graves and cemeteries. The High and Very High Sensitivity areas indicated on the DFFE Screening Tool generally correspond with known Graded sites.

5.2 Site Sensitivity Desktop Results

Due to the wide range of CRM reports done in the region, this desktop study does not include all the CRM reports. However, reports in the wider region predominantly recorded artefacts and features relating to the Stone Age, Iron Age and the Historical Period. These reports were obtained from the SAHRIS database.

The desktop study revealed that no Heritage Impact Assessments had been conducted directly on the proposed development area. Numerous impact assessments were conducted within a 20- to 30-km radius of the proposed development.

The consulted reports, located within a 20- to 30-km periphery of the study area, reported on materials predominantly related to the Stone Age and the Historical Period. Resources were identified by, but not limited to, ACRM (2016, 2017, 2020a; 2020c), Beaumont (2008a & b), Engelbrecht (2015), Engelbrecht & Fivaz (2019a), Fivaz & Engelbrecht (2021), Kaplan (2008, 2018), Kinahan (2003), Kitto (2019), Kruger (2012, 2015, 2017), Morris (2013, 2014, 2017b), Morris & Beaumont (1991), Orton (2012), Orton & Webley (2012), Parsons (2007), Pelser (2012), Rossouw (2013, 2019, 2022), Smith (1995), Van der Walt & Lombard (2018), Van Ryneveld (2007). The absence of any Iron Age evidence is not surprising, as the remnants of this time period are rarely found in the Northern Cape.

5.2.1 Stone Age

Numerous reports from the study area document lithics dating from the ESA, MSA, and LSA. Rossouw (2013) identified isolated brown jasper lithics on Blaauwskop 36, likely of LSA origin, which appeared fresh and unrefined. Kruger (2015) found MSA tools at Eenduin farm, including blades, scrapers, and an adze, while Engelbrecht (2015) recorded similar finds near Blaauwskop. Kaplan (2018) documented a large silcrete core, an LSA retouched flake, and other tools near Lennertsville, 10 km from Kousas. Kaplan (2008) also recorded LSA tools, including convex scrapers and adzes, as well as an ESA core, attributing most of these to the Wilton Complex.

Morris (2013) reported grinding grooves at Dyason's Klip and LSA flakes. Morris (2017b) recorded a rare rock gong on granite-gneiss, the first of its kind locally. Van der Walt & Lombard (2018) identified two dolerite "kite" features 22 km north of Keimoes, which were likely used for hunting (Holzer et al., 2010, in Van der Walt & Lombard, 2018). However, their attribution to Stone Age herders remains uncertain.

Morris (2014; Morris & Beaumont 1991) suggested intensive farming along the Orange River may have destroyed archaeological remains of herder/hunter-gatherer camps. On Orange Falls 16, Rossouw (2019) and Kaplan (2018) found sparse lithics and minor scatters of LSA/MSA tools, including an MSA point, adze, and hammerstone, potentially linked to flaking during wetter periods.

ACRM (2020a; 2020c) surveys on Farms Tierkop 355 and Oorkant revealed isolated MSA/LSA tools and a pottery fragment. Fivaz & Engelbrecht (2021) also noted weathered tools without context. Kitto (2019) recorded a medium to high-density 4200 m² MSA scatter between outcrops.

Beaumont (2008b) documented fresh Acheulean quartzite and ironstone artefacts on Kakamas South Farm 2092, though lacking formal tools. ACRM (2017) noted sparse LSA/MSA artefacts, scrapers, and minimal knapping evidence at Renosterkop Extension. Rossouw (2022) found a broken grindstone and debitage but no in situ material.

Van Ryneveld (2007) reported that MSA artefacts on Cnydas East 439 were mainly quartz-based. Pelser (2012) found ESA-MSA-LSA tools, quartz scatters, and a handaxe near Augrabies Falls on Padrooi 13. Orton (2012) recorded MSA/LSA artefacts, including a large scatter near a koppie at Rooipad 15/9, potentially an LSA campsite.

Engelbrecht & Fivaz (2019a) found ESA-MSA-LSA materials and LSA ceramics at Rozynen Bosch No. 104. David Morris reported fishbone-rich herder sites near Riemvasmaak (Pelser 2012), while Beaumont (2008a) recorded un-diagnostic artefacts and a possible kraal. Orton & Webley (2012) noted MSA scatters, LSA sites with Khoekhoen links, grindstones, and shelters.

Kruger (2012) observed MSA dominance in the area, noting LSA presence. His 2017 survey at Sonfin Oseiland indicated MSA lithics remained beyond the cleared development footprint. At Renosterkop, Morris & Beaumont (1991) found LSA materials, scrapers, beads, and a rock shelter with MSA/LSA layers. ACRM (2016) reported scattered lithics, MSA tools, and ostrich eggshell fragments.

The area immediately west of Augrabies Falls has been subject to archaeological research by Professor Andrew Smith. Prof. Smith conducted informal surveys within the National Park and on river-bordering farms in the Kakamas area. He also excavated several caves (Zoovoorbij, Droegrond, Waterval), which produced MSA and LSA material (Pelser 2012). Smith (1995) recovered at Zoovoorbj (some 64 km east of Augrabies) a collection of MSA flakes stone artefacts from the lower levels of the excavation. The upper levels contained LSA material and artefacts such as bone, OES beads, and a few potsherds. According to Pelser (2012), it was evident to Prof. Smith that the Khoekhoen herders were dependent on being close to the Orange River, rich in resources. The research also revealed that San hunter-gatherers lived in refuge deeper in the hinterland. Smith (1986; 1995) recorded pottery, sheep bones, informal stone artefact assemblage, retouches pieces, beads, and a decorated flask mouth fragment at Waterval 1, near Augrabies Falls. The site was dated to 760 ± 40 BP (Pta-3847) and has been occupied by herders (Orton 2012). Assemblages excavated from sites (Biesje Poort 2 and Bokvasmaak 3) in the Augrabies Falls area by Peter Beaumont have been analysed by Parsons (2007). The two sites were dated to around 1390 ± 70 BP (Pta-4772) and 120 ± 50 (Pta-4872) by Beaumont et al. (1995). Biesje Poort 2 yielded numerous retouched items. Beaumont ascribed both sites to herders, but Parsons' (2007) analyses showed the relevant characteristics as unclear and unreliable (Orton 2012).

5.2.2 Rock Art

Several rock art sites have been documented on the SAHRA Database in the Northern Cape Province. No sites have, however, been recorded in the Kakamas region. Instead, rock art sites have been recorded at Augrabies.

ROCKART SITES AROUND THE STUDY AREA				
Site/Object Name	Coordinates	Site type	Site Reference	Site ID
Augrabies sites RVM19 historical engraving	-28.464711, 20.287494	Rock Art	RVM19	93896
Augrabies sites RVM3 LSA engraving	-28.395425, 20.386838	Rock Art	RVM3	93893

5.2.3 Iron Age

It is rare, but not uncommon, to find sites associated with the 'Iron Age' of southern Africa in the Northern Cape. None of the consulted HIA's indicated any material uncovered relating to the Iron Age.

5.2.4 Historical/Colonial Period

Very few HIA and AIAs reported on artefacts/sites associated with the Historical/Colonial period.

While assessing a portion of the farm Cnydas East 439, Van Ryneveld (2007) recorded a historical complex and observed two historic structures, a kraal, wind pump, dam, and associated workers unit. Van Ryneveld comments that the two historical structures probably represent early farming occupations and activity. The area lacked associated historical artefacts, but the stone kraal is still used. The wind pump and dam, situated near the two historic structures, are of more recent origin and associated with earlier prospecting activities on the property post-dating 60 years and, by implication, are not protected by the NHRA. In contrast, the workers' unit and its associated historical artefacts (such as metal, porcelain and glass) pre-date 60 years.

Pelser (2012) recorded a low stone wall (single row of stones) in front of a section of the outcrop during his survey on Padrooi 13. He found glass and metal, such as tins, near the stone feature. Pelser (2012) explains that they are unsure of the age and function of this feature and that it may be relatively recent and could have been used by herd boys. Orton (2012) recorded a 28 m by 6 m flat-roofed farm building that was most likely built in the early to mid-20th century. However, the

structure has since been added on and altered several times over the years. Orton (2012) also noted that the outbuildings were made of poles and reeds and a sheep dip, which is of more recent age. These outbuildings have also been added to and altered.

Orton and Webley (2012) reported that abundant historical remains were found at Riemvasmaak. The sites are related to the ancestors of the Riemvasmaak community, who were forcibly removed from the land in 1973 and 1974 during the Apartheid regime. Orton and Webley (2012) recorded ruins of structures, stone features (with indeterminate function), and artefacts such as metal objects, glass bottles, and a plastic bead. Most historical artefacts are relatively recent (mid-20th century), but occasional ceramic fragments were undoubtedly originally of late 19th-century origin. However, they state that it is likely that these materials were only deposited during the early to mid-20th century.

Kinahan (2003) conducted fieldwork in Augrabies Falls. However, it was limited to the gorge, where the archaeological material was infrequent. Various historical remains (related to the Anglo-Boer war and the rebellion led by Manie Maritz) dating to the late 19th and early 20th centuries are well preserved within the Falls, such as the Manie Maritz Fort in the western part of the Park. Historically, it has been unclear whether the fort can be associated with Maritz (Orton 2012).

Beaumont (2008b) found a minor scatter of undiagnostic tin and glass fragments and what seemed to be some minor levelling of the ground surface. He remarks that these vestiges could likely be where a small group of people camped briefly during the early 20th century while digging for diamonds nearby, leaving behind pieces of a spade and some sieve mesh.

During Engelbrecht and Fivaz's (2019a) survey of Plot 1763, Plot 2372, and Plot 2363, various surface scatters of material relating to the historical/colonial period, such as a hole-in-cap tin lid with lead solder and a tin can with folded/cramped hand-soldered seam, and cast-iron potsherds, a broken horseshoe, green and weathered clear glass, whiteware ceramics, and tin can with folded/crimped hand-soldered seam was recorded. At Rozynen Bosch No. 104, recorded surface scatters include a historical fuel/oil tin with machine soldered seems with trademarks, a historical green liquor bottle, the partial base of a bottle, a historically fired shotgun cartridge, and a metal casing 12 BR.

Just outside the town of Kakamas North on Lot 189 is a monument that commemorates First World War German *Schutztruppe* killed in a battle against South African Union forces on the 4th of February 1915. Union troops assembled near Upington to launch an attack on German South West Africa while the German forces prepared an attack on Kakamas. A heavy battle ensued between two unevenly matched forces, resulting in seven dead, six wounded, and sixteen German prisoners of war captured. The memorial was erected by the '*Volksbund Deutschen Kriegsgräberfürsorge* (SAHRA database, Kakamas 2025).

A handful of sites have been graded in the area. Most of these sites have been graded as Grade II with one instance of an IIIa. The sites range from buildings, structures, ruins and monuments/memorials. These can all be found on the SAHRIS database:

SITES IDENTIFIED ON THE SAHRA DATABASE						
Site/Object Name	Coordinates	Archive Status	Declaration Type	Site type	Site Reference	Site ID
North Furrow, Kakamas, Gordonia District	-28.785592; 20.639647	National monument	Provincial heritage	Building	9/2/032/0005	28797
Battlefield, Kakamas, Gordonia District	-28.743329; 20.635730	National monument	Provincial heritage	Battlefield, Monuments & Memorials, Burial Grounds & Graves	9/2/032/0006	28798
Water wheel, near DR Church Parsonage, South Furrow, Kakamas	-28.772950; 20.622203	National monument	Provincial heritage	Building	9/2/032/0008	28799
Water wheel No. 2, Plot 103, South Furrow, Kakamas	-28.783353; 20.635208			Building	9/2/032/0009/001	28793
Water wheel No. 2, Plot 103, South Furrow, Kakamas	-28.783353; 20.635208	National monument	Provincial heritage	Building	9/2/032/0009/001	28793
Water Wheel No. 1, Plot 103, South Furrow, Kakamas	-28.783504; 20.635524	National monument	Provincial heritage	Building	9/2/032/0009/004	28794
Water wheel, Plot 1057, North Furrow, Kakamas	-28.785597; 20.640039	National monument	Provincial heritage	Building	9/2/032/0009/005	28792
Water wheel, Plot 68, North Furrow, Kakamas	-28.785335; 20.638437	National monument	Provincial heritage	Building	9/2/032/0009/006	28791
Water Wheel, Plot 1467, South Furrow, Kakamas	-28.783988; 20.636358	National monument	Provincial heritage	Building	9/2/032/0009/009	28788
Kakamas Museum, Voortrekker Street, Kakamas	-28.770215; 20.617134	National monument	Provincial heritage	Building	9/2/032/0010	28789

5.2.5 Graves/Burials

Graves are readily found throughout the landscape, especially on old farms and around homesteads. Graves and burial sites are widespread across the region, ranging from informal graves to large cemeteries. For example, graves, cemeteries, and burials have been reported in the consulted HIAs within a 30 km radius by ACRM (2016), Beaumont (2008a), and Van Schalkwyk (2013a). A small military graveyard and declared heritage site commemorates several German

soldiers who were killed in a battle against a force of the Union of South Africa, which took place here on the 4th of February 1915 was recorded by Rossouw (2021) during a survey for the proposed Lutzburg cemetery.

During Orton's (2012) survey, he recorded a single historic grave dating to 1955. In the same HIA, Orton also reported a large pile of rocks, seemingly placed on top of the degraded bedrock. Although a burial on bedrock exposure is unlikely, there have been reports of burial shafts dug into degraded bedrock covered with a cairn. This cairn is, therefore, assumed to be similar to the other burial sites found within the region. Nicholas Wiltshire (2018) recorded a possible gravesite on the soft, red sands at the base of Renosterkop Peak. These stones were deliberately arranged, although no head or footstones were present, thus suggesting that it is not a Christian burial. ACRM (2019) also noted the grave in their report.

Orton and Webley (2012) identified several features likely to be graves during their survey of the proposed hydroelectric facilities near Riemvasmaak. However, they remark that they cannot be certain about this interpretation without subsurface testing, as these features could have been historical during the 20th century. They also found a memorial with the inscription: "Eerste Landsdienskom Dept v Landbou 21.6.52 – 5.?.52". During Beaumont's (2008a) survey, he examined a graveyard with about 50 to 60 burials. This graveyard was adequately fenced and contained headstones dating from 1959 to 2009, with some unmarked interments that could be older.

Prof. Allan Morris excavated and analysed a collection of burials from the Kakamas area. He studied the materials he collected in 1984 and 56 individuals exhumed by Dreyer and Meiring in 1936. The burial cairns and other information suggested that they belonged to the Khoekhoen people, specifically the Einiqua. According to Pelser (2012), historical data indicate that most graves dating back to the 18th and early 19th centuries have been recorded as containing grave goods, including trade beads and red ochre.

5.2.6 Palaeontological Sensitivity

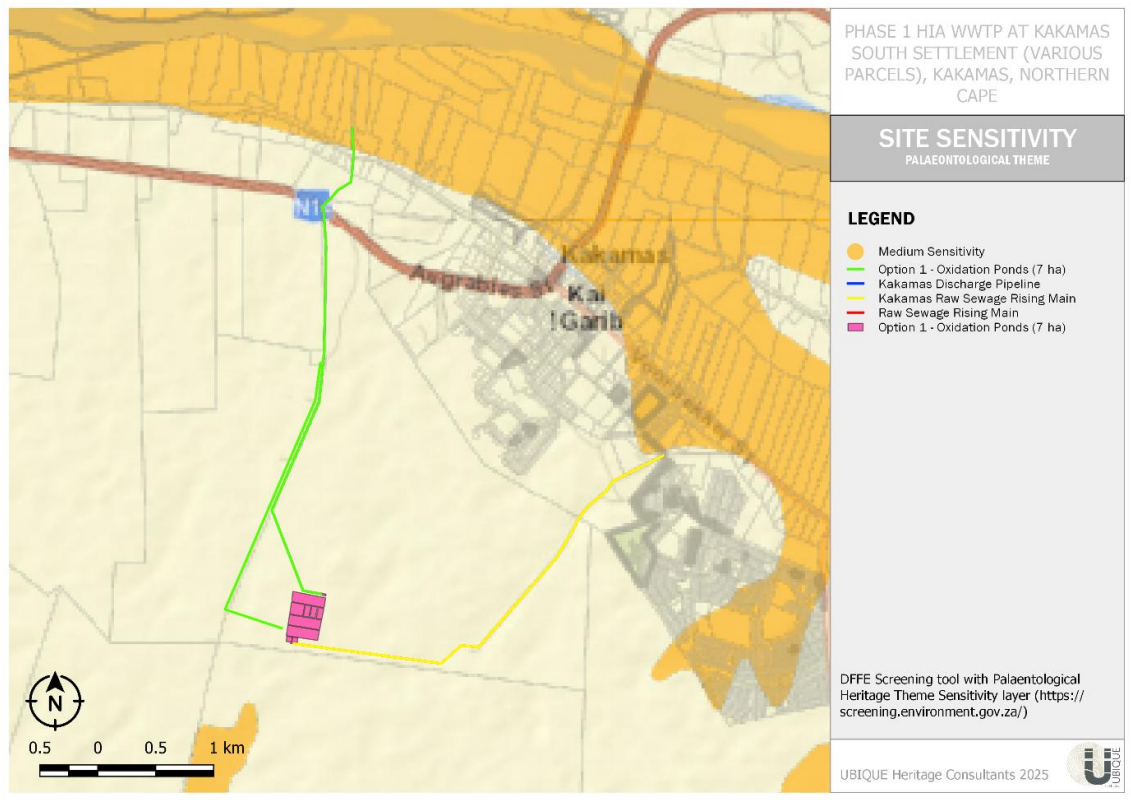

Figure 9 *The Project area indicated on the DFFE Screening tool; Palaeontological Theme layer, indicating Medium (Orange) palaeontological significance north of the study area (https://screening.environment.gov.za/).*

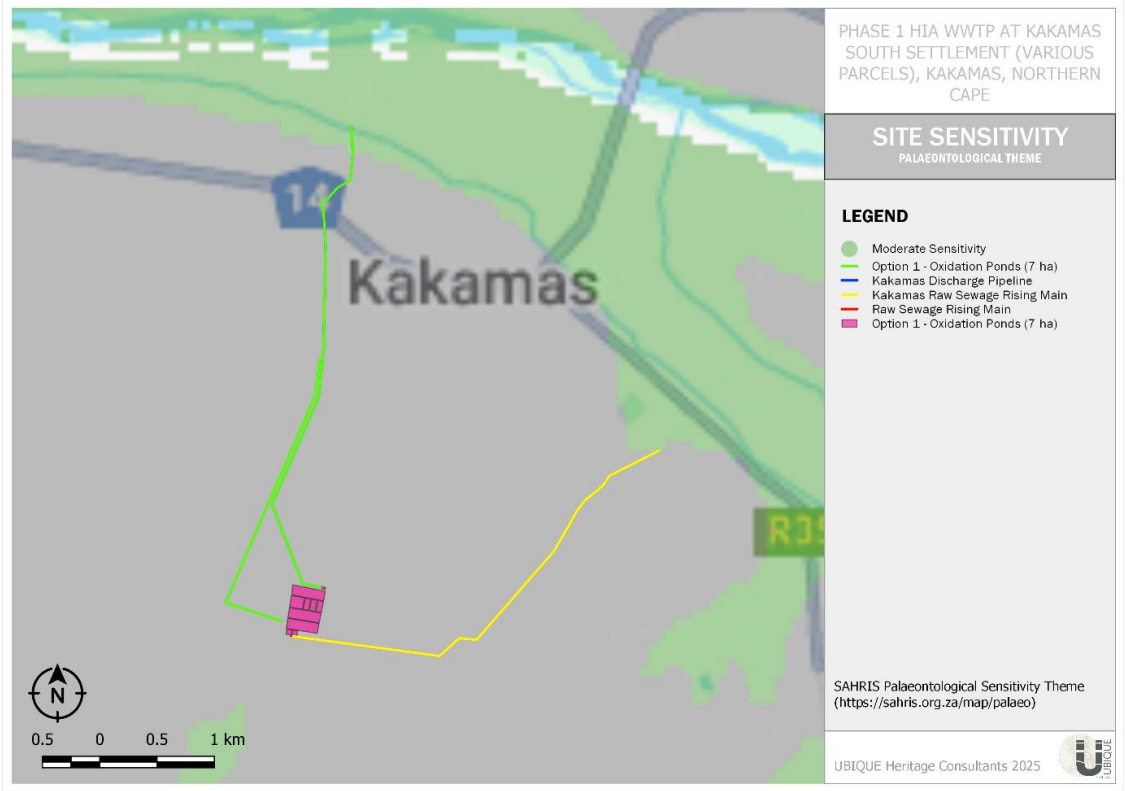

Figure 10 *The SAHRIS PalaeoMap indicates Zero/Insignificant (Grey) and Moderate (Green) palaeontological significance in the study area (https://sahris.org.za/map/palaeo).*

The study area is entirely underlain by unfossiliferous Riemvasmaak Gneiss (RMG) and Kenhardt Magmatite (MK), as well as potentially fossiliferous Quaternary deposits. The PalaeoMap of SAHRIS (**Figure 10**) indicates that the Palaeontological Sensitivity of the study area is Moderate (green) and Zero (grey), while that of the DFFE Screening Report (**Figure 9**) indicates a medium (yellow) and Unknown (white) Sensitivity. Due to the Moderate (SAHRIS) and Medium (DFFE Screening report) Sensitivities, no site investigation was undertaken for this study. However, desktop research has indicated that the Paleosensitivity of the study area is low (Butler 2025, Appendix B).

5.3 Digital Survey

The Google satellite imagery and topographic maps (2820DC) indicate that the proposed agricultural development will be situated in an open landscape with ongoing agricultural expansions over the years.

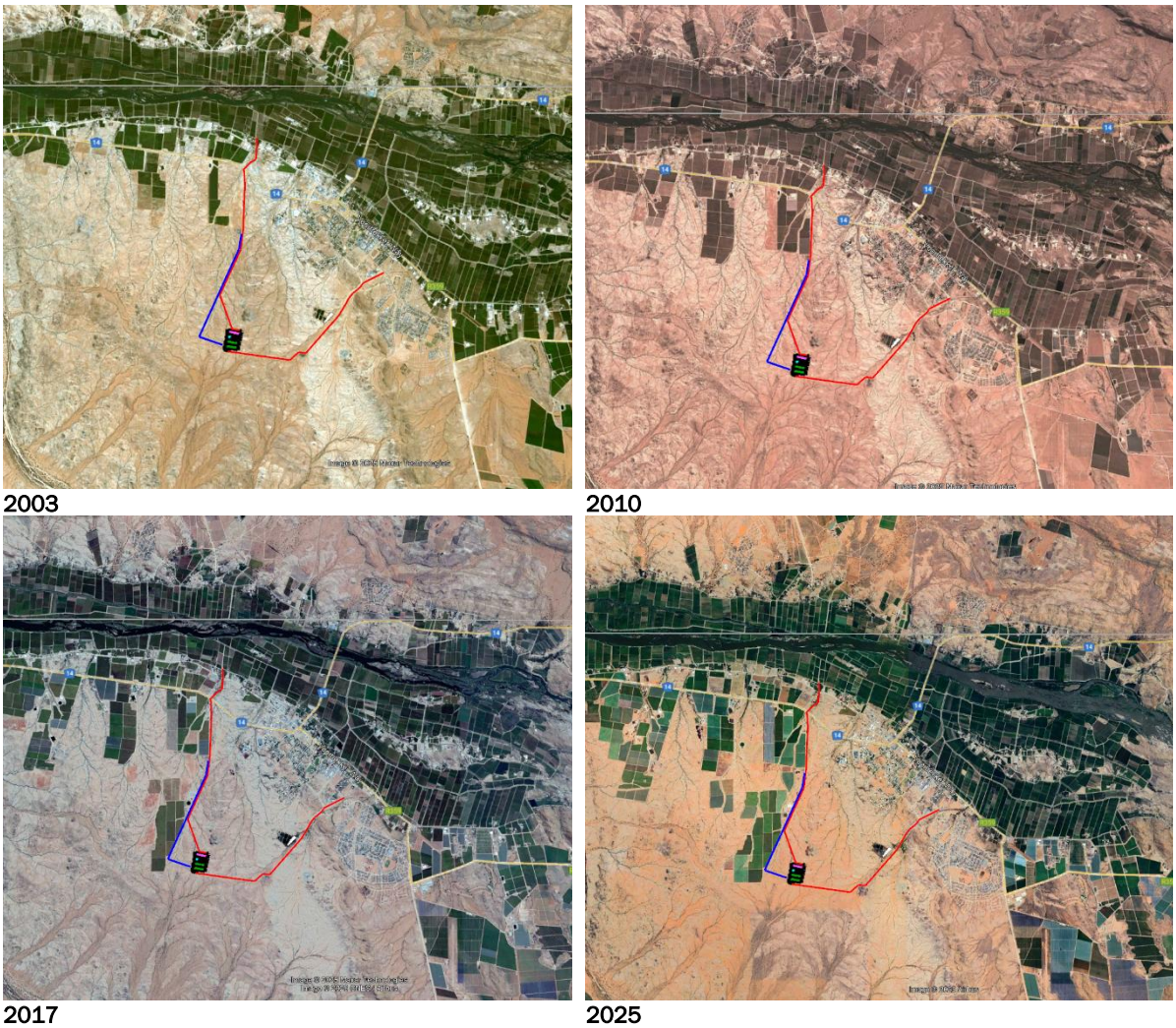

Figure 11 *Historical Google Earth Satellite imagery showing the assessed area between 2003 and 2025.*

5.4 Description of the Affected Environment

The archaeological site visit was conducted during late Autumn on the **8th to the 9th of April 2025.** The development area falls within the Bushmanland Arid Grassland (SANBI BGIS Map Viewer 2018 National Vegetation Map). The geology observed on the ground surface throughout the survey included quartz, chert, dolomite, granite and quartzite. The vegetation predominantly consisted of Tall Bushmangrass/Lanbeen Boesmangras (Stipagrostis ciliate), Silky Bushmangrass/Blinkblaar Boesmangras (*Stipagrostis uniplumis*), Krulblaargras/Curly Leave grass (*Eragrostis biflora*), Camelthorn trees (*Acacia erioloba*), Prosopis (*Prosopis glandulosa*), Blackthorn trees (*Acacia melifora*), Three thorn bushes (*Rhigozum trichotomum*), Quiver tree (*Aloidendron dichotomum*) and Shepherd's tree (*Bosia albitrunca*).

The assessed area is predominantly a flat plain that consists of klipveld, with rocky outcrops and sandy patches. The footprint slopes to the north towards the Orange River. The vegetation was not dense. However, slight scatters of small trees, shrubs and grasses were seen in certain areas throughout the site. Several dry stream drainages can be found (toward the Orange River). Open fields and municipal lands are located to the north and east, while neighbouring farms can be found to the south and west of the site. Access to the site was gained from the N14 National Road. Disturbances include minor erosion caused by floodwater and two-track roads.

Seasonality had no bearing on the study; the fieldwork was deemed sufficient for the nature of the project.

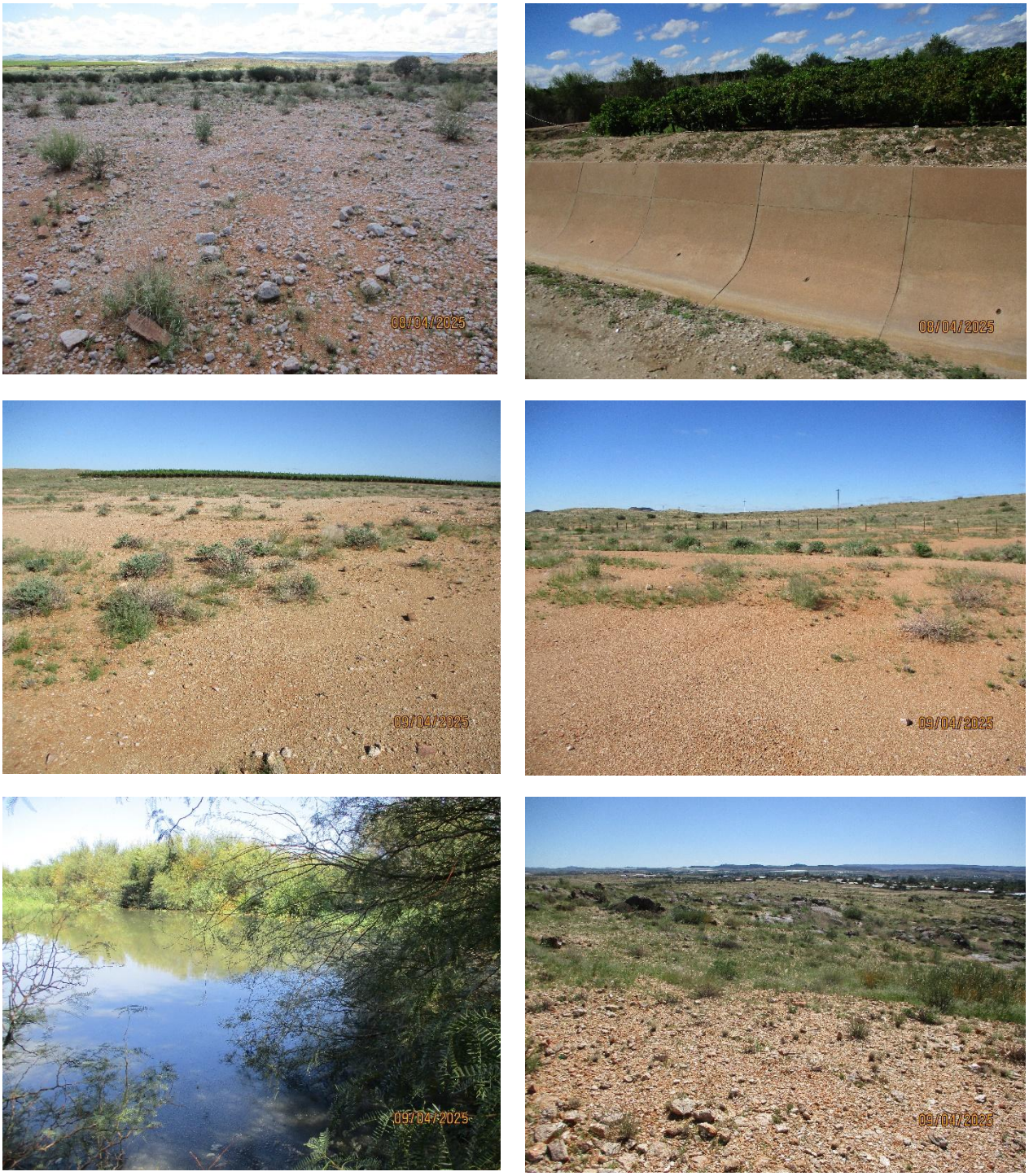

Figure 12 *Views of the affected development area*

6. SURVEY AND IDENTIFIED HERITAGE RESOURCES

6.1 Surveyed Area

UBIQUE Heritage inspected the proposed development and surrounding areas from the **8th to the 9th of April 2025** and completed a controlled, exclusive, pre-planned pedestrian survey. We inspected the ground's surface, wherever the surface was visible. This was done with no substantial attempt to clear brush, sand, deadfall, leaves or other material that may cover the surface and with no effort to look beneath the surface beyond inspecting rodent burrows, cut banks and other exposures fortuitously observed. Seasonality had no bearing on the study; the fieldwork was deemed sufficient for the nature of the project.

The areas surveyed for the impact assessment were dictated by the Google Earth map of the development footprint provided by the client. A one-person survey team surveyed the proposed development footprint on foot.

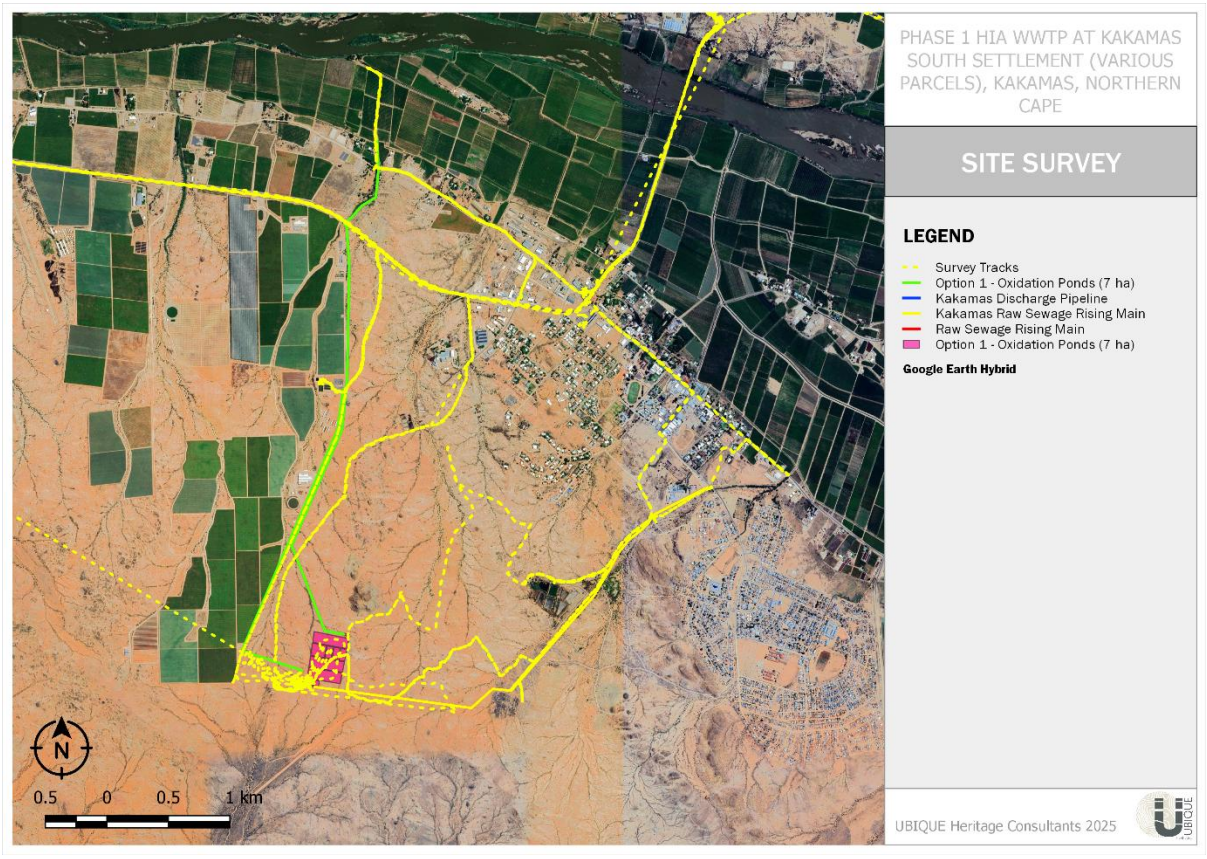

Figure 13 *Survey tracks across the development footprint.*

6.2 Identified Heritage Resources

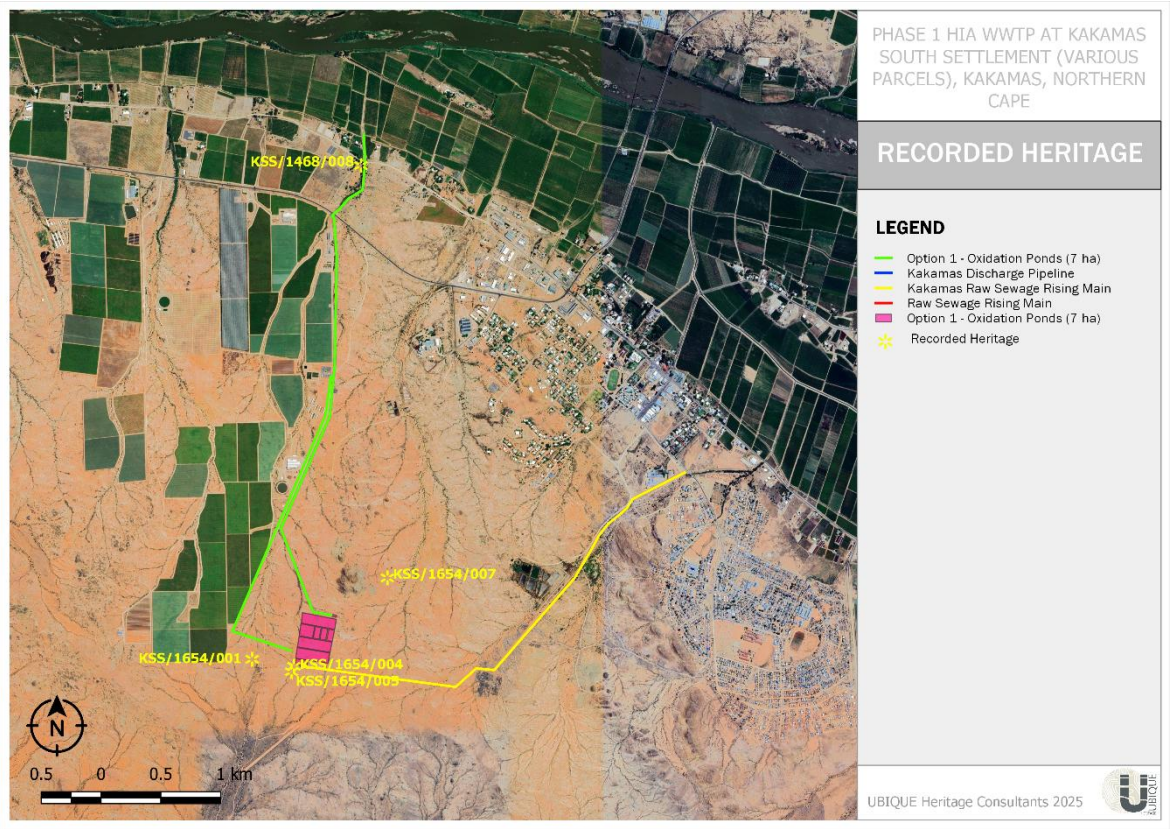

Figure 14 *Distribution of identified heritage resources at the proposed development area.*

6.2.1 Stone Age Identified

STONE AGE PERIOD RESOURCES RECORDED					
SITE ID	DESCRIPTION		PERIOD	LOCATION	FIELD RATING/ SIGNIFICANCE/ RECOMMENDED MITIGATION
KSS/1654/001	Type of lithic/s	Chips and flakes	MSA	**28° 47' 34.6" S 20° 35' 29.6" E**	Field Rating IVC Low Significance **No mitigation is recommended.**
	Material	BIF			
	N in m².	8/100m²			
	Context	Random debris			
	Additional	No context			
KSS/1654/004	Type of lithic/s	Flakes and chunks	MSA	**28° 47'36.3" S 20° 35' 29.6"E**	Field Rating IVC Low Significance **No mitigation is recommended.**
	Material	BIF			
	N in m².	3/100m²			
	Context	Random debris			
	Additional	No context			
KSS/1654/005	Type of lithic/s	Flakes and chunks	MSA	**28° 47' 37.6" S 20° 35' 40.3" E**	Field Rating IVC Low Significance **No mitigation is recommended.**
	Material	BIF			
	N in m².	4/100m²			
	Context	Random debris			
	Additional	No context			

6.2.1.1 Discussion: Stone Age Period

Three instances of Middle Stone Age (MSA) lithic scatters/occurrences were recorded (KSS/1654/001, KSS/1654/004, and KSS/1654/005). The recorded lithics included flakes, chunks, and chips. The lithic material exhibits various degrees of weathering and lacks substantial archaeological context or matrix. Therefore, it is deemed to be of minor scientific importance.

These resources are given a 'General' Protection C (Field Rating IVC) and are considered low significance. Therefore, no further mitigation is recommended.

KSS/1654/001

KSS/1654/004

KSS/1654/005

Figure 15 *Examples of Low significant lithic material recorded*

6.2.2 Iron Age Identified

No cultural material, features or structures attributed to the Iron Age period were recorded within the development footprint.

6.2.3 Historical/Colonial Period Identified

No cultural material, features or structures attributed to the Historical period were recorded within the development footprint.

6.2.4 Graves Identified

GRAVES RECORDED					
SITE ID	DESCRIPTION		PERIOD	LOCATION	FIELD RATING/ SIGNIFICANCE/ RECOMMENDED MITIGATION
KSS/1654/007	Grave markers	Unmarked stone packed	Unknown	**28° 47' 15.4" S 20° 36' 06.2" E**	Field Rating IIIA High Significance **30 m precautionary buffer zone**
	Inscription	None			
	Graves' orientation	East/West			
	Dimensions/ Extent	2m x 1m			
	Additional	Possible unmarked grave			
KSS/1468/008	Grave markers	Stonepacked, cement, wooden crosses	Unknown	**28°45'37.72"S 20°35'59.02"E**	Field Rating IIIA High Significance **30 m precautionary buffer zone**
	Inscription	Various			
	Graves' orientation	East/West			
	Dimensions/ Extent				
	Additional	N/A			

6.2.4.1 Discussion: Graves

An unmarked possible grave (KSS/1654/007) was recorded. Unfortunately, it cannot be confirmed whether this is a grave without subsurface testing. If this is indeed a grave, any impact would be negative. All graves are considered to be of high significance and should be mitigated. However, since this possible grave is outside the proposed footprint, it will not be impacted by development.

This possible grave is given a 'Local Grade Protection' (Field Rating IIIA) and is of local importance and worthy of conservation. However, no further mitigation is recommended since it is outside of the proposed footprint. Although the chance of impact occurring is extremely low (less than a 25% chance of occurrence):

- **Implementing a precautionary 30 m buffer (no-go) zone around the grave site can avoid any possible impact.**

KSS/1654/007

KSS/1654/007

Figure 16 *Examples of possible Grave(s) recorded*

A cemetery (KSS/1468/008) was recorded, varying from stone-packed and cement graves to a few with wooden crosses as headstones. All graves are considered to be of high significance and should be mitigated. However, since this graveyard is outside the proposed footprint, it will not be impacted by development.

This graveyard is given a 'Local Grade Protection' (Field Rating IIIA) and is of local importance and worthy of conservation. However, no further mitigation is recommended since it is outside of the proposed footprint. Although the chance of impact occurring is extremely low (less than a 25% chance of occurrence):

- **Implementing a precautionary 30 m buffer (no-go) zone around the grave site can avoid any possible impact.**

KSS/1468/008

KSS/1468/008

KSS/1468/008

KSS/1468/008

Figure 17 *Examples of Graves recorded*

6.2.5 Palaeontological Resources

An Exemption for a Palaeontological Impact Assessment is recommended for the WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province, as it is underlain by unfossiliferous Riemvasmaak Gneiss (MRM) as well as the Kenhardt Magmatite (MKM) and potentially fossiliferous Quaternary alluvium (QG). However, the Quaternary sediments are not highly fossiliferous (Butler 2025, Appendix B).

7. IMPACT ASSESSMENT OF THE DEVELOPMENT

7.1 Impact Assessment Tables

ARCHAEOLOGICAL, HISTORICAL, & CULTURAL								
NATURE	HERITAGE AND CULTURAL RESOURCES IDENTIFIED SITE(S): LOW SIGNIFICANCE Field Rating IVC – KSS/1654/001, KSS/1654/004 and KSS/1654/005							
DEVELOPMENT PHASE	DEVELOPMENT IMPACT			IMPACT RATING		RECOMMENDED MITIGATION	IS IMPACT ACCEPTABLE?	
	CRITERIA	*BM	**AM	BEFORE MITIGATION	AFTER MITIGATION		*BM	**AM
PLANNING PHASE	Extent	1	1	Positive low impact	Positive low impact	NONE	YES	YES
	Probability	1	1					
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					
CONSTRUCTION PHASE	Extent	1	1	Negative Low impact	Negative Low impact	NONE	YES	YES
	Probability	1	1					
	Reversibility	2	2					
	Irreplaceability	3	1					
	Duration	3	2					
	Cumulative Effect	2	2					
	Magnitude	2	1					
	Impact Significance	28	9					
OPERATIONAL PHASE	Extent	1	1	Negative Low impact	Negative Low impact	NONE	YES	YES
	Probability	1	1					
	Reversibility	2	2					
	Irreplaceability	3	1					
	Duration	3	2					
	Cumulative Effect	2	2					
	Magnitude	2	1					
	Impact Significance	28	9					

*BM = BEFORE MITIGATION =; **AM = AFTER MITIGATION

IMPACT: Three instances (KSS/1654/001, KSS/1654/004, and KSS/1654/005) of Middle Stone Age (MSA) lithic scatters/occurrences were recorded. These resources are given a 'General' Protection C (Field Rating IVC) and are considered to be of low significance. The impact is negligible. The impact would be NEGATIVE LOW before and after mitigation during the construction phase and NEGATIVE LOW, before and after mitigation during the operational phase.

MITIGATION: No further mitigation is recommended.

MITIGATION CONFIDENCE: The significance of the impact is assessed following the implementation of mitigation measures based on the confidence levels that the mitigation measures will reduce the impact.

MITIGATION CONFIDENCE		
NEGATIVE IMPACTS		
1	Low	No change to the significance of the impact. No mitigation measures required.

ARCHAEOLOGICAL, HISTORICAL, & CULTURAL								
NATURE	HERITAGE AND CULTURAL RESOURCES IDENTIFIED SITE(S): HIGH SIGNIFICANCE Field Rating IIIA – KSS/1654/007, KSS/1468/008							
DEVELOPMENT PHASE	DEVELOPMENT IMPACT			IMPACT RATING		RECOMMENDED MITIGATION	IS IMPACT ACCEPTABLE?	
	CRITERIA	*BM	**AM	BEFORE MITIGATION	AFTER MITIGATION		*BM	**AM
PLANNING PHASE	Extent	1	1	Positive low impact	Positive low impact	NONE	YES	YES
	Probability	1	1					
	Reversibility	1	1					
	Irreplaceability	1	1					
	Duration	1	1					
	Cumulative Effect	1	1					
	Magnitude	1	1					
	Impact Significance	6	6					
CONSTRUCTION PHASE	Extent	2	2	Negative High impact	Negative Low impact	30m Cautionary Safety/No-Go Buffer Zone	NO	YES
	Probability	1	1					
	Reversibility	3	2					
	Irreplaceability	4	1					
	Duration	4	2					
	Cumulative Effect	3	3					
	Magnitude	3	2					
	Impact Significance	51	22					
OPERATIONAL PHASE	Extent	2	2	Negative Medium Impact	Negative Low impact	30m Cautionary Safety/No-Go Buffer Zone	NO	YES
	Probability	1	1					
	Reversibility	3	2					
	Irreplaceability	4	1					
	Duration	3	2					
	Cumulative Effect	3	3					
	Magnitude	3	2					
	Impact Significance	48	22					

*BM = BEFORE MITIGATION =; **AM = AFTER MITIGATION

IMPACT: One instance of a possible grave was recorded (KSS/1654/007), as well as a cemetery (KSS/1468/008). All graves are of High significance and should be protected. However, none of the grave sites fall within the proposed development footprint, so neither will be impacted. However unlikely, if an impact occurs, the impact would be NEGATIVE HIGH before mitigation, NEGATIVE LOW after mitigation during the construction phase, and NEGATIVE MEDIUM before and NEGATIVE LOW after mitigation during the operational phase.

MITIGATION: As both grave sites are outside the proposed footprint, no further mitigation is recommended.

- Although the probability of impact occurring is extremely low (less than a 25% probability of occurrence), the impact can be avoided by implementing a precautionary 30 m buffer (no-go) zone around the grave sites.

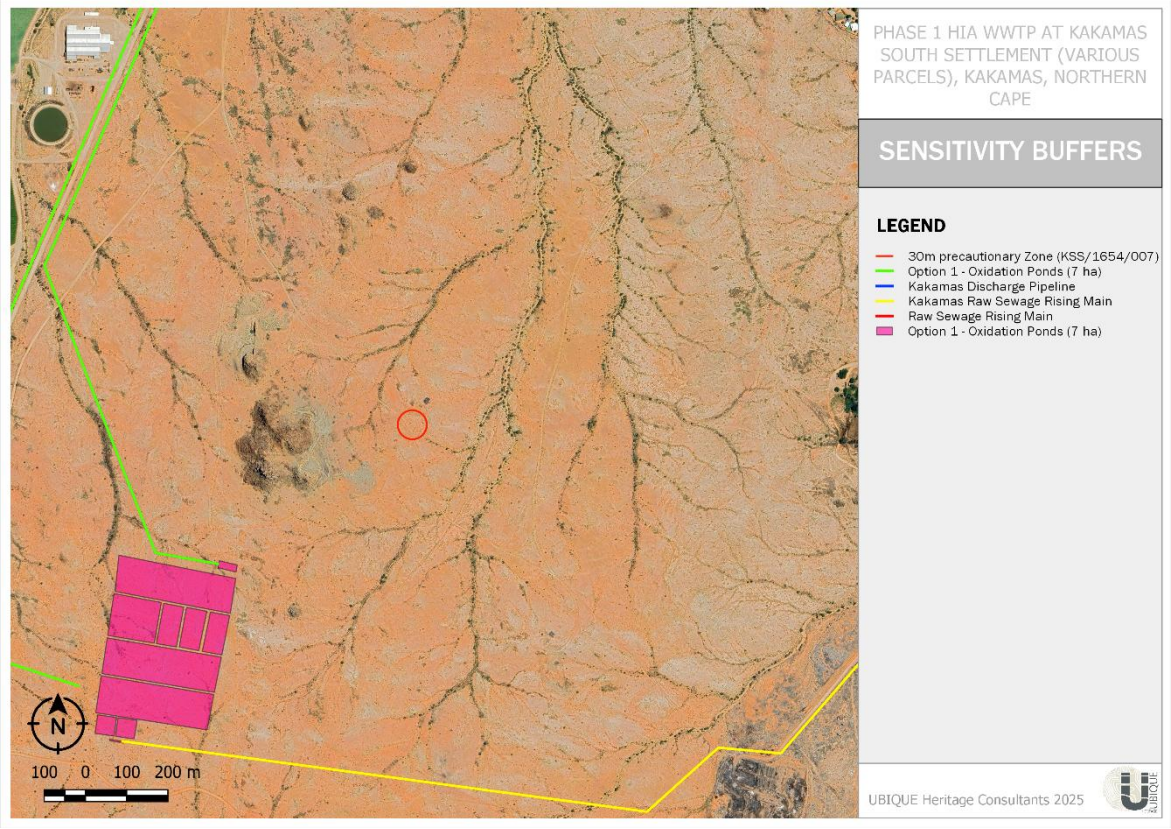

Figure 18 Precautionary Buffer for KSS/1654/007

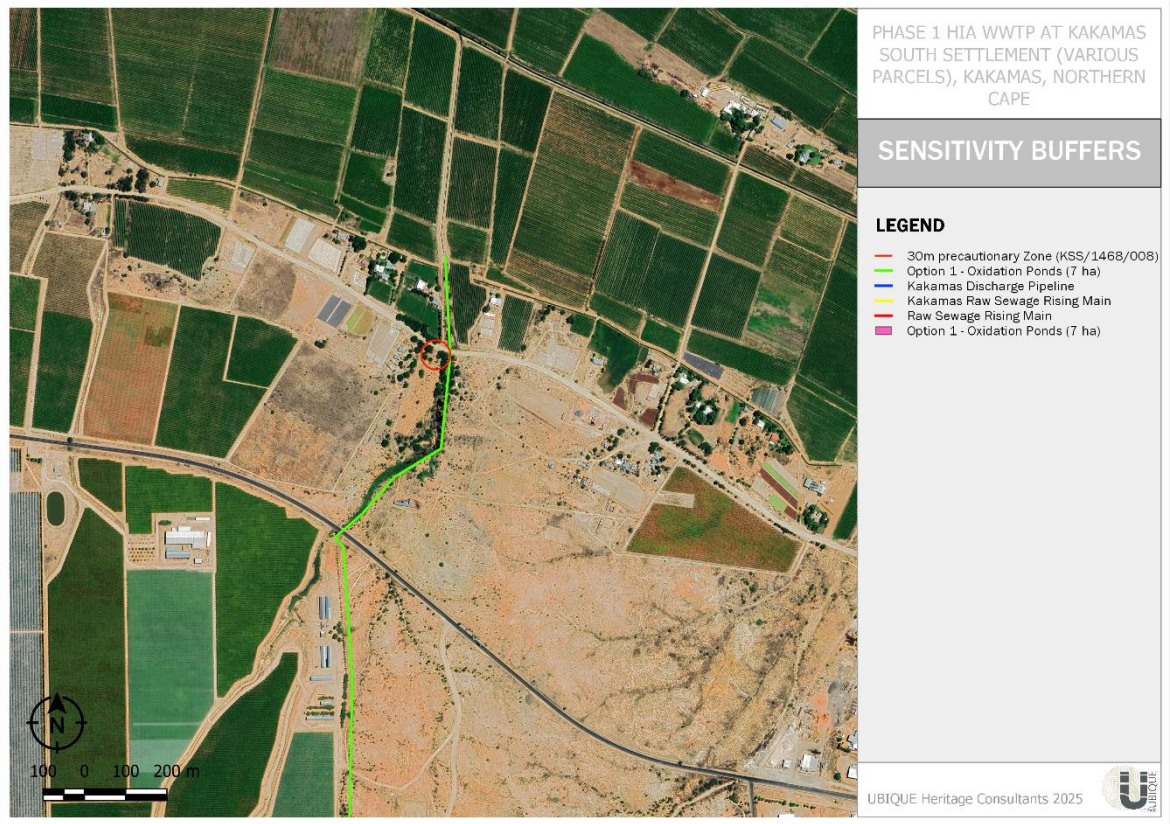

Figure 19 *Precautionary Buffer for KSS/1468/008*

MITIGATION CONFIDENCE: The significance of the impact is assessed following the implementation of mitigation measures based on the confidence levels that the mitigation measures will reduce the impact.

MITIGATION CONFIDENCE		
NEGATIVE IMPACTS		
0.2-0.3	High	80% confidence that the mitigation measures will reduce the impact

7.2 Cumulative Impact

The EIA Regulations 2014 (as amended in 2017) determine that cumulative impacts, "*in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.*"

For this report, the term "cumulative effect" has been defined as the summation of effects over time that can be attributed to the operation of the project itself and the overall effects on the

heritage significance of the site within a 30 km radius that can be attributed to the project and other similar existing and planned future projects.

7.2.1 Geographical Area to be Assessed

The geographic area of evaluation is the spatial boundary within which the cumulative effects analysis was undertaken. The geographical area evaluated for the cumulative effects assessment includes a 30 km radius surrounding the proposed development (Figure 20). Development has transformed the area minimally.

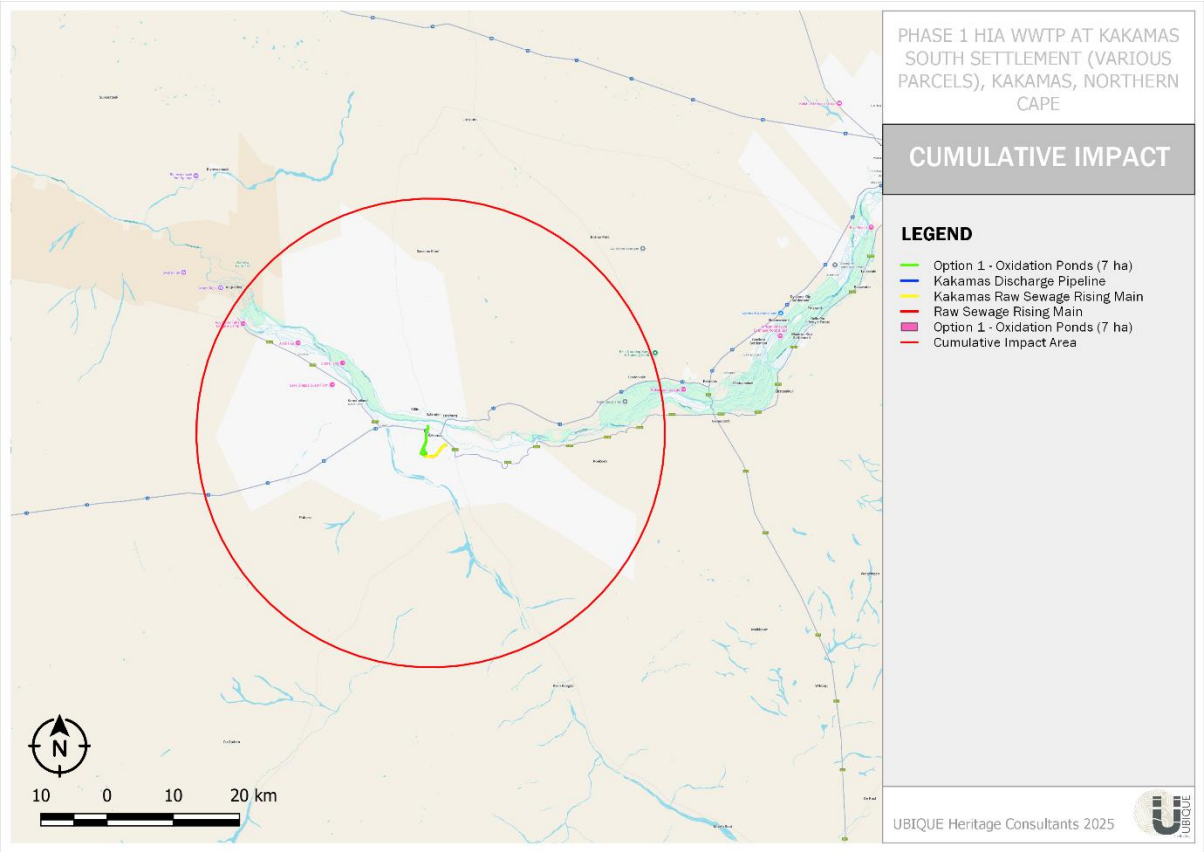

Figure 20 *Map showing the 30 km radius of the geographical area.*

7.2.2 Temporal Boundary

The temporal boundary refers to the timeframe for the expected cumulative impacts. As heritage resources are finite, if negative impacts occur, the effect would likely have a cumulative impact that exceeds the temporal boundary.

7.2.3 Specialist Assessments: Archaeological and Palaeontological

The desktop research shows that heritage resources are predominantly sparsely distributed in the broader landscape, with highly significant sites around Kakamas. The heritage resources recorded during our assessment add minimal understanding of the wider archaeological, historical, and cultural landscape, even though they are site-specific. More significant heritage sites are located within the 30 km radius, but the cumulative effect of resources recorded within the footprint will not affect their significance, positively or negatively. Therefore, the proposed development will have a **LOW NEGATIVE** cumulative impact. **The proposed development within the study area cannot potentially negatively impact the significant archaeological resources in the larger geographical area or vice versa.**

RESOURCE TYPE	DEVELOPMENT IMPACT			IMPACT RATING	
	CRITERIA	*BM	**AM	BEFORE MITIGATION	AFTER MITIGATION
ARCHAEOLOGICAL, HISTORICAL, CULTURAL	Extent	2	2	Negative low impact	Positive low impact
	Probability	2	2		
	Reversibility	2	2		
	Irreplaceability	2	2		
	Duration	3	3		
	Magnitude	2	2		
	Impact Significance	22	22		

8. RECOMMENDATIONS

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

1. The Middle Stone Age Period surface scatters/occurrences (KSS/1654/001, KSS/1654/004, and KSS/1654/005) show various degrees of weathering and are without substantial archaeological context or matrix. Therefore, it is deemed to be of minor scientific importance. These resources are given a '**General' Protection C (Field Rating IVC)** and are considered **low significance**. **The impact is negligible. Therefore, no further mitigation is recommended.**

2. One instance of a possible grave was recorded (KSS/1654/007) as well as a cemetery (KSS/1468/008). All graves are of **High significance** and should be protected. However, none of the grave sites fall within the proposed development footprint, so **neither will be impacted.** Although the probability of **impact occurring is extremely low** (less than a 25% chance of occurrence):
    - **Implementing a precautionary 30 m buffer (no-go) zone around the grave sites can avoid any possible impact.**

3. Should it be impossible to avoid graveyard(s), grave(s) or burial(s) sites during development, mitigation in the form of grave relocation could be undertaken. This is, however, a lengthy and costly process. Grave relocation specialists should be employed to manage the liaison process with the communities and individuals who, by tradition or familial association, might have an interest in these graves or burial grounds, as well as manage the permit acquisition from the SAHRA Burial Grounds and Graves (BGG) Unit and the arrangements for the exhumation and re-interment of the contents of the graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

4. An **Exemption for a Palaeontological Impact Assessment is recommended** for the WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province, as it is underlain by unfossiliferous Riemvasmaak Gneiss (MRM) as well as the Kenhardt Magmatite (MKM) and potentially fossiliferous Quaternary alluvium (QG). However, the Quaternary sediments are not highly fossiliferous (Appendix B).

5. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone

artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA must be alerted immediately as per section 36(6) of the NHRA. Depending on the nature of the finds, a professional archaeologist or palaeontologist must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources are of archaeological or palaeontological significance, a Phase 2 rescue operation may be required, subject to permits issued by SAHRA. UBIQUE Heritage and its personnel will not be held liable for such oversights or costs incurred due to such oversights.

9. CONCLUSION

This HIA has identified various resources during the assessment. Three instances (KSS/1654/001, KSS/1654/004, and KSS/1654/005) of Middle Stone Age (MSA) lithic scatters/occurrences were recorded. These resources are given a 'General' Protection C (Field Rating IVC) and are considered to be of low significance. The impact is negligible. Therefore, no further mitigation is recommended.

One instance of a possible grave was recorded (KSS/1654/007) and a cemetery (KSS/1468/008). All graves are of High significance and should be protected. However, none of the grave sites fall within the proposed development footprint, so neither will be impacted. Although the chance of impact occurring is extremely low (less than a 25% chance of occurrence), any possible impact can be avoided by implementing a precautionary 30 m buffer (no-go) zone around the grave sites.

Palaeontological Impact Assessment Exemption is recommended.

The proposed WWTP (Waste Water Treatment Plant) development at Kakamas South Settlement Parcel 1654, Kakamas, in the Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province, may continue, provided the recommendations stipulated within this report and the subsequent SAHRA decision are followed.

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11. TERMS OF REFERENCE

11.1 Statutory Requirements

11.1.1 General

The principle is that the environment should be protected for present and future generations by preventing pollution, promoting conservation and practising ecologically sustainable development. With regard to spatial planning and related legislation at national and provincial levels, the following legislation may be relevant:

- Physical Planning Act 125 of 1991
- Municipal Structures Act 117 of 1998
- Municipal Systems Act 32 of 2000
- Development Facilitation Act 67 of 1995 (DFA)

The identification, evaluation and management of heritage resources in South Africa are required and governed by the following legislation:

- National Environmental Management Act 107 of 1998 (NEMA)
- KwaZulu-Natal Heritage Act 4 of 2008 (KZNHA)
- National Heritage Resources Act 25 of 1999 (NHRA)
- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)

11.1.2 National Heritage Resources Act 25 of 1999

The NHRA established the South African Heritage Resources Agency (SAHRA) together with its Council to fulfil the following functions:

- coordinate and promote the management of heritage resources at the national level;
- set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance;
- control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries;
- enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; and
- provide for local authorities' protection and management of conservation-worthy places and areas.

12.1.3 Heritage Impact Assessments/Archaeological Impact Assessments

Section 38(1) of the NHRA of 1999 requires **the responsible heritage resources authority to notify the person who intends to undertake a development that fulfils the following criteria to submit an impact assessment report if there is reason to believe that heritage resources will be affected by such event:**

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity that will change the character of a site—
    - exceeding 5000m² in extent; or
    - involving three or more existing erven or subdivisions thereof; or
    - involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    - the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- the rezoning of a site exceeding 10 000m² in extent; or
- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

11.1.4 Management of Graves and Burial Grounds

- **Graves younger than 60 years** are protected in terms of the Graves and Dead Bodies Ordinance (Ord 7) of 1925 (re-instituted by the Proclamation 109 of June 17 1994), the Exhumations Ordinance (Ord 12 of 1980), as well as either the Human Tissues Act (Act 65 of 1983 as Amended) or the National Health Act (Act 61 of 2003).

- **Graves older than 60 years, situated outside a formal cemetery administered by a local Authority are** protected in terms of Section 36 of the NHRA as well as the Human Tissues Act of 1983. Accordingly, such graves are under the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

The **protocol for the management of graves older than 60 years situated outside a formal cemetery administered by a local authority** is detailed in Section 36 of the NHRA:

> (3) *(a)* No person may, without a permit issued by SAHRA or a provincial heritage resources authority—
>
> *(a)* destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
>
> *(b)* destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
>
> *(c)* bring onto or use at a burial ground or grave referred to in paragraph *(a)* or *(b)* any excavation equipment, or any equipment which assists in the detection or recovery of metals.
>
> (4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)*(a)* unless

it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

(5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)*(b)* unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

(a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in cooperation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—

(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

APPENDIX A

SPECIALIST CVS

HEIDI FIVAZ

ABRIDGED CURRICULUM VITAE

heidi@ubiquecrm.com

QUALIFICATIONS

2021 MA: Archaeology (Cum Laude) - UNISA
Dissertation: Late 19th-century railroad workcamps associated with the NZASM Oosterlijn: An archaeological survey. https://uir.unisa.ac.za/handle/10500/28082

2015 BA Honours: Archaeology - UNISA
Dissertation: Architecture, Material Remains and the Use of Domestic Space: the evidence from a 19th-century Venda household on Magoro Hill.

2012 BA: CUA – Historical Studies - UNISA
Majors: Archaeology and History

2000 B-Tech: Fine Art - Tshwane University of Technology

1998 National Diploma: Fine Art - Vaal Triangle Technikon

1995 G.E.D Matriculation - Hoërskool Brandwag

COURSES

October 2015 Care and Conservation of Archaeological Collections – City of Angels Conservation

March 2013 Conservation: Ceramic & glass colour fills – SA Institute of Object Conservation

September 2012 GIS and mapping workshop - University of South Africa

March 2012 Conservation of Low-fired and non-fired wares - SA Institute of Object Conservation

September 2011 Introduction to Ceramic Conservation - SA Institute of Object Conservation

March 2011 Introduction to Ceramic Conservation - SA Institute of Object Conservation

2010-2012 Intern Archaeozoological Analysis - Archaeozooologist Karin Scott

SKILLS

Archaeology:
Excavation Techniques and Methodology - Historical and Iron Age; **Survey** – Historical, Iron Age and Stone Age; **Site Mapping** - Historical and Iron Age; **Cultural Material Identification and Analysis** - Historical and Iron Age (Specialist); **Faunal Material Analysis** (Basic); **Lithic Tool Identification** (intermediate)

Related skills:
On and off-site Archaeological Material Conservation; Ceramic and Glass objects Conservation and Restoration; Scientific and Technical Writing; Archival Research; Archaeological Illustration

ARCHAEOLOGICAL FIELDWORK EXPERIENCE

Archaeological Excavations:
Ms Fivaz has been involved in nearly 40 archaeological excavations since 2005, including historical and agropastoral research excavations, Phase 2 mitigation rescue excavations, and grave rescue and relocation projects.

Cultural Resource Management / Heritage Impact Assessments:
Ms Fivaz has conducted numerous Heritage Impact Assessments, including field surveys, report writing and permit applications since 2015, compiling Heritage Inventories, and providing support for local Heritage Initiatives.

PROFESSIONAL BODIES

ASAPA (Association for Southern African Professional Archaeologists) Professional Membership number: 433

ARCSOC (Archaeological Society of South Africa)

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ABRIDGED CURRICULUM VITAE

sky@ubiquecrm.com

QUALIFICATIONS

2023 MA: Archaeology - UNISA

Dissertation: An archaeological investigation of the *Bakgatla Baga Kgafela* at Mabeleapodi, Pilanesberg National Park, North West Province.

2018 BA Honours: Archaeology (Cum Laude)- UNISA

Dissertation: An archaeological investigation of a 19th-century Tswana townhouse, Pilanesberg National Park, North West Province.

2016 BA (Bachelor of Arts): - UNISA

Majors: Archaeology and Biblical Archaeology.

2012 National Senior Certificate - High school/Hoërskool Westonaria

COURSES

July 2019 Historical Ceramics and Interpretation Workshop - ASAPA

December 2017 Student Development Workshop – ASAPA Student Council and PAST

August 2017 Archaeozoology/Bone Identification - HeritageworX-Ditsong Museum of Natural History

SKILLS

Archaeology:

Excavation Techniques and Methodology - Historical and Iron Age; **Survey –** Historical, Iron Age and Stone Age; **Site Mapping -** Historical and Iron Age; **Cultural Material Identification and Analysis -** Historical and Iron Age (Specialist); **Faunal Material Analysis** (Basic); **Lithic Tool Identification** (intermediate)

Related skills:

On-site Archaeological Material Conservation; Scientific and Technical Writing; Archival Research; Archaeological Illustration

ARCHAEOLOGICAL FIELDWORK EXPERIENCE

Archaeological Excavations:

Mrs Fairhurst-Booyse has been involved in 31 archaeological excavations since 2013, including historical and agropastoral research excavations and a Phase 2 mitigation rescue excavation.

Cultural Resource Management / Heritage Impact Assessments:

Mrs Fairhurst-Booyse started conducting numerous desktop assessments in 2019, but as of 2021 she has conducted numerous Heritage Impact Assessments, which included field surveys, report writing, and assisted with permit applications.

PROFESSIONAL BODIES

ASAPA (Association for Southern African Professional Archaeologists) Professional Membership number: 541

ARCSOC (Archaeological Society of South Africa)

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JAN ENGELBRECHT

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QUALIFICATIONS

2011 BA Honours: Archaeology - UNISA
Dissertation: The Historical Site of Dr. David Bruce at Ubombo.

2009 BA: Archaeology, Biblical Archaeology and Ancient History. - UNISA
Majors: Archaeology

2004 B-Tech: Animal Health (UNISA)

1997 National Diploma: Animal Health (SA Technikon)

1989 G.E.D Matriculation

COURSES

2024: UNISA workshop: Archaeobotany

2022: Occupational Safety and Health Course (Khumba-Anglo American)

2018: Report Writing Skills (DALRRD)

2012: GIS and Mapping Workshop (Wits)

2010: Occupational Safety and Health Course (Richards Bay Minerals)

2010: Ceramics Workshop (UNISA)

2009: Project Management Course (Northwest University)

2008: Employee Performance Management (Dept. of Agriculture)

2008: Nature Conservation Workshop-Invasive Aquatic Plants and Honorary Ranger Course (Ezemvelo KZN)

2007: Workshop on Environmental and Heritage Management Plans (UNISA)

SKILLS

Archaeology:
Excavation Techniques and Methodology - Historical and Iron Age; Survey – Historical, Iron Age and Stone Age; Site Mapping - Historical and Iron Age; Cultural Material Identification and Analysis - Historical and Iron Age; Lithic Tool Identification (intermediate)

Related skills:
Site interpretation and survey (Expert); Scientific and Technical Writing

ARCHAEOLOGICAL FIELDWORK EXPERIENCE

Archaeological Excavations:
Mr Engelbrecht has been involved in nearly 20 archaeological excavations since 2005, including historical and agropastoral research excavations Phase 2 mitigation rescue excavations.

Cultural Resource Management / Heritage Impact Assessments:
Mr Engelbrecht has been involved in over 60 Heritage Impact Assessments since 2006, including field surveys and report writing, compiling Heritage Inventories, and supporting local Heritage Initiatives.

PROFESSIONAL BODIES

ASAPA (Association for Southern African Professional Archaeologists) Professional Membership number: 297

ARCSOC (Archaeological Society of South Africa)

South African Military Historical Society

South African Veterinary Council

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APPENDIX B

PALAEONTOLOGICAL IMPACT ASSESSMENT EXEMPTION

PALAEONTOLOGICAL EXEMPTION LETTER

PROPOSED WASTE WATER TREATMENT PROJECT LOCATED AT KAKAMAS SOUTH SETTLEMENT, KAKAMAS, IN THE NORTHERN CAPE PROVINCE

Conducted By Elize Butler (Banzai Environmental)

The Applicant: KAI !GARIB MUNICIPALITY

Location:

Lutzburg & Cillie: 450 m³/day aerated facultative pond system (Figure 1-3).

Background information:

Overview of the Wastewater Management Situation in Kakamas and Surrounding Areas

Currently, wastewater from Kakamas and the surrounding areas is treated in a network of raised oxidation ponds southwest of the town. Due to its elevated location, all sewage from Kakamas must be piped uphill to access the treatment facility.

In Kakamas, several regions, along with adjacent villages and farms to the north and northwest of Blouputs, are equipped with conservancy tanks or dry sanitation systems, including Ventilated Improved Pit (VIP) and Urine Diversion Sanitation (UDS) toilets. These regions are under the jurisdiction of the Kai !Garib Municipality.

Municipal Hoover tanker trucks convey wastewater from the conservancy tanks to the Kakamas oxidation ponds.

Current Capacity and Challenges

BVi Consulting Engineers have determined that the current oxidation ponds can process a maximum of 430 m³ per day. Currently, they get around 4,584 m³/day—exceeding their original capacity by more than tenfold. This overload is attributable to:

• The proliferation of sub-economic housing in the last 15–20 years, with these newly developed areas linked to waterborne sewage systems, while the treatment infrastructure has remained static. • Wastewater being conveyed from six adjacent villages by tanker to the Kakamas facility.

• Accumulated sludge diminishes the ponds' capacity. The retention duration in the ponds, preferably 40 to 50 days, has decreased to just one day. This has resulted in non-compliance with effluent quality regulations (General Limit Values).

2. Regular overflows into an adjacent creek, which feeds into the Orange River, upstream of the town's potable water intake.

Constraints and Limitations of the Current Facility

The existing location possesses several constraints:

• Location: Proximity to residential zones is excessive.

• Expansion Constraints: It restricts the town's northern expansion, the sole feasible path for future development.

• Topography: Treatment facilities are optimally situated at the lowest elevation of the town to facilitate gravity-fed sewage systems. Nonetheless, the lowest terrain adjacent to the Orange River constitutes high-value agricultural property and is not eligible for building. Consequently, the sole viable alternative for additional facilities is situated on municipally owned elevated terrain to the south.

Proposed Approaches

The engineering team identified two primary options:

Approach A: Centralised System

Establish a single traditional oxidation pond system with a capacity of 4.5 million litres per day in Kakamas.

Advantages: Minimal capital expenditure.

Disadvantages: Necessitates ongoing, expensive tanker transportation from adjacent settlements.

Approach B: Decentralised System

Establish smaller treatment facilities in Kakamas and adjacent communities. Proposed Facilities: Kakamas: 2 million litres per day conventional oxidation ponds accompanied by a horizontal-flow reed bed.

- Alheit & Marchand: 800 m^3/day aerated facultative pond system at the Alheit location.
- Augrabies: 500 m^3/day traditional oxidation ponds.
- Lutzburg & Cillie: 450 m^3/day aerated facultative pond system at the Cillie location.
- Vredesvallei: 250 m^3/day traditional oxidation ponds.

Benefits: Reduces wastewater transportation distances and volumes and improves service efficiency. Disadvantages: Increased construction costs due to geographical constraints and the requirement for odourless solutions (e.g., aerated ponds instead of anaerobic systems in residential areas).

In both scenarios, hoover tanker trucks would be essential owing to the absence of waterborne sewage infrastructure in the majority of settlements. Under Approach B, operational expenses remain similar to those of Approach A, although transport volumes and distances are decreased.
Oxidation ponds typically fail to comply with wastewater discharge guidelines. Consequently, at Kakamas, supplementary treatment methods, such as reedbed filtration, will guarantee compliance.
At smaller village locations, sewage will be utilised for irrigation on sports fields, therefore circumventing the necessity for stringent adherence to discharge requirements.

This feasibility analysis advocates for the cessation of exclusive dependence on the overloaded Kakamas oxidation ponds. A hybrid approach of centralised and distributed treatment systems is recommended to:

- Enhance wastewater treatment capacity,
- Optimise service delivery,
- Mitigate long-term operational expenses and public health hazards, and
- Facilitate future expansion in Kakamas and its adjacent villages.

The focus of this report is the WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province.

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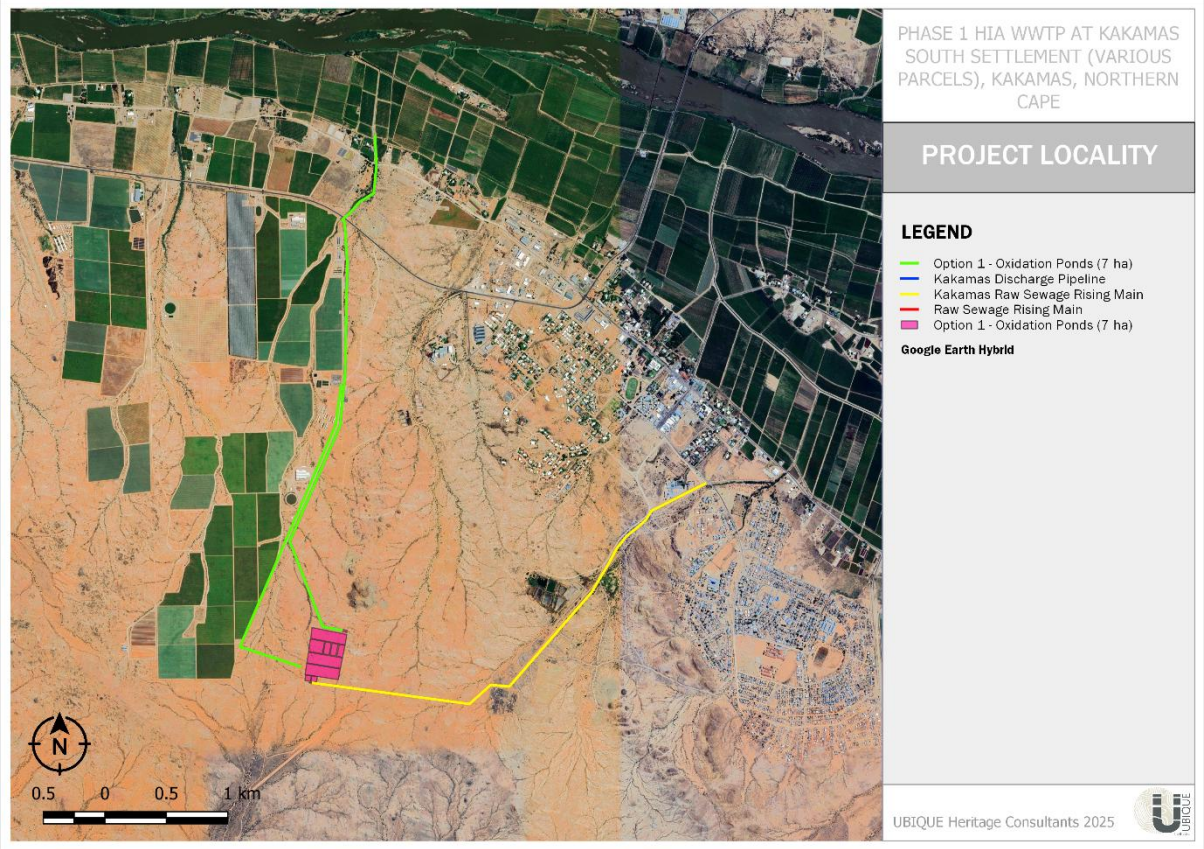

Figure 1: Google Earth image of the WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province.

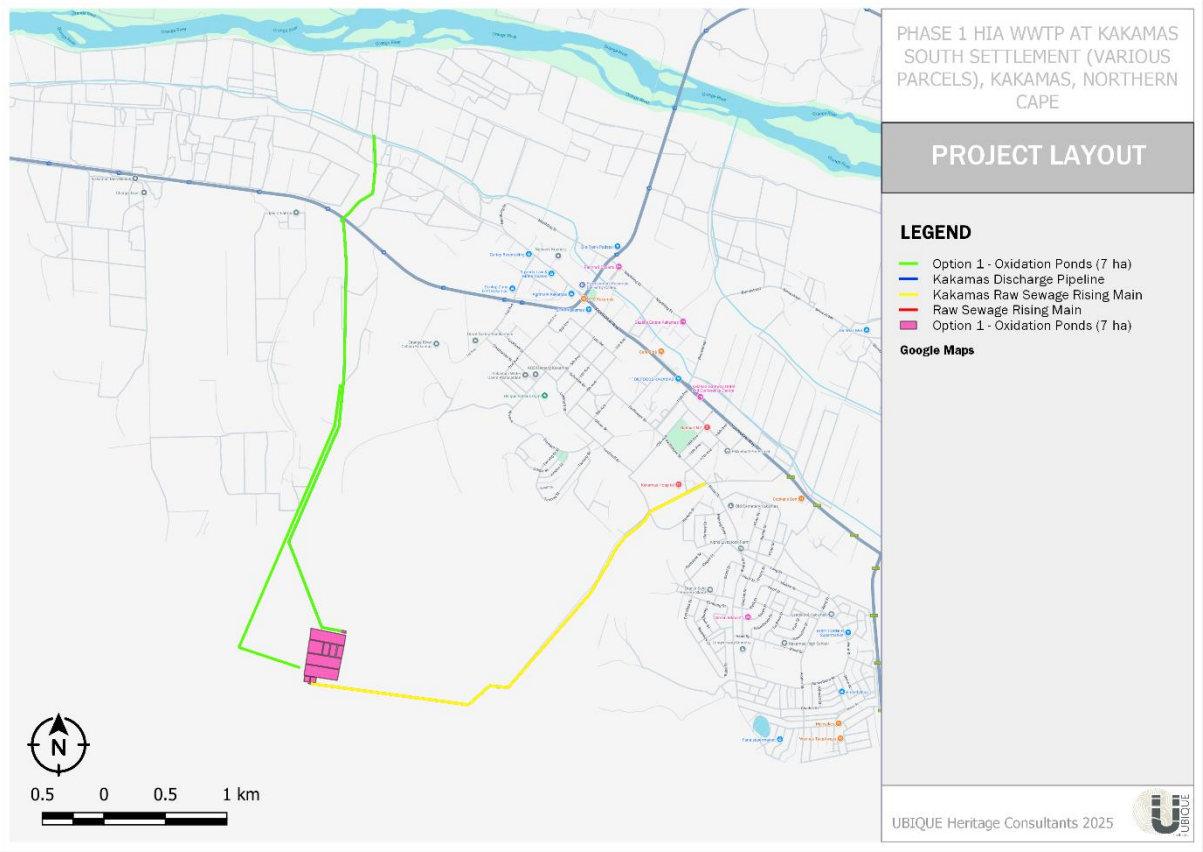

Figure 2: Project layout of the proposed WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province.

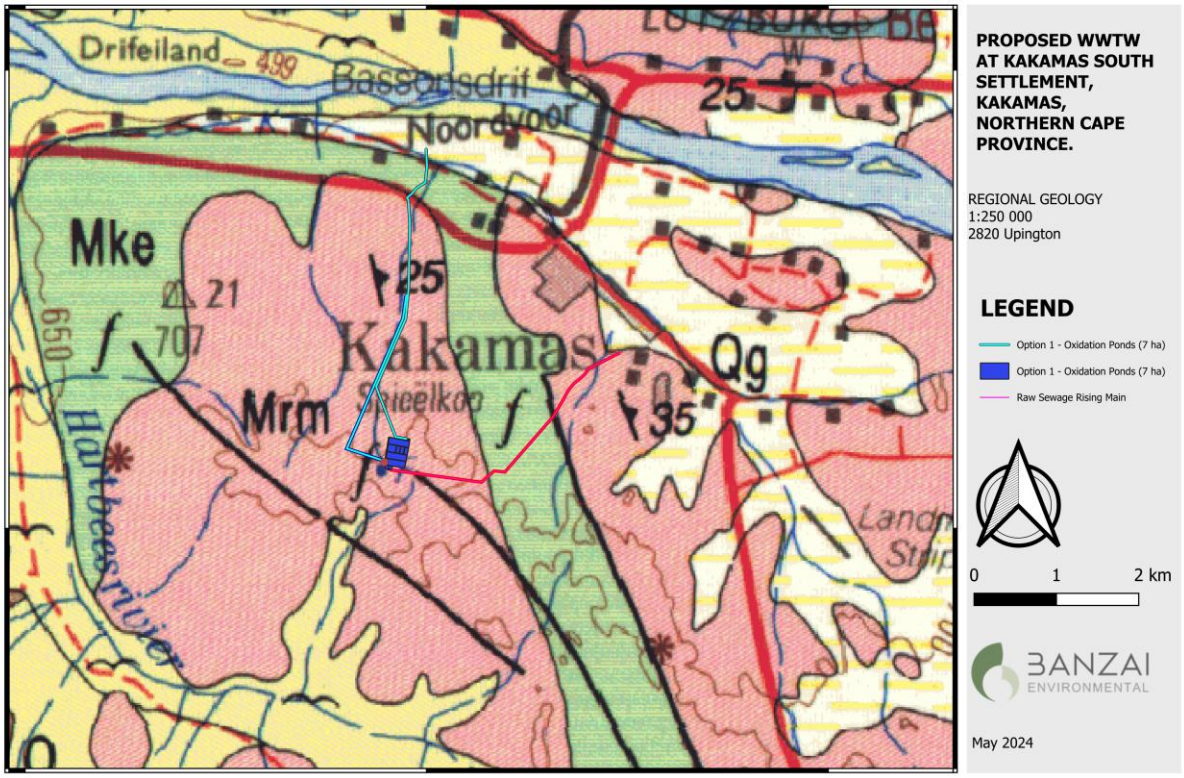

Figure 3 Extract of the 1:250 000 Upington 2820 (1988) Geological map (Council of Geoscience, Pretoria) indicating that the study area is entirely underlain by unfossiliferous Riemvasmaak Gneiss (Mrm) as well as the Kenhardt Magmatite (Mke) and potentially fossiliferous Quaternary alluvium (Qg).

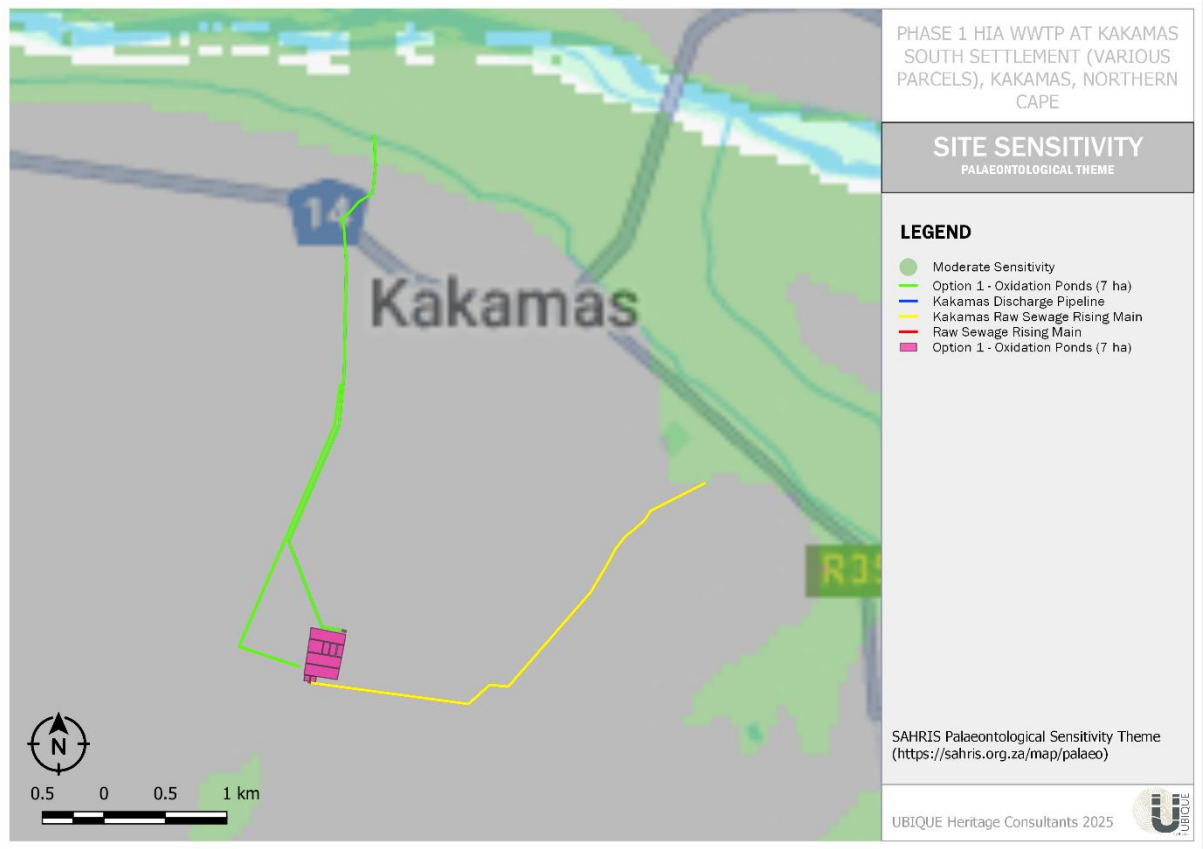

Figure 4: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website) indicates a Zero (grey) and Moderate (green) Palaeontological Sensitivity.

Table 1:Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).		
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.

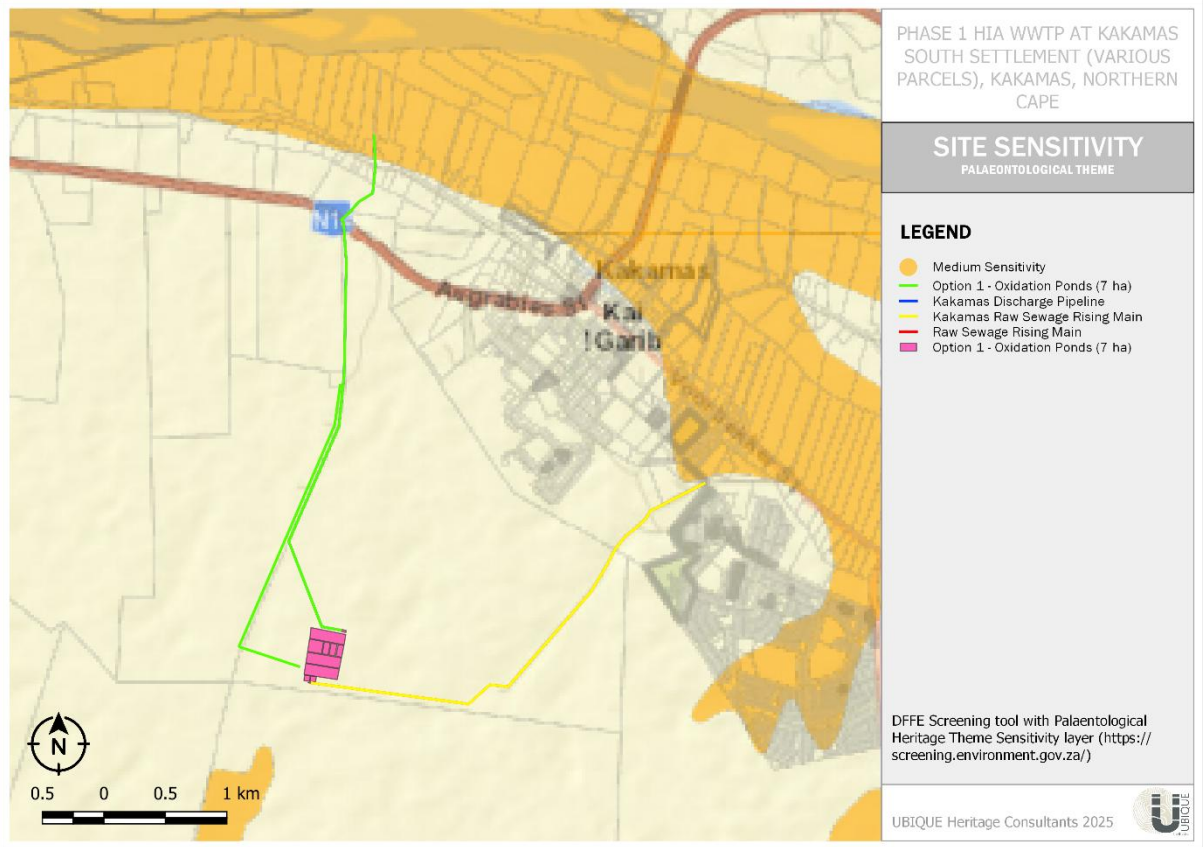

Figure 5: The Palaeontological Sensitivity generated by the DFFE National Environmental Web-Based Screening Report indicates that the study area has a Medium (orange) and unknown (pale yellow-white) level of Palaeontological Sensitivity.

Summary

The study area is entirely underlain by unfossiliferous Riemvasmaak Gneiss (RM) and Kenhardt Magmatite (MK), as well as potentially fossiliferous Quaternary deposits. The PalaeoMap of SAHRIS (Figure 4) indicates that the Palaeontological Sensitivity of the study area is Moderate (green) and Zero (grey), while that of the DFFE Screening Report (Figure 5) indicates a medium (yellow) and Unknown (white) Sensitivity. Due to the Moderate (SAHRIS) and Medium (DFFE Screening report) Sensitivities, no site investigation was undertaken for this study. However, desktop research has indicated that the Paleosensitivity of the study area is low.

Recommendation

An Exemption for a Palaeontological Impact Assessment is recommended for the WWTW at Kakamas South Settlement, Kakamas, Northern Cape Province, as it is underlain by unfossiliferous Riemvasmaak

Gneiss (MRM) as well as the Kenhardt Magmatite (MKM) and potentially fossiliferous Quaternary alluvium (QG). However, the Quaternary sediments are not highly fossiliferous.

Declaration (disclaimer)

I, Elize Butler, declare that I am an independent consultant with no commercial, financial, personal, or other interests in the proposed development project for which I was hired to do a palaeontological evaluation. There are no conditions that jeopardise my objectivity when completing such work.

I accept no liability, and by receiving this document, the client agrees to indemnify me against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly, as a result of the use of the information contained herein.

It is likely that the Exemption Letter overlooked palaeontological resources in the project area, as outcrops are not always present or visible on geological maps. Others may be hidden beneath the earth's overburden and only become visible once construction begins.

Yours sincerely

APPENDIX 1

CURRICULUM VITAE

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	30 years in Palaeontology
EDUCATION:	University of the Orange Free State
	B.Sc Botany and Zoology, 1988
	University of the Orange Free State
	B. Sc (Hons) Zoology, 1991
	University of the Free State
	M. Sc. *Cum laude* (Zoology), 2009

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle.

EMPLOYMENT HISTORY

Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant	National Museum, Bloemfontein
and Collection Manager	1998–2022
Banzai Environmental	2016 to present

Elize Butler has conducted approximately 850 Palaeontological Impact Assessments for developments in the Free State, KwaZulu-Natal, Eastern Cape, Northern Cape, Western Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specialising in Palaeontology) from the University of the Free State, South Africa. She has experience in locating, collecting, and curating fossils. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently.

A full CV is available on request.