



PHASE 1 HIA SEWAGE GRAVITY LINE/ FALLOUT, HOPETOWN, NORTHERN CAPE

THE PROPOSED UPGRADE OF THE HOPETOWN SEWAGE GRAVITY
LINE/ OUTFALL FROM STEYNVILLE TO EXISTING OXIDATION PONDS
IN HOPETOWN, THEMBELIHLE LOCAL MUNICIPALITY,
PIXLEY KA SEME DISTRICT MUNICIPALTY, NORTHERN CAPE.

PREPARED FOR:
ENVIROAFRICA

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20 OCTOBER 2018

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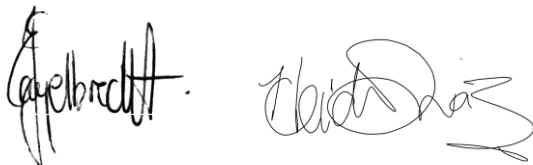
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For this project, Mr Engelbrecht was responsible for the field survey of the development footprint, identification of heritage resources, and recommendations. Ms Fivaz was responsible for research and report compilation.

Declaration of independence:

We, Jan Engelbrecht and Heidi Fivaz, partners of UBIQUE Heritage Consultants, hereby confirm our independence as heritage specialists and declare that:

- we are suitably qualified and accredited to act as independent specialists in this application;
- we do not have any vested interests (either business, financial, personal or other) in the proposed development project other than remuneration for the heritage assessment and heritage management services performed;
- the work was conducted in an objective and ethical manner, in accordance with a professional code of conduct and within the framework of South African heritage legislation.



Signed:
J.A.C. Engelbrecht & H. Fivaz
UBIQUE Heritage Consultants

Date: 2018-10-20

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EXECUTIVE SUMMARY

Technical summary

Project description	
Project name	THE PROPOSED UPGRADE OF THE HOPETOWN SEWAGE GRAVITY LINE/ OUTFALL FROM STEYNVILLE TO EXISTING OXIDATION PONDS IN HOPETOWN, THEMBELIHLE LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALTY, NORTHERN CAPE.
Description	The proposed development is looking at upgrading the existing waste water treatment works in Hopetown. The proposed development aims to replace the old outfall bulk sewer line with a larger diameter pipe and a new route which will enable sewage to gravitate from local settlements and eliminate some pumping systems in the future.
Developer	
Thembelihle Local Municipality	
Consultants	
Environmental	EnviroAfrica cc.
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
Property details	
Province	Northern Cape
District municipality	Pixley Ka Seme District Municipality
Local municipality	Thembelihle Local Municipality
Topo-cadastral map	2924CA
Farm name	De Hoek Farm 1/0 Marktsdrift Farm 3/0 Erf 487 Erf 409 Erf 2755 Erf 3247 Erf 3188
Closest town	Hopetown
GPS Co-ordinates	Start east: 29° 36' 38.18" S; 24° 06' 19.02" E End west: 29° 36' 35.3" S; 24° 05' 24.5" E
Development footprint size	±2.5 ha

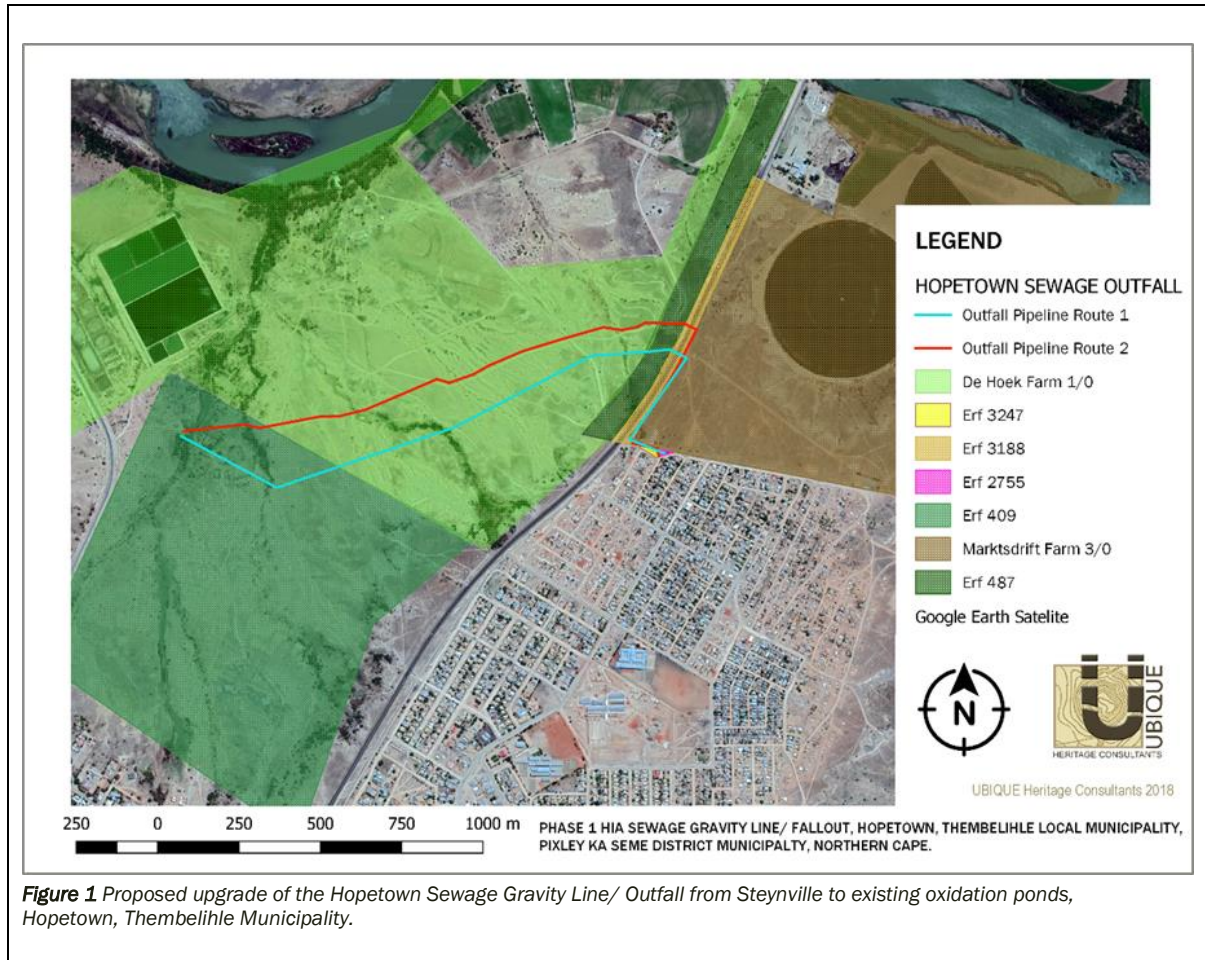


Figure 1 Proposed upgrade of the Hopetown Sewage Gravity Line/ Outfall from Steynville to existing oxidation ponds, Hopetown, Thembelihle Municipality.

Project description

UBIQUE Heritage Consultants were appointed by EnviroAfrica cc. as independent heritage specialists in accordance with Section 38 of the NHRA, to conduct a cultural heritage assessment to determine the impact of the proposed upgrade of the Hopetown sewage gravity line and outfall on any sites, features, or objects of cultural heritage significance. The pipeline will run from Steynville to existing oxidation ponds in Hopetown, within the Thembelihle Local Municipality, Pixley Ka Seme District Municipality, Northern Cape. The construction footprint is expected to be $\pm 25\,404\text{ m}^2$ which was determined with a 12 m pipeline and construction footprint diameter multiplied by the proposed $\pm 2117\text{ m}$ length of the pipeline. The proposed pipeline will cross the N12 from east to west, and traverse seven different properties: De Hoek Farm 1/0, Marktsdrift Farm 3/0, Erf 487, Erf 409, Erf 2755, Erf 3247, and Erf 3188. Two alternatives for the route of the pipeline has been identified, with the second route (indicated in red, Figure 1) being the preferred revised alternative.

Findings and Impact on Heritage Resources

Description	Period	Location	Field rating/ Significance
Stone Age			
Possible MSA chunk. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 26.5" S 24° 06' 25.1" E	Field Rating IV C Low significance
Possible MSA chunk. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 26.0" S 24° 06' 23.4" E	Field Rating IV C Low significance
Possible MSA prepared core.	MSA/LSA	29° 36' 30.0" S 24° 06' 21.0" E	Field Rating IV C Low significance
Flake/ debitage.	MSA/LSA	29° 36' 31.2" S 24° 06' 21.1" E	Field Rating IV C Low significance
Possible MSA punch, broken. Isolated occurrence.	MSA/LSA	29° 36' 26.0" S 24° 06' 15.8" E	Field Rating IV C Low significance
Possible MSA prepared core.	MSA/LSA	29° 36' 32.5" S 24° 06' 03.5" E	Field Rating IV C Low significance
Historical			
No historical features were identified.			N/A
Graves			
Informal graveyard. Outside development footprint, but near. Most graves are unmarked, but some have headstones. Graveyard dimensions is approximately 1,5 to 2 ha.		29° 36' 38.2" S 24° 05' 40.1" E	Local Grade IIIB High significance

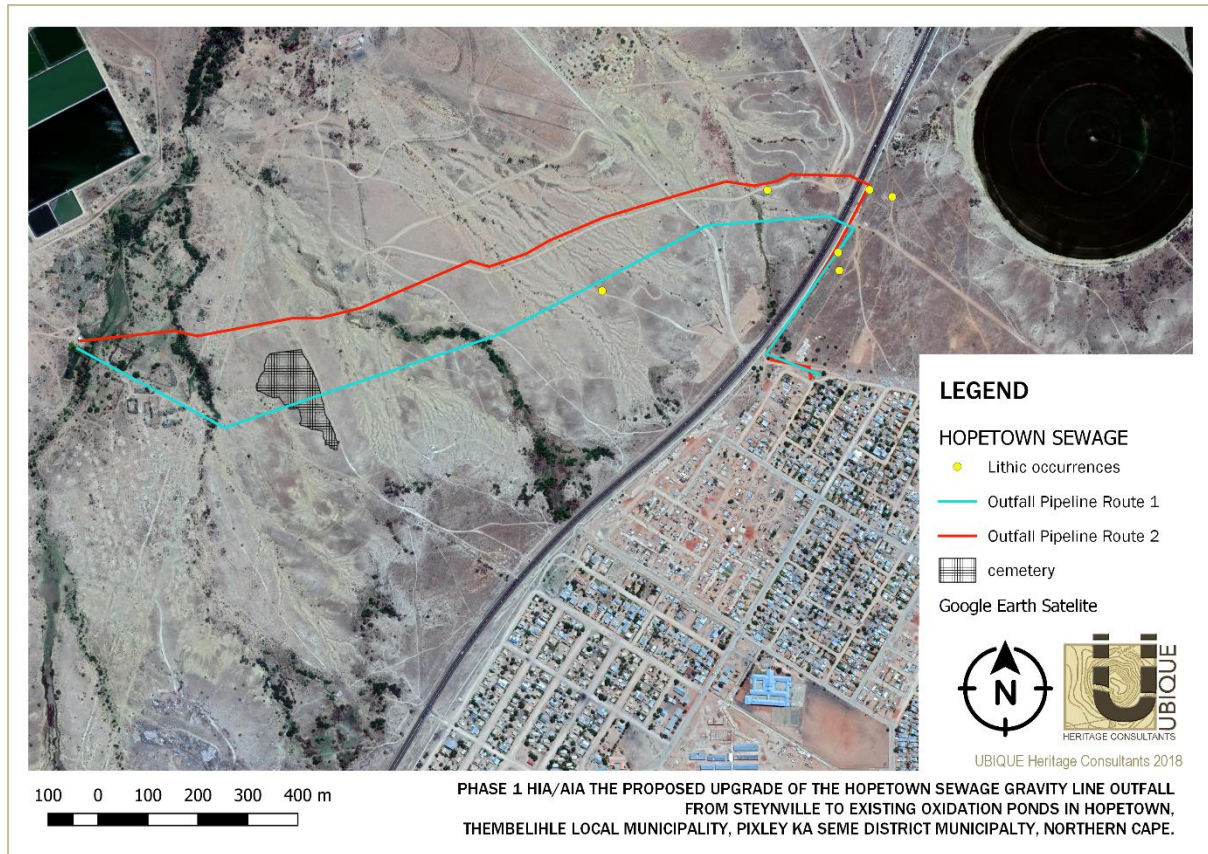


Figure 2 Isolated occurrences of lithics across the study area, indicated on Google Earth Satellite image.

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 lithic traces on the landscape of the study area are of low significance and the impact of the development on these resources are inconsequential. No further mitigation is required. Therefore, from a heritage point of view we recommend that the proposed development can continue.
2. The graveyard is not in the path of the final alternative route of the pipeline, but it is near the development. Graves do not need to be relocated to make way for development. It is therefore only recommended that the area is fenced and clearly demarcated, especially during construction, and that no construction should take place within 50 m of the perimeter thereof. If any other graves, or human remains are uncovered during construction activities, law enforcement and heritage authorities need to be notified.
3. Due to the low palaeontological significance of the area, no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the

discovery of newly discovered fossils. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. If fossil remains are discovered during any phase of construction, either on the surface or unearthed by fresh excavations, the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected (preferably in situ) and the ECO must report to SAHRA so that appropriate mitigation (e.g. recording, collection) can be carried out by a professional palaeontologist (Butler 2018).

4. 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 possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.

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ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
BIA:	Basic Impact Assessment
CRM:	Cultural Resource Management
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment*

EIA:	Early Iron Age*
EMP:	Environmental Management Plan
ESA:	Earlier Stone Age
GPS:	Global Positioning System
HIA:	Heritage Impact Assessment
LIA:	Late Iron Age
LSA:	Later Stone Age
MEC:	Member of the Executive Council
MIA:	Middle Iron Age
MPRDA:	Mineral and Petroleum Resources Development Act
MSA:	Middle Stone Age
NEMA:	National Environmental Management Act
NHRA:	National Heritage Resources Act
OWC:	Orange River Wine Cellars
PRHA:	Provincial Heritage Resource Agency
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Agency

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

GLOSSARY

Archaeological: material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;

- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years (as defined and protected by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) including any area within 10 m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which were wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history, which are older than 75 years and the sites on which they are found.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Earlier Stone Age: >2 000 000 - >200 000 years ago

Middle Stone Age: <300 000 - >20 000 years ago

Later Stone Age:	<40 000 - until the historical period
Iron Age:	(Early Farming Communities). Period covering the last 1800 years, when immigrant African farmer groups brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age. Early Iron Age: AD 200 - AD 900 Middle Iron Age: AD 900 - AD 1300 Later Iron Age: AD 1300 - AD 1850
Historic:	Period of arrival of white settlers and colonial contact. AD 1500 to 1950
Historic building:	Structures 60 years and older.
Fossil:	Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.
Heritage:	That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).
Heritage resources:	These mean any place or object of cultural significance, tangible or intangible.
Holocene:	The most recent geological period that commenced 10 000 years ago.
Palaeontology:	Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site that contains such fossilised remains or traces
Cumulative impacts:	“Cumulative Impact”, 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 may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.
Mitigation:	Anticipating and preventing negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.
A ‘place’:	a site, area or region; – a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure; – a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures; – an open space, including a public square, street or park; and – in relation to the management of a place, includes the immediate surroundings of a place.

'Public monuments and memorials': mean all monuments and memorials—

- erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or
- which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual;

'Structures': any building, works, device or other facility made by people and which are fixed to land, and include any fixtures, fittings and equipment associated therewith.

1. INTRODUCTION

1.1 Scope of study

The project involves the proposed upgrade of the Hopetown sewage gravity line and outfall from Steynville to existing oxidation ponds in Hopetown, within the Thembelihle Local Municipality, Pixley Ka Seme District Municipality, Northern Cape. UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with the National Environmental Management Act 107 of 1998 (NEMA), and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage assessment (AIA/HIA) of the development area.

The aim of the assessment is 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 both rich and widely diverse, encompassing sites from all periods of human history. Resources may be tangible, such as buildings and archaeological artefacts, or intangible, such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic or technological values; their representation of a time or group; their rarity; and their sphere of influence.

The integrity and significance of heritage resources can be jeopardized by natural (e.g. erosion) and human (e.g. development) activities. In the case of human activities, a range of legislation exists to ensure the timeous and accurate identification and effective management of heritage resources for present and future generations.

The result of this investigation is presented within this heritage impact assessment report. It comprises the recording of heritage resources present/ absent and offers recommendations for the management of these resources within the context of the proposed development.

Depending on SAHRA's acceptance of this report, the developer will receive permission to proceed with the proposed development, taking in account 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 impact assessment.

The significance of the sites, structures and artefacts is determined by means of 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 the evaluation of any site is done with reference to any number of these aspects. Cultural significance is site-specific and relates to the content and context of the site.

Although all possible care has been taken during the comprehensive field survey and intensive desktop study to identify sites of cultural importance within the development areas, it is important to note that some heritage sites may have been missed due to their subterranean nature, or due to dense vegetation cover. No subsurface investigation (i.e. excavations or sampling) were undertaken, since a permit from SAHRA 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 contacted for an assessment of the find. Observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question.

2. TERMS OF REFERENCE

An HIA/ AIA must address the following key aspects:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

In addition, the HIA/AIA should comply with the requirements of NEMA, including providing the assumptions and limitations associated with the study; the details, qualifications and expertise of the person who prepared the report; and a statement of competency.

2.1. Statutory Requirements

2.1.1 General

The Constitution of the Republic of South Africa Act 108 of 1996 is the source of all legislation. Within the Constitution the Bill of Rights is fundamental, with the principle 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)

2.1.2 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:

- co-ordinate and promote the management of heritage resources at 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 the protection and management of conservation-worthy places and areas by local authorities.

2.1.3 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 development:**

- 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 re-zoning 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.

2.1.4 Definitions of heritage resources

The NHRA defines a heritage resource as any place or object of cultural significance, i.e. of 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);
- Eco facts (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.

Furthermore, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.

2.1.5 Management of Graves and Burial Grounds

- **Graves younger than 60 years** are protected in terms of Section 2(1) of the Removal of Graves and Dead Bodies Ordinance 7 of 1925 as well as the Human Tissues Act 65 of 1983.

- **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 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 administered by a local authority. Graves in the category located inside a formal cemetery administered 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 co-operation 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.

3. STUDY APPROACH AND METHODOLOGY

3.1 Desktop study

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

By incorporating data from previous CRM reports done in the area and an archival search, the study area is contextualised. The objective of this is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves of the area.

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 from sources including those listed in the bibliography.

3.1.1 Literature review

A survey of literature was undertaken to obtain background information regarding the area. 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 have been performed within the wider vicinity of the study area. Sources consulted in this regard are indicated in the bibliography.

3.2 Field study

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

3.2.1 Systematic survey

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

UBIQUE Heritage Consultants inspected the proposed development and surrounding areas on 22nd and 23rd of September 2018 and completed a controlled-exclusive, pre-planned, pedestrian survey. We conducted an inspection of the surface of the ground, 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 attempt to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures fortuitously observed.

The survey was tracked with a handheld Garmin global positioning unit (Garmin eTrex 10).

3.2.2 Recording significant areas

GPS points of identified significant areas were recorded with a handheld Garmin global positioning unit (Garmin eTrex 10). Photographs were taken with a Sony Coolpix 10-megapixel camera. Detailed fieldnotes were taken to describe observations. The layout of the area and plotted by GPS points, tracks and coordinates, were transferred to Google Earth and QGIS, and maps were created.

3.2.3 Determining significance

Levels of significance of the various types of heritage resources observed and recorded in the project area will be determined to the following criteria:

Cultural significance:

- Low A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium Any site, structure or feature being regarded less important due to several factors, such as date and frequency. Likewise, any important object found out of context.
- High Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorized as of a high importance. Likewise, any important object found within a specific context.

Heritage significance:

- Grade I Heritage resources with exceptional qualities to the extent that they are of national significance
- Grade II Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate
- Grade III Other heritage resources of local importance and therefore worthy of Conservation

Field ratings:

- i. National Grade I significance should be managed as part of the national estate
- ii. Provincial Grade II significance should be managed as part of the provincial estate
- iii. Local Grade IIIA should be included in the heritage register and not be mitigated (high significance)
- iv. Local Grade IIIB should be included in the heritage register and may be

- mitigated (high/ medium significance)
- v. General protection A (IV A) site should be mitigated before destruction (high/ medium significance)
 - vi. General protection B (IV B) site should be recorded before destruction (medium significance)
 - vii. General protection C (IV C) phase 1 is seen as sufficient recording and it may be demolished (low significance)

Heritage value, statement of significance:

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

3.3 Oral history

Where possible, people from local communities were interviewed to obtain information relating to the surveyed area.

3.4 Report

The results of the desktop research and field survey are compiled in this report. The identified heritage resources and anticipated and cumulative impacts that the development of the proposed project may have on the identified heritage resources will be presented objectively. Alternatives, should any significant sites be impacted adversely by the proposed project, are offered. All effort

will be made to ensure that all studies, assessments and results comply with the relevant legislation and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA). The report aims to assist the developer in managing the documented heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

4. PROJECT OVERVIEW

UBIQUE Heritage Consultants were appointed by EnviroAfrica cc. as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA), to conduct a cultural heritage assessment to determine the impact of the proposed upgrade of the Hopetown sewage gravity line and outfall on any sites, features, or objects of cultural heritage significance. The pipeline will run from Steynville to existing oxidation ponds adjacent to Hopetown, within the Thembelihle Local Municipality, Pixley Ka Seme District Municipality, Northern Cape. The construction footprint is expected to be $\pm 25\,404 - 25\,800$ m² which was determined with a 12 m pipeline and construction footprint diameter multiplied by the proposed $\pm 2117 - 2150$ m length of the pipeline. The proposed pipeline will cross the N12 from east to west, and traverse seven different properties: De Hoek Farm 1/0, Marktsdrift Farm 3/0, Erf 487, Erf 409, Erf 2755, Erf 3247, and Erf 3188. Two alternatives for the route of the pipeline has been put forward, with the second route (indicated in red, Figure 1) being the preferred revised alternative provided by the client.

The Thembelihle Local Municipality is currently experiencing recurring blockages and other issues on the existing sewage outfall line that has exceeded its design life and is under high volume demand. The current line consists of a 200 mm diameter gravity line, which divides into two separate lines for some distance and its capacity is at full level. Sewer effluent from growing settlements nearby Hopetown in Steynville (which include Sewendelaan, Tamboville, Goutrou, Vergenoeg, Houjoubek, Donkerhoek and Steynville) gravitate towards a pump station from where it is discharged into oxidation ponds. The proposed development aims to replace the old outfall bulk sewer line with a larger diameter pipe (315 mm diameter uPVC pipe) along a new route with more suitable slopes which will enable sewage to gravitate from the settlements and eliminate drop inlets as well as pumping systems in future planning.

The first alternative route proposed for the sewage outfall line had a starting point (29° 36' 31" S; 24° 06' 19" E, near the N12) lower than the current line, to accommodate the proposed future development to the north of Steynville and follows more suitable slopes to accommodate flow. The construction footprint was expected to be $\pm 25\,404$ m² which was determined with a 12 m pipeline and construction footprint diameter multiplied by the proposed ± 2117 m length of the pipeline. However, it has subsequently been discovered that this proposed route will run through a cemetery and has therefore been revised (Figure 3).

The second alternative route (starting point: 29° 36' 38.18" S; 24° 06' 19.02" E), is to the north of alternative one. It bypasses the cemetery and an uneven strip of land between the N12 and the cemetery, and it partly runs along an established road. The construction footprint is expected to be

±25 800 m² which was determined with a 12 m pipeline and construction footprint diameter multiplied by the proposed ±2150 m length of the pipeline. This alternative is the preferred and final route proposed by the engineers of BVI Group, and as such, this route will be the focus of this report.

4.1 Technical information

Project description	
Project name	THE PROPOSED UPGRADE OF THE HOPETOWN SEWAGE GRAVITY LINE/ OUTFALL FROM STEYNVILLE TO EXISTING OXIDATION PONDS IN HOPETOWN, THEMBELIHLE LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALTY, NORTHERN CAPE.
Description	The proposed development is looking at upgrading the existing waste water treatment works in Hopetown. The proposed development aims to replace the old outfall bulk sewer line with a larger diameter pipe and a new route which will enable sewage to gravitate from local settlements and eliminate some pumping systems in the future.
Developer	
Thembelihle Local Municipality	
Contact information	smarufu@thembelihlemunicipality.gov.za
Development type	
Land owner	
Various	
Contact information	
Consultants	
Environmental	EnviroAfrica cc
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
Property details	
Province	Northern Cape
District municipality	Pixley Ka Seme District Municipality
Local municipality	Thembelihle Local Municipality
Topo-cadastral map	2924CA
Farm name	De Hoek Farm 1/0 Marktsdrift Farm 3/0 Erf 487 Erf 409 Erf 2755 Erf 3247 Erf 3188
Closest town	Hopetown
GPS Co-ordinates	Start east: 29° 36' 38.18" S; 24° 06' 19.02" E End west: 29° 36' 35.3" S; 24° 05' 24.5" E
Property size	N/A

Development footprint size	±2.5 ha
Land use	
Previous	Agriculture
Current	Agriculture and burrow pits
Re- zoning 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 form of development or barrier exceeding 300m in length.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ² .	No
Development involving three or more existing erven or subdivisions.	Yes
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ² .	No
Any other development category, public open space, squares, parks, recreation grounds.	No

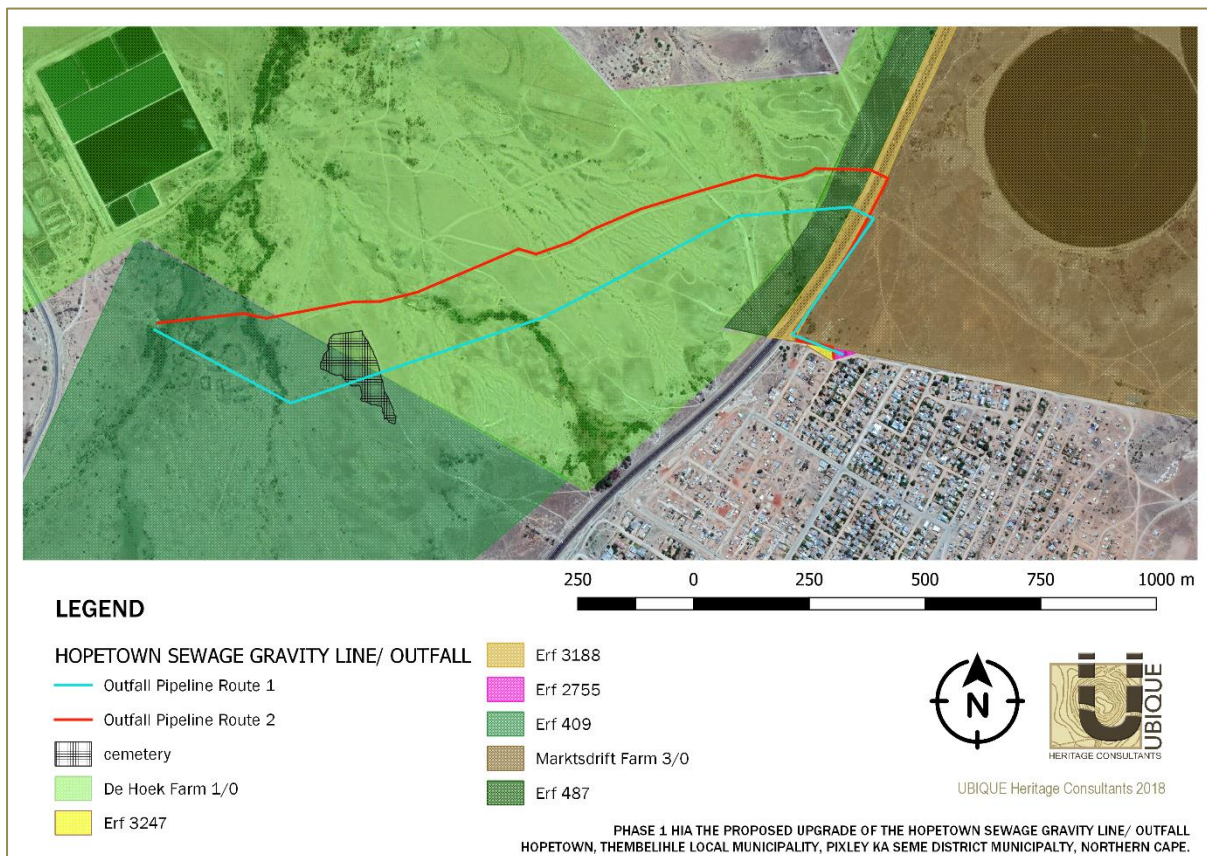


Figure 3 Proposed upgrade of the Hopetown Sewage Gravity Line/ Outfall from Steynville to existing oxidation ponds, Hopetown, Thembelihle Municipality. Preferred alternative route indicated in red.

PHASE 1 HIA SEWAGE GRAVITY LINE/ FALLOUT, HOPETOWN, NORTHERN CAPE

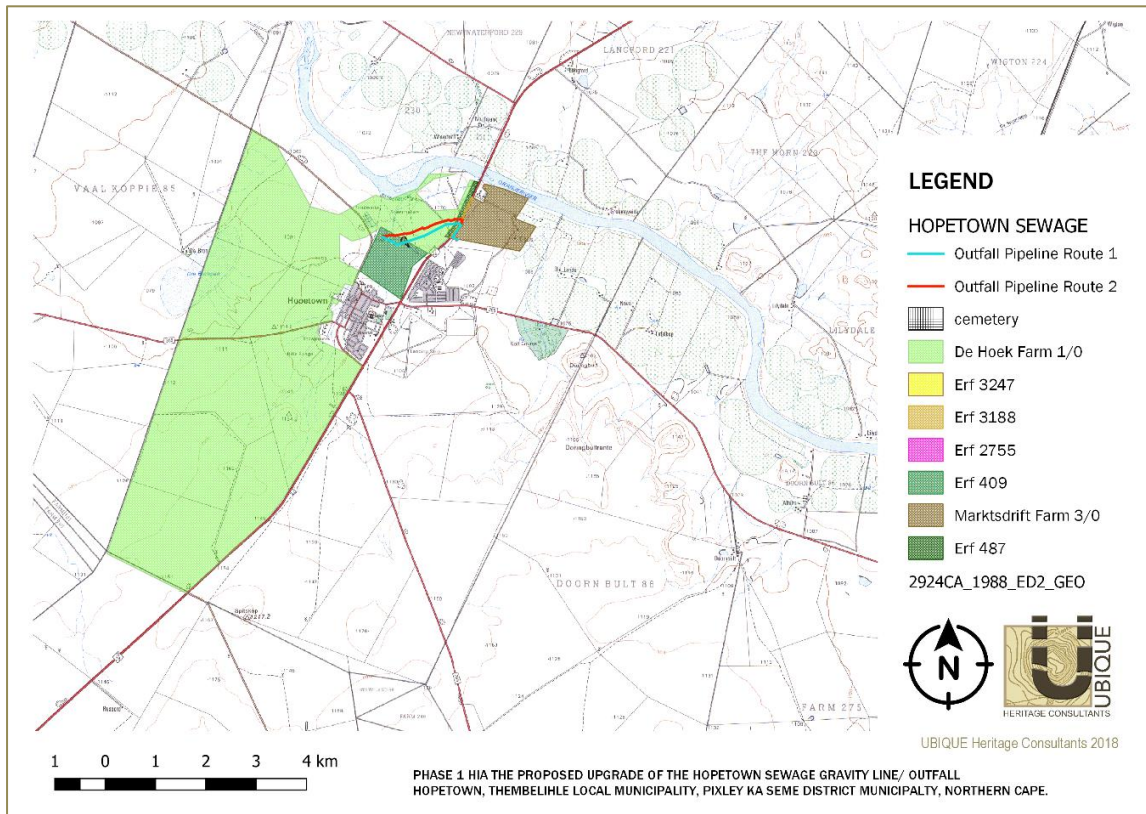


Figure 4 Site locality map 1:50 000 topo-cadastral map WGS84- 2924CA Surveyor General.

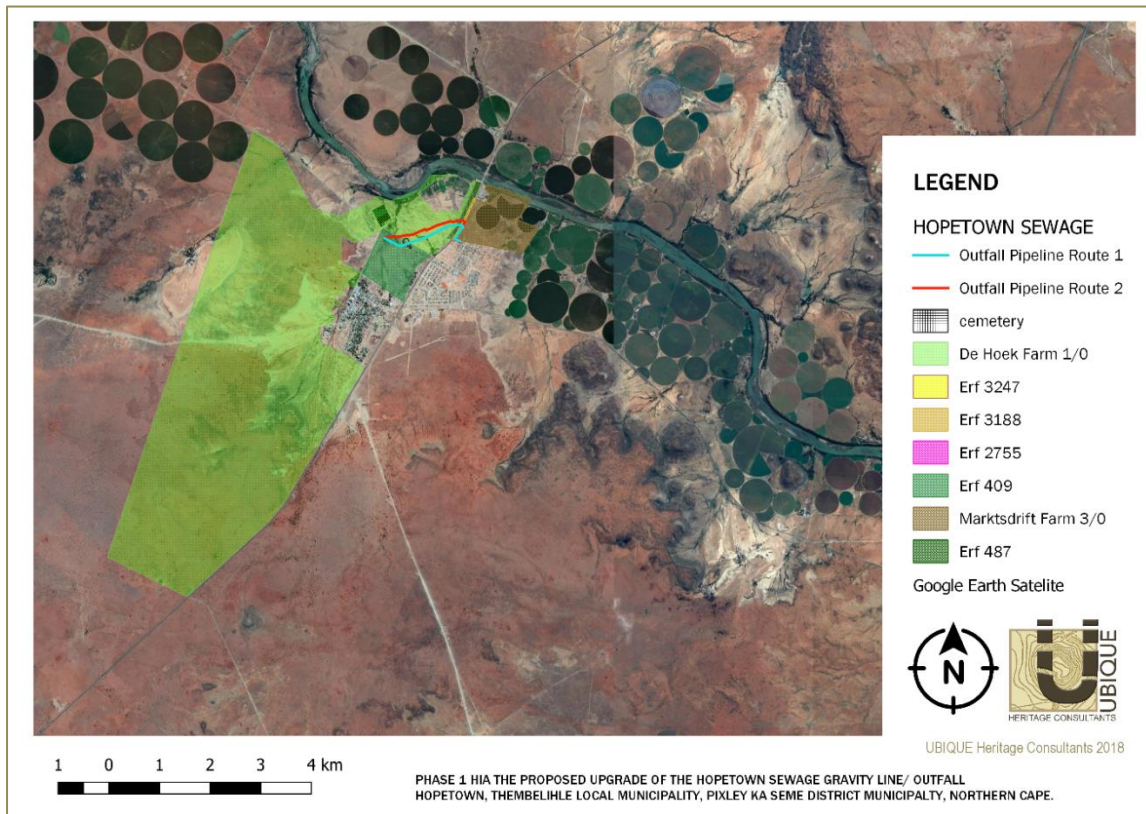


Figure 5 Site locality Google Earth Satellite.

4.2 Description of affected environment

The Thembelihle Local Municipality consists of predominantly three different biomes; the Grassland Biome, the Nama-Karoo Biome, and the Savanna Biome (Mucina & Rutherford 2006; <http://bgjs.sanbi.org/LUDS/Home/Municipality/211>), and the majority of the vegetation type in the study area is typical Kimberley Thornveld. This vegetation type is characterised by slightly irregular plains with well-developed tree layers consisting of *Acacia erioloba*, *A. tortilis*, *A. karroo* and *Boscia albitrunca* as well as a well-developed shrub layer with occasional dense stands of *Tarchonanthus camphoratus* and *A. mellifera*. Grass layers are open with ample uncovered sandy to loamy soils of the Hutton soil form on slightly undulating sandy plains (Mucina & Rutherford 2006). The topography of the site is steep with various natural waterways traversing the site.

There are several access roads to the site. Close to the study site, a bridge on the N12 that crosses the Orange River is currently under upgrade and construction. The bridge construction work generated various quarries, burrow pits, and access roads for construction vehicles in the area. The study area is heavily disturbed. Rubble and foundations of previous occupation of the area is prevalent in the western and northern regions of the study area. Furthermore, the effects of erosion can also be seen across the entire site.



PHASE 1 HIA SEWAGE GRAVITY LINE/ FALLOUT, HOPETOWN, NORTHERN CAPE



Figure 6 Views of the affected development area.

5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

5.1 Region

The Northern Cape is rich in archaeological sites and landscapes that reflect the complex South African heritage from the Stone Age to Colonial history.

5.1.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996). In South Africa the Stone Age can be divided in three periods. It is, however, important 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: >2 000 000 - >200 000 years ago
Middle Stone Age: <300 000 - >20 000 years ago
Later Stone Age: <40 000 - until the historical period.

Each of the sub-divisions is formed by a group of industries where the assemblages share attributes or common traditions (Lombard et al. 2012). Prominent sites that exemplify these periods in the Nama-Karoo Biome are Rooidam and Bundu Farm (Earlier Stone Age and Middle Stone Age), and Biesje Poort 2, Bokvasmaak 3, Melkboom 1, Vlermuisgat, and Jagtpan 7 (Later Stone Age) (Lombard et al. 2012).

Within the region, Stone Age sites and complexes have been, and are still being investigated in some detail. This includes, but are not limited to, the landscape near Kathu, where numerous Stone Age sites have been documented and excavated, representing the longest preserved lithostratigraphic and archaeological sequence of human occupation at the pan through the ESA, MSA, and LSA and with evidence for 500 000-year-old hafted stone points; ancient specularite working (and mining) on the eastern side of Postmasburg, Doornfontein; and associated Ceramic Later Stone Age material, and also the older transitional ESA/MSA Fauresmith sites at Lyly Feld, Demaneng, Mashwening, King, Rust & Vrede, Paling, Gloucester and Mount Huxley (Beaumont 2004; Beaumont 2013; Beaumont & Morris 1990; Beaumont & Vogel 2006; Morris 2005; Morris & Beaumont 2004; Porat et al. 2010; Thackeray et al. 1983; Walker et al. 2014; Wilkins et al. 2012).

Beaumont et al. (1995) commented that thousands of square kilometres of Bushmanland are covered by low-density lithic scatters. It is therefore not surprising that Stone Age sites and lithic scatters were identified by CRM practitioners between the Garona substation and the Gariep/Orange River in numerous surveys conducted during the recent years. Scatters of MSA material have been recorded close to Griekwastad, Hotazel, Postmasburg and Kenhardt, Pofadder, Marydale, and in the Upington district (Dreyer 2006, 2012, 2014; Pelsler & Lombard 2013; PGS Heritage 2009, 2010; Webley 2013). MSA and LSA tools as well as rock engravings were also found at Putsonderwater, Beeshoek and Bruce (Morris 2005; Snyman 2000; Van Vollenhoven 2012b; Van Vollenhoven 2014).

Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites since these areas were utilized for base camps close to water and hunting ranges. If any such features occur in the study area, Stone Age manifestations can be anticipated (Lombard 2011).

5.1.2 Historical period

The historical period within the region coincides with the incursion of white traders, hunters, explorers, and missionaries into the interior of South Africa. Buildings and structures associated with the early missionaries, travellers, and traders such as PJ Truter's and William Somerville (arriving in 1801), Donovan, Burchell and Campbell, James Read (arriving around 1870) William Sanderson, John Ryan and John Ludwig's (De Jong 2010; Snyman 2000) arrival during the 19th century, and the settlement of the first white farmers and towns, are still evident in the Northern Cape. Numerous heritage reports that provide a synthesis of the incursions of travellers, missionaries and the early European settlers have been captured on the SAHRIS database.

San hunter-gatherer groups utilised the landscape for thousands of years and Khoi herders moved into South Africa with their cattle and sheep approximately 2000 years ago. 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 collectively known as the Korannas, living as small tribal entities in their own separate areas (Penn 2005).

According to Breutz (1953, 1954), and Van Warmelo (1935), several Batswana tribes, including the different Thlaping and Thlaro sections as well as other smaller groups, take their 18th and 19th century roots back to the area around Groblershoop, Olifantshoek, the Langeberg (Majeng) and Korannaberg ranges in the western part of the region. After Britain annexed Bechuanaland in 1885, the land of the indigenous inhabitants was limited to a few reserves. In 1895, when British Bechuanaland was incorporated into the Cape Colony, the land inside the reserves remained the property of the Tswana and could only be alienated with the consent of the British Secretary of State.

Because of its distance from the Cape Colony, this arid part of South Africa's interior was generally not colonised until relatively recent. According to history, the remote northern reaches of the Cape Colony were home to cattle rushers, gun-runners, river pirates and various manner of outlaws. Distribution of land to colonial farmers only occurred from the 1880s onwards when Government-owned land was surveyed, divided into farms, and transferred to farmers. More permanent large-scale settlement however only started in the late 1920s and the first farmsteads were possibly built during this period. The region remained sparsely populated until the advent of the 20th century (De Jong 2010, Penn 2005).

The region has been the backdrop to various incidents of conflict. The arrival of large numbers of Great Trek Boers from the Cape Colony to the borders of Bechuanaland and Griqualand West in 1836 caused conflict with many Tswana groups and the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s

when the Korana and Griqua communities and the British government became involved. The Northern Cape was very important in the Anglo-Boer War (1899-1902) and major battles took place within 120 km of Kimberley, including the battle of Magersfontein. Boer guerrilla forces roamed the entire Northern Cape region and skirmishes between Boer and Brits were regular occurrences. Furthermore, many graves in the region tell the story of battles fought during the 1914 Rebellion (Hopkins 1978).

5.2 Local

Numerous Heritage Impact Assessments have been conducted in the wider Hopetown landscape. These include, but are not limited to, studies involving alluvial grave mining at Slypsteen 41, Hopetown District (Higgitt & Nel 2014), residential developments at Vluytjeskraal 149 (Opperman 2012), and agricultural developments at Waterford 229 (Rossouw 2017) and Donegal 217 (Rossouw 2018). Van Ryneveld & Van der Walt (2014) assessed Deelfontein 237/3 and Eskdale 204/3 for the Rooikat Hydroelectric Power project, while Kaplan (2012, 2017) surveyed Remainder Farm 77 for the proposed Keren Energy Disselfontein Solar Energy Plant. Furthermore, Dreyer (2005, 2008, 2012) worked on various ESKOM and MTN infrastructure projects, while Morris (2011) investigated the site of a prospective quarry on the farm Gannahoek.

5.2.1 Stone Age

Scatters of stone artefacts around Hopetown have been reported by Boshoff (2009), Dreyer (2005, 2008, 2012), Higgitt & Nel (2014), Kaplan (2012, 2017), Morris (2011) Opperman (2012), and Van Ryneveld & Van der Walt (2014). Higgitt & Nel (2014) noted, surface ESA, MSA and LSA finds are relatively commonplace and typical of the general region. Kaplan (2012) recorded ESA lithic assemblages that included several sub-bifaces and at least two handaxes, and MSA assemblages that comprised of triangular shaped flakes, chunks, retouched and utilised flakes and blades, and LSA scrapers and adzes (Kaplan 2017). Predominantly, the heritage specialists describe the recorded stone artefacts in the area as ephemeral, ex-situ, of poor preservation and of low significance.

Rock Engraving sites have been recorded on a number of farms in the Hopetown district, including Beeshoek, Brandfontein Disselfontein, Doornbult Karee Kloof, Lemietskop, Rooikop, Slypsteen, De Kalk, and Darnysbosch (Rossouw 2018; Van Ryneveld & Van der Walt 2014). Morris (2011) also found a small number of stones with hairline engravings and artificially rubbed surfaces on boulders that form part of a dolerite ridge on the farm Gannahoek to the south of Hopetown.

5.2.2 Historical period

Hopetown was founded in 1853 and became a municipality in 1858, but it is the 1865-1867 discovery of the 1st diamond in South Africa, the 23.25 carat 'Eureka' on the farm De Kalk, that led to the development of a flourishing town. When the boom ended, the town declined into insignificance and almost weathered to oblivion (Van Ryneveld & Van der Walt 2014; www.heritage.org.za/karoo/hope/htm).

The ruins of the Jacobs family residence, where the young Erasmus Jacobs discovered the diamond, has been declared a Grade II Provincial Heritage Site. The house was reportedly already derelict in 1880 (www.sahris.co.za).

The historic wagon bridge connecting portion of Minor Road 232, and Minor Road 16, has also been declared a Grade II Provincial Heritage Site. The Old Wagon route and the first bridge across the Orange, dating to 1871, carried traffic to the diamond fields and a blockhouse can still be seen standing on the banks of the river (www.sahris.co.za).

Apart from the scattered remains related to early colonial settlement and diamond prospecting, the Historical period cultural landscape of the Hopetown region is also characterised by sites and cultural material associated with significant events of the Second Anglo Boer War, or South African War. Hopetown saw some action during the Anglo Boer War, at the skirmish at Houtkraal. Remains of various British military camps, fortifications and other structures, as well as the remains of a women's concentration camp, hospital and graveyard are to be found in the vicinity of the Orange River Railway Station. The Doornbult Concentration camp established from 1901 to 1902, housed approximately 1600 women towards the end of 1901 and according to Official British statistics at least 250 people died there. Cultural heritage of the camp includes the remains of the floors of a large number of tents in the camp, fireplaces, numerous cooking utensils, toys, improvised tools, a hospital area with kitchen and midden, and grave yard. In addition to this camp and cemetery, a British military camp was also established on Doornbult. This camp housed 16 000 British soldiers that would invade the Orange Free State (Boshoff 2009; Wiid, 2011). Small finds such as buttons, pipes, porcelain and tin food containers are present in huge quantities. These finds are scattered over an area of slightly more than 350 ha according to Boshoff (2009).

Dreyer (2005) furthermore identified artefacts and structures probably associated with the Anglo Boer War near the Wigton Sub-station on the farm Wigton 224. Remains of structures of undetermined age with tin cans with heavy soldering was recorded. And on the farm Elandsdraai, Dreyer (2008) recorded archaeological surface material associated with the Anglo Boer War at the foot of a hill. These finds, together with other important battlefield sites at Belmont, Fabersput and Sunnyside and the concentration camp at Orange River Station, emphasise the probability and significance of other Anglo-Boer War sites in the area (Dreyer 2008).

5.2.3 Oral history

No interviews with locals were conducted regarding the history of the area.

6. IDENTIFIED RESOURCES AND HERITAGE ASSESSMENT

6.1 Surveyed area

The area surveyed for the impact assessment was dictated by the Google Earth map of the development footprint provided by the client. Pedestrian surveys were conducted along the pipeline routes throughout the entire 2,5 ha footprint. Certain areas were approached by vehicle and then surveyed on foot. The survey commenced on the western boundary of the site at the existing pump station and oxidation ponds and the survey exited the study area to the south through the town of Hopetown. The N12 National road runs through the eastern border of the site from northeast to southwest. The surveyed area extended beyond the study area to include the rejected path of the pipeline and surrounding area as well.

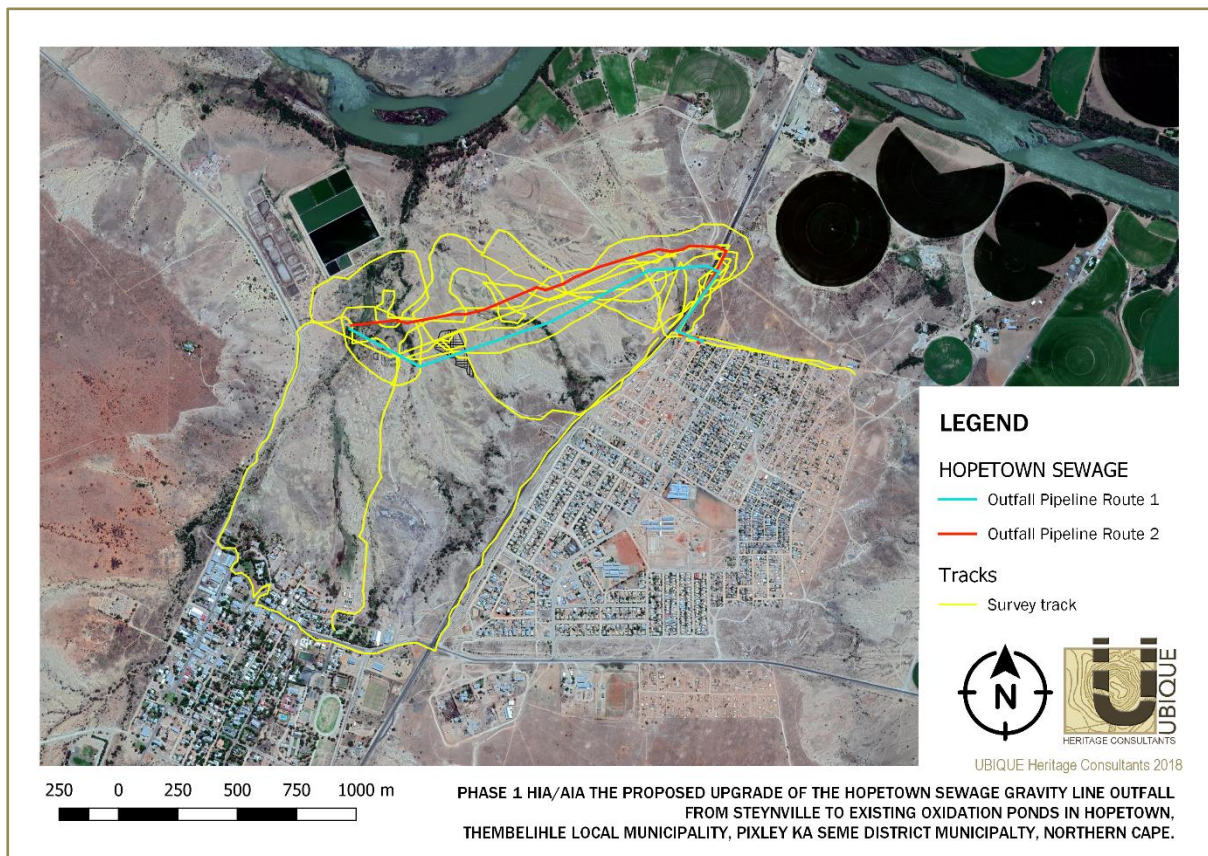


Figure 7 Google Earth image showing survey track in study area.

6.2 Identified heritage resources

Description	Period	Location	Field rating/ Significance
Stone Age			
Possible MSA chunk. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 26.5" S 24° 06' 25.1" E	Field Rating IV C Low significance
Possible MSA chunk. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 26.0" S 24° 06' 23.4" E	Field Rating IV C Low significance
Possible MSA prepared core. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 30.0" S 24° 06' 21.0" E	Field Rating IV C Low significance
Flake/ debitage. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 31.2" S 24° 06' 21.1" E	Field Rating IV C Low significance
Possible MSA punch, broken. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 26.0" S 24° 06' 15.8" E	Field Rating IV C Low significance
Possible MSA prepared core. Isolated lithic in 20 m ² area.	MSA/LSA	29° 36' 32.5" S 24° 06' 03.5" E	Field Rating IV C Low significance
Historical			
No historical features were identified.			N/A
Graves			
Informal graveyard. Outside development footprint, but near. Most graves are unmarked, but some have headstones. Graveyard dimensions is approximately 1,5 to 2 ha.		29° 36' 38.2" S 24° 05' 40.1" E	Local Grade IIIB High significance

6.3 Discussion

6.3.1 Archaeological features

A total of six incidences of Stone Age material were recorded across the surveyed area (Figure 2) within the northern eastern section of the surveyed area. Four isolated lithics were recorded along the pipeline route on Marktsdrift Farm 3/0, and two isolated lithics were recorded on De Hoek Farm 1/0 (Figure 8). These occurrences are of isolated lithics found ex situ alongside access roads and amongst roadside surface gravel. It should be noted that the lithics may be the result of construction machinery and not accurately diagnostic (Van der Walt & Bradfield (accepted for publication)). The identified archaeological materials are of low significance, as the archaeological sample is small and without context, and therefore of little scientific value.

These Stone Age heritage finds are given a 'General' Protection C (Field Rating IV C). This means these sites have been sufficiently recorded (in the Phase 1). It requires no further action.

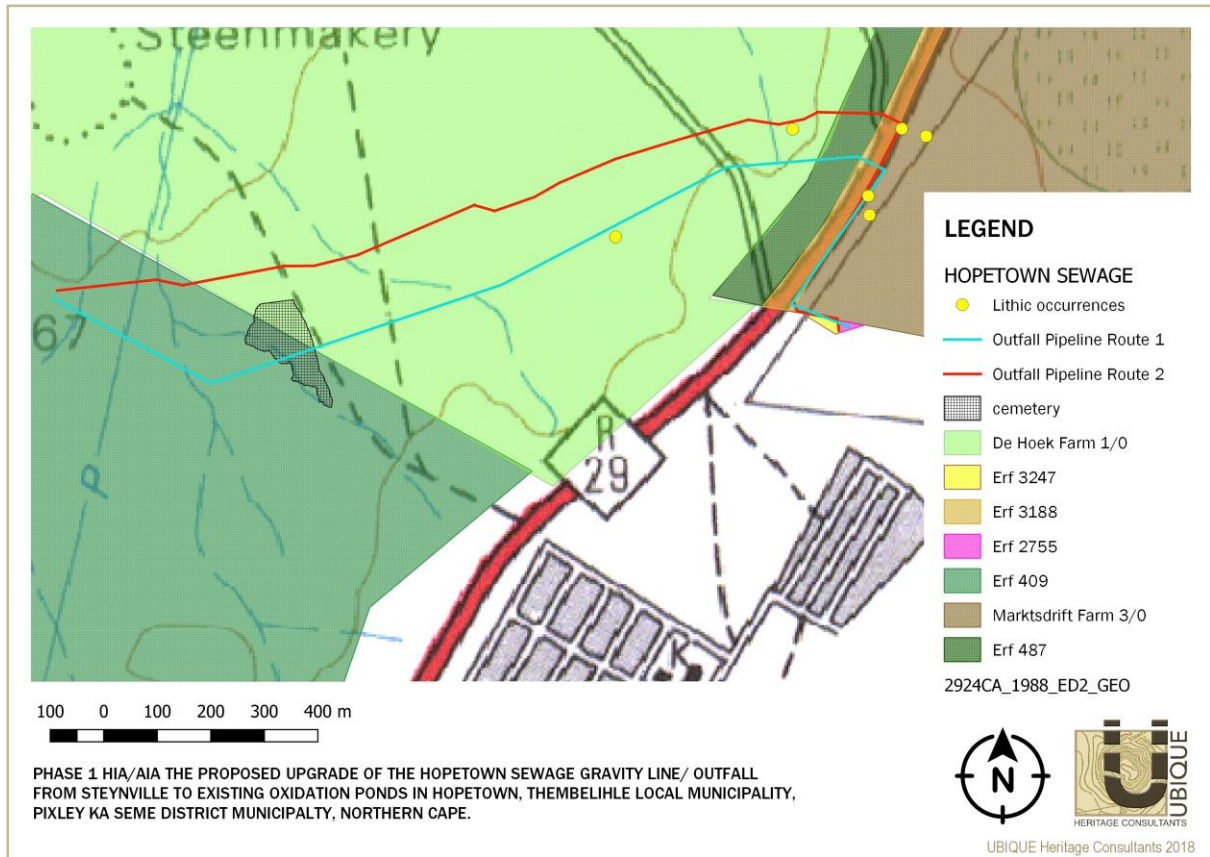


Figure 8 Distribution of lithic occurrences across study area, indicated on 1:50 000 Topo-Cadastral map 2924CA, Surveyor General.



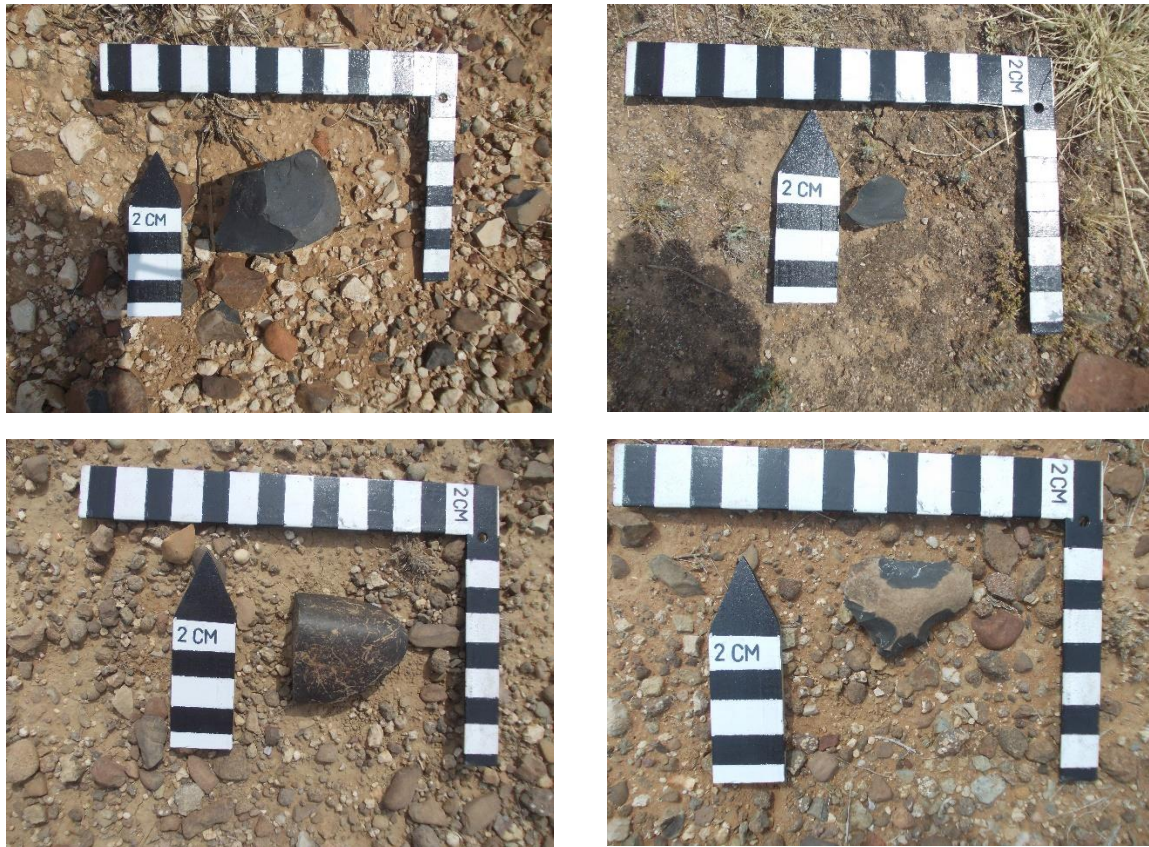


Figure 9 Lithic finds from study area.

6.3.2 Historical features

No significant historical features were identified within the study area.

6.3.3 Graves

No formal or informal graves were identified in the path of the preferred pipeline route. A graveyard is however in proximity to the study area on De Hoek Farm 1/0 and Erf 409 and lies directly in the path of the rejected pipeline alternative (Figure 8). Most of the graves are unmarked. Graves with formal marked headstones date from the 1930s. The graveyard is approximately 1,5 to 2 ha in size. All graves are of high significance and care should be taken to protect them. Their proximity to the proposed pipeline should be noted and care should be taken by construction vehicles to avoid the area completely, as they could have a detrimental effect.

The graves are of Local significance with Field Rating/Grade IIIB. It could be mitigated and (part) retained as a heritage register site (High significance). We recommend that the boundaries of the informal graveyard be identified, demarcated and properly fenced by the developer prior to construction. A buffer zone of 50m around the grave yard is out of bounds to all construction vehicles and/or activity.



Figure 10 Views of the graveyard in proximity to proposed pipeline.

6.3.4 Palaeontological resources

The geology of the proposed development footprint is underlain by the Lower Permian sediments of the Ecca Group (Prins Albert Formation) of the Karoo Basin (Butler 2018). According to the SAHRIS PalaeoMap the Ecca Group (Prins Albert Formation) has a high Palaeontological sensitivity. Palaeontologist Elize Butler from Banzai Environmental visited the development footprint and found no fossiliferous outcrops (see Appendix A for full PIA report). For this reason, a low palaeontological sensitivity is assigned to the development footprint. The scarcity of fossil heritage at the proposed development footprint indicates that the impact of the Hopetown Sewage Gravity Line/Outfall will be of a low significance in palaeontological terms (Butler 2018).

7. 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 lithic traces on the landscape of the study area are of low significance and the impact of the development on these resources are inconsequential. No further mitigation is required. Therefore, from a heritage point of view we recommend that the proposed development can continue.
2. Due to the low palaeontological significance of the area, no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. If fossil remains are discovered during any phase of construction, either on the surface or unearthed by fresh excavations, the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected (preferably in situ) and the ECO must report to SAHRA so that appropriate mitigation (e.g. recording, collection) can be carry out by a professional palaeontologist (Butler 2018).
3. 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 possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.

8. CONCLUSION

This HIA has identified and recorded heritage resources on De Hoek Farm 1/0, Marktsdrift Farm 3/0, Erf 409, while no heritage resources were found on Erf 2755, Erf 3247, and Erf 3188, Hopetown, Thembelihle Local Municipality, Pixley Ka Seme District Municipality Northern Cape. In the development footprint there are no archaeological, historical or cultural sites, or palaeontological resources and the proposed development will have no impact on heritage resources.

9. BIBLIOGRAPHY

- Beaumont, P.B. & Morris, D. 1990. *Guide to archaeological sites in the Northern Cape*. McGregor Museum: Kimberley.
- Beaumont, P. 2004. Kathu Pan and Kathu Townlands/ Uitkoms. In Morris, D. and Beaumont, P. *Archaeology in the Northern Cape: some key sites*: 50-53. McGregor Museum: Kimberley.
- Beaumont, P.B. 2013. Phase 2 Archaeological Permit Mitigation Report on a 0.7ha Portion of the farm Bestwood 549, situated on the eastern outskirts of Kathu, John Taolo Gaetsewe District Municipality, Northern Cape Province. Unpublished report. Dennesig.
- Beaumont, P.B. & Vogel, J.C. 2006. On a timescale for the past million years of human history in central South Africa. *South African Journal of Science* 102: 217-228.
- Beaumont, P.B., Smith, A.B. & Vogel, J.C. 1995. Before the Einiqua: the archaeology of the frontier zone. In Smith, A.B. (Ed.). *Einiqualand: Studies of the Orange River frontier*. University of Cape Town Press: Cape Town.
- Boshoff, W. (2006). Doornbult: Sites. http://www.doornbult.com/sites_station.htm. Accessed 20-09-2018.
- Breutz, P.L. 1953. The tribes of the Rustenburg and Pilanesberg districts. Department of Native Affairs, *Ethnological Publications* No.28. Government Printer: Pretoria.
- Breutz, P.L. 1954. The tribes of Marico District. Department of Native Affairs, *Ethnological Publications* No. 30. Government Printer: Pretoria.
- Breutz, P.L. 1963. The tribes of the districts of Kuruman and Postmasburg. Department of Native Affairs, *Ethnological Publications* No. 49. Government Printer: Pretoria.
- Butler, E. 2018. Palaeontological Desktop Assessment of the Proposed Upgrade of the Hopetown Sewage Gravity Line/ Outfall from Steynville to Existing Oxidation Ponds, Hopetown, Thembelihle Municipality. Unpublished report. Banzai Environmental: Bloemfontein.
- Coertze, P.J. & Coertze, R.D. 1996. *Verklarende vak woordeboek vir Antropologie en Argeologie*. R.D. Coertze: Pretoria.
- Deacon, H.J. & Deacon, J. 1999. *Human Beginnings in South Africa: Uncovering the secrets of the Stone Age*. David Phillips Publishers: Cape Town.
- Dreyer, C. 2005. Archaeological and Cultural Heritage Investigation of the Proposed Wigton – Osborne ESKOM Power Line Route, Near Hopetown, Northern Cape. Unpublished report. Brandhof.
- Dreyer, C. 2008. Archaeological and Cultural Heritage Assessment of the Proposed MTN Mast at the Farm Elandsdraai 88, Near Orange River Station, Hopetown District, Northern Cape. Unpublished report. Brandhof.

- Dreyer, C. 2012. Letter of Recommendation for the Exemption from a First Phase Archaeological & Heritage Investigation of the Proposed Establishment of a Photovoltaic (Solar Power) Installation on the Farm Wicklow 218, Near Hopetown, Northern Cape. Unpublished report. Brandhof.
- Higgitt, N & Nel, J. 2014. Slypsteen Bulk Sample Application, Slypsteen 41, Hopetown District, Northern Cape. Unpublished report. Digby Wells Environmental: Randburg.
- Korsman, S.A. & Meyer, A. 1999. Die Steentydperk en rotskuns. In: Bergh, J.S. (red.). *Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies*. J.L. van Schaik: Pretoria.
- Lombard, M. 2011. Howieson's Poort. *McGraw Hill Year Book of Science & Technology*. Article ID: YB120253; Sequence Number 14.
- Lombard, M. & Parsons, I. 2008. Blade and bladelet function and variability in risk management during the last 2000 Years in the Northern Cape. *South African Archaeological Bulletin* 63: 18-27.
- Lombard, M., Wadley, L., Deacon, J., Wurz, S., Parsons, I., Mohapi, M. Swart, J. & Mitchell, P. 2012. South African and Lesotho Stone Age sequence updated. *South African Archaeological Bulletin* 67: 123-144.
- Kaplan, J. 2012. Archaeological Impact Assessment: The Proposed Disselfontein Keren Energy Solar Plant Near Hopetown, Northern Cape Province. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- Kaplan, J. 2017. Archaeological Impact Assessment: The Proposed Disselfontein Keren Energy Solar Plant Near Hopetown, Northern Cape Province. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- Mitchell, P. 2002. *The archaeology of Southern Africa*. Cambridge: Cambridge University Press.
- Morris, A. 1995. The Einiqua: an analysis of the Kakamas skeletons. In: Smith A.B. (ed.) *Einiqualand: studies of the Orange River frontier*: 110-164.
- Morris, D. & Beaumont, P. 2004. *Archaeology in the Northern Cape: Some key sites*. SA3 Post-Conference Excursion, 8-10 April 2004. McGregor Museum: Kimberley.
- Morris, D. 2005. Report on a Phase 1 Archaeological Impact Assessment of proposed mining areas on the farms Ploegfontein, Klipbankfontein, Welgevonden, Leeuwfontein, Wolhaarkop and Kapstevell, west of Postmasburg, Northern Cape. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2009. Report on a further Phase 1 Archaeological Impact Assessment at Bucklands Settlement near Douglas, Northern Cape. McGregor Museum: Kimberly.
- Morris, D. 2011 Archaeological Impact Assessment Phase 1: Gannahoek N12 Quarry near Hopetown, Northern Cape. Unpublished Report. McGregor Museum: Kimberley.
- Mucina, L. & Rutherford, M.C. (eds) 2006. *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. SANBI: Pretoria.
- Opperman, H. 2012. First phase archaeological and cultural heritage assessment of the proposed residential development of portions 14 and 3 of the farm Vluytjeskraal 149, District: Hopetown, Province: Northern Cape. Unpublished report. Epog Navorsings Maatskappy: Orania.
- Orton, J. & Webley, L. 2013. *Heritage Impact Assessment for a proposed Hydro-Electric facility near Riemvasmaak, Northern Cape*. Unpublished report. ACO Associates cc: St James.
- Pelser, A.J. & Lombard, M. 2013. *A report on the archaeological investigation of Stone Age finds on the Paling 434, Hay Magisterial District, near Postmasburg in the Northern Cape Province*. Unpublished EIA Report. Kia Batla Holdings: Craighall.
- Penn, N. 2005. *The Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the 18th Century*. Athens. Ohio University Press and Double Storey Books: Ohio and Cape Town.

- Porat, N., Chazan, M., Grun, Aubert, R., Eisenmann, V. & Horwitz, L. 2010. New radiometric ages for the Fauresmith industry from Kathu Pan, southern Africa: Implications for the Earlier to Middle Stone Age transition. *Journal of Archaeological Science* 37: 269-283.
- Ross, R. 1975. The!Kora Wars on the Orange River, 1830-1880. *The Journal of African History*, 16 (4): 561-576.
- Rossouw, L. 2013. Phase 1 Palaeontological Impact Assessment of the Proposed Construction of the North and South Sidala Hydroelectric Power Sites on the Orange River, Siyancuma and Thembelihle municipalities, NC. Langehovenpark: Palaeo Field Services.
- Rossouw, L. 2017. A Phase 1 Heritage Impact Assessment of proposed installation of new irrigation pivots and associated infrastructure on portion 0 and 2 of the farm Waterford 229 outside Hopetown, NC Province. Unpublished report. National Museum Bloemfontein: Bloemfontein.
- Rossouw, L. 2018. Phase 1 Heritage Impact Assessment: Proposed cultivation of 16 ha farmland on the farm Donegal 217 near Hopetown, NC Province. Unpublished report. Paleo Field Services: Langehoven Park.
- Snyman, P.H.R. 2000. *Changing tides. The story of ASSMANG*. The Associated Manganese Mines of South Africa Limited: Johannesburg.
- Thackeray, A.I., Thackeray, J.F. & Beaumont, P.B. 1983. Excavations at the Blinkklipkop specularite mine near Postmasburg, Northern Cape, *South African Archaeological Bulletin* 38:17-25.
- Van der Walt, J. & Bradfield, J. (accepted for publication). The effect of heavy-duty machinery on the formation of pseudo-knapping débitage on Stone Age cultural landscapes. *Antiquity*. (personal communication with authors).
- Van Ryneveld, K. 2007. *Archaeological Impact Assessment Phase 1: Portion of the farm Bokspuits 118, Groblershoop district, Northern Cape South Africa*. Unpublished report.
- Van Ryneveld, K. 2005. Cultural Resources Management Impact Assessment: (Portions of) Etrick 182; Hopetown District, Northern Cape, South Africa. Kimberley: McGregor Museum.
- Van Ryneveld, K. 2013a. Phase 1 Archaeological Impact Assessment: The North Hydroelectric Power Site, Orange River, Siyancuma Local Municipality, Northern Cape, South Africa. Beacon Bay: ArchaeoMaps Archaeological Consultancy.
- Van Ryneveld, K. 2013b. Phase 1 Archaeological Impact Assessment: The South Hydroelectric Power Site, Orange River, Thembelihle Local Municipality, Northern Cape, South Africa. Beacon Bay: ArchaeoMaps Archaeological Consultancy.
- Van Ryneveld, K. & Van der Walt, J. 2014. Phase 1 Archaeological Impact Assessment. The South Hydroelectric Power Site, Orange River, Thembelihle Local Municipality, Northern Cape, South Africa. ArchaeoMaps: Beacon Bay.
- Van Vollenhoven 2012a. *A report on a cultural heritage baseline study for the proposed exploration activities at the Jacomynspan Project, Northern Cape Province*. Unpublished report. Archaetnos: Groenkloof.
- Van Vollenhoven, A.C. 2012b. *A report on a heritage impact assessment for the proposed SASOL CSP and CPV Project near Upington in the Northern Cape Province*. Unpublished report. Archaetnos: Groenkloof.
- Van Vollenhoven, A.C. 2014a. *A report on a cultural heritage impact assessment for the proposed exploration activities at the Jacomynspan Project, Northern Cape Province*. Unpublished report. Archaetnos: Groenkloof.
- Van Warmelo, N.J. 1935. A Preliminary Survey of the Bantu Tribes of South Africa. Department of Native Affairs, *Ethnological Publications* Vol. V. Government Printer: Pretoria.

Walker, S.J.H., Chazan, M. & Morris, D. 2013. *Kathu Pan: Location and Significance* – A report requested by SAHRA, Cape Town.

Wiid, R. (2011). *Ons mag nie vergeet nie: Doornbult-konsentrasiekamp 1901-1902*. Exclusive Solutions.

Wilkins, J. 2010. Style, symboling, and interaction in Middle Stone Age societies. *Explorations in Anthropology* 10(1):102–125.

ACTS

National Environmental Management Act, 1998 (Act 107 of 1998).

National Heritage Resources Act, 1999 (Act 25 of 1999).

SAHRA. 1999. *Government Gazette 1999*. National Heritage Resources Act No. 25 of 1999.

SAHRA. 2007. *SG 2.2 SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports*.

SAHRA. 2008. *Site Management Plans: Guidelines for the Development of Plans for the Management of Heritage Sites or Places*. (see specifically Section 7). (www.sahra.org.za).

WEB

<http://bgis.sanbi.org/LUDS/Home/Municipality/211>

<http://www.doornbult.com>

<http://www.heritage.org.za/karoo/hope/htm>

<http://www.sahra.org.za/sahris>

APPENDIX A

PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED UPGRADE OF THE HOPETOWN SEWAGE GRAVITY LINE/ OUTFALL FROM STEYNVILLE TO EXISTING OXIDATION PONDS, HOPETOWN, THEMBELIHLE MUNICIPALITY, NORTHERN CAPE.

**PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED UPGRADE OF THE HOPETOWN
SEWAGE GRAVITY LINE/ OUTFALL FROM STEYNVILLE TO EXISTING OXIDATION PONDS,
HOPETOWN, THEMBELIHLE MUNICIPALITY**

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8 SEPTEMBER 2018

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EXECUTIVE SUMMARY

UBIQUE Heritage Consultants appointed Banzai Environmental (Pty) Ltd to undertake a Palaeontological Impact Assessment assessing the palaeontological impact of the proposed upgrade of the Hopetown Sewage Gravity Line/Outfall from Steynville to existing oxidation ponds, Hopetown, Thembelihle Municipality, Northern Cape. According to the National Heritage Resources Act (Act No 25 of 1999, Section 38), a palaeontological impact assessment is required to identify the occurrence of fossil material within the proposed development footprint and to calculate the impact of the development on the palaeontological resources.

The geology of the proposed development footprint is entirely underlain by the Lower Permian sediments of the Ecca Group (Prins Albert Formation) of the Karoo Basin. According to the SAHRIS PalaeoMap the Ecca Group (Prins Albert Formation) has a high Palaeontological sensitivity. During a field survey of the development footprint (on foot and by motor vehicle), no fossiliferous outcrops were found. For this reason, a **low palaeontological sensitivity** is assigned to the development footprint. The scarcity of fossil heritage at the proposed development footprint indicates that the impact of the Hopetown Sewage Gravity Line/Outfall will be of a low significance in palaeontological terms. It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further Palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

In the event that fossil remains are discovered during any phase of construction, either on the surface or unearthed by fresh excavations, the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected (preferably *in situ*) and the ECO must report to SAHRA so that appropriate mitigation (e.g. recording, collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for collection permit from SAHRA. Fossil material must be curated in an accredited institution (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

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INTRODUCTION

UBIQUE Heritage Consultants was appointed to conduct the HIA (Heritage Impact Assessment) for the proposed upgrade of the Hopetown Sewage Gravity Line/Outfall from Steynville to existing oxidation ponds, Hopetown, Thembelihle Municipality, Northern Cape. Banzai Environmental (Pty) Ltd was appointed to undertake the Palaeontological Impact Assessment assessing the palaeontological impact of the proposed development on fossil heritage in the development footprint. The Thembelihle Municipality is subjected to continuous difficulties with blockages on the current outfall sewer line due to a lack of capacity.

LEGISLATION

NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **“all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens”**.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA. Palaeontological resources may not be unearthed, moved, broken or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Desktop Assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- the construction of a bridge or similar structure exceeding 50 m in length;
- any development or other activity which will change the character of a site— (exceeding 5 000 m² 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 re-zoning of a site exceeding 10 000 m² in extent;

or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.



Figure 1: Google image indicating the proposed pipeline route in green, in proximity to Hopetown, the existing sewage works and the Orange River.



Figure 2: Google image indicating the proposed pipeline route in green, drainage lines to the orange river clearly visible.



Figure 3: Google image indicating the proposed pipeline route in green as well as current suburbs and the possible new development area which will be serviced by the Hopetown Sewage Gravity Line/Outfall.

OBJECTIVE

The objective of a Palaeontological Desktop Assessment is to determine the impact of the development on potential palaeontological material at the site. According to the “SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports” the aims of the palaeontological impact assessment are: 1) to identify the palaeontological importance of the exposed and subsurface rock formations in the development footprint 2) to evaluate the palaeontological importance of the formations 3) to determine the impact of the development on fossil heritage; and 4) to recommend how the developer ought to protect or mitigate damage to fossil heritage.

When a palaeontological desktop study is compiled, the potentially fossiliferous rocks present within the study area are established utilizing 1:250 000 geological maps. The topography of the development area is identified by using 1:50 000 topography maps as well as Google Earth Images of the development area. Possible fossil heritage within of the development area is obtained from previous palaeontological impact studies in the same region as well as the PalaeoMap from SAHRIS and thus the palaeontological importance of the rock units is calculated. The possible impact of the proposed development footprint on local fossil heritage by: 1) the palaeontological importance of the rocks and 2) the type of the development footprint and 3) quantity of bedrock excavated.

When rocks of moderate to high palaeontological sensitivity are present within the study area, a field-based assessment by a professional palaeontologist is required. Based on the desktop data and field assessment the impact significance of the planned development is measured with recommendations for further studies or mitigation. Usually, destructive impacts on palaeontological heritage only occur during construction. The excavations will transform the current topography and may destruct or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

GEOLOGICAL AND PALAEONTOLOGICAL HERITAGE

The geology of the proposed development footprint is entirely underlain by the Lower Permian sediments of the Ecca Group (Prins Albert Formation) of the Karoo Basin. The Ecca Group consists of 16 formations of which the Prins Albert and Whitehill formations is the most extensive. The Prins Albert Formation is limited to the south western half of the Karoo Basin and in the past known as “Upper Dwyka Shales.”

This Formation consists of marine to hyposaline basin plain mud rocks that occur with minor volcanic ashes, iron stones and phosphates. Post-glacial mud rocks are present at the base of the

Prince Albert Formation. These sediments generally appear dark on satellite images because the outcrop is mantled in gravels rich in ferromanganese minerals (gravel clasts have a shiny-black discolouration).

The fossil assemblage of the Prince Albert Formation is known for its rich assemblages of plant fossils known as the *Glossopteris* flora. This includes petrified wood, roots and palynomorphs which include spores and acritarchs. In rare cases body fossils of insects have been recovered. Moderately diverse trace fossil assemblages can be present of which many can be assigned to fish or non-marine arthropod groups like crustaceans, king crabs and predatory water scorpions which could have reached lengths of two meters or more.

This trace fossil assemblage of the non-marine *Mermia* Ichnofacies, is dominated by the ichnogenera *Umfolozia* (arthropod trackways) and *Undichna* (fish swimming trails). Fish coprolites have also been described from this formation. A low diversity marine invertebrate (bivalves, nautiloids, brachiopods), palaeoniscoid fish, sharks and protozoans have been uncovered. There is also a possibility that stromatolites and oolites are preserved. Well-preserved skeletons of the well-known aquatic mesosaurids have been uncovered while amphibians are also recorded from the uppermost Ecca beds.

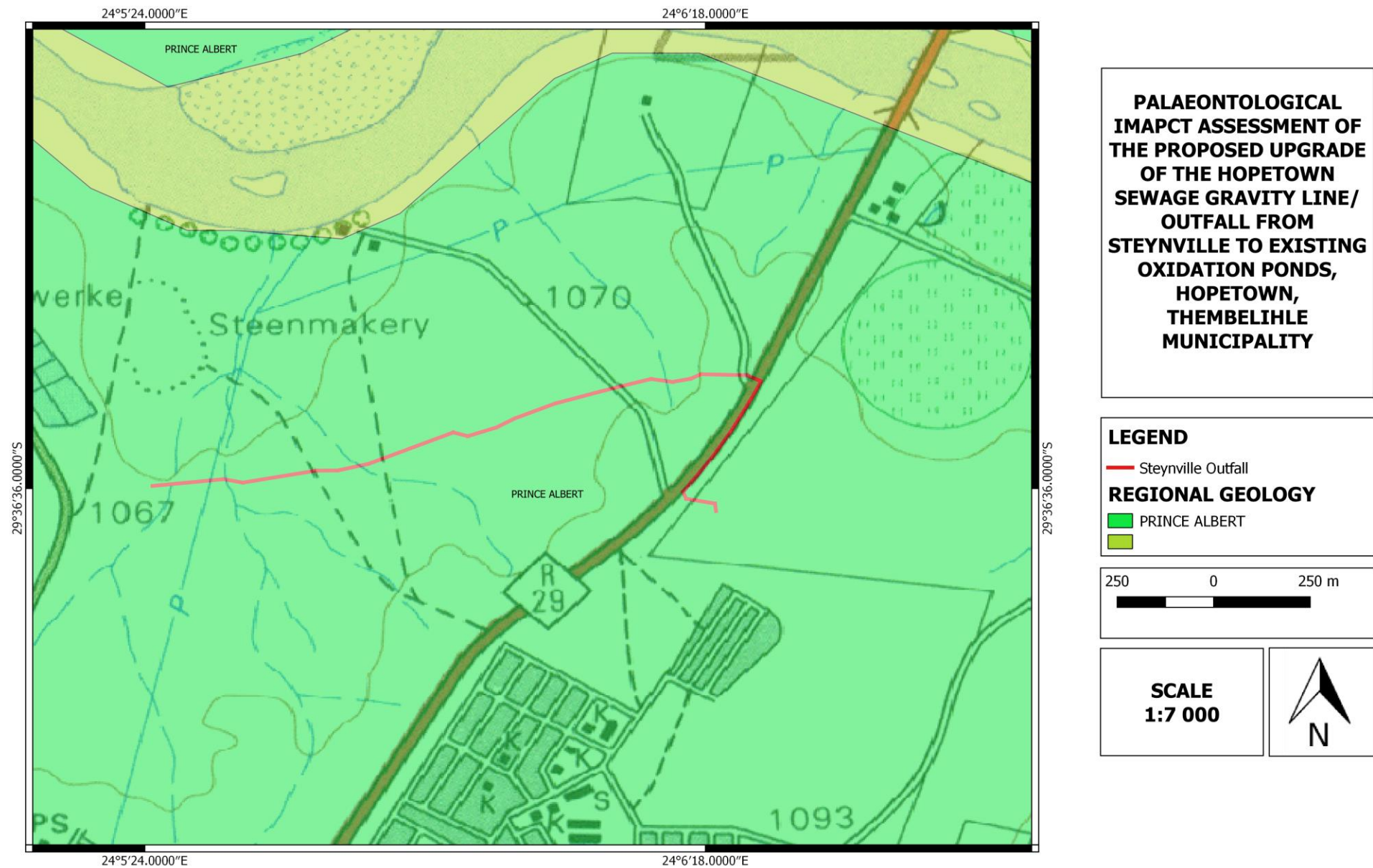


Figure 5. The surface geology of the proposed upgrade of the Hopetown sewage gravity/ outfall resort from Steynville to existing oxidation ponds, Thembelikle Local Municipality, Pixey ka Seme District. The proposed development is entirely underlain by the Prince Albert Formation of the Ecca Group. Map drawn QGIS Desktop 2.18.14. The Orange River is represented by the yellow green in the map).

GEOGRAPHICAL LOCATION OF THE SITE

The existing waste water treatment works lie to the north west of the site, and the town of Hopetown to the south. The informal housing development, Steynville, lies to the south east of the proposed pipeline, while the Orange River is situated directly north. The proposed development site is situated on undeveloped land while agriculture is the main activity in the area.

According to the available information the location of the sewage gravity line and outfall is :

Start : 29° 36' 38.14S; and 24° 06' 19.73E

Middle 29° 36' 36.57S; and 24° 05' 52.73E

End 29° 36' 36.22S; and 24° 05' 24.49E

The proposed development is situated on the following farms:

- De Hoek Farm 1/0
- Marktsdrift Farm 3/0
- Erf 487
- Erf 409
- Erf 2755
- Erf 3274

METHODS

As part of the PIA, a field-survey of the development footprint was conducted in August 2018 to assess the potential risk to palaeontological material (fossil and trace fossils) in the proposed footprint of the development. A physical field-survey was conducted on foot within the proposed development footprint. The results of the field-survey, the author's experience, aerial photos (using Google Earth, 2018), topographical and geological maps and other reports from the same area were used to assess the proposed development footprint. No consultations were undertaken for this Impact Assessment.



ASSUMPTIONS AND LIMITATIONS




The accurateness of Palaeontological Desktop Impact Assessments is reduced by old fossil databases that do not always include relevant locality or geological formations. The geology in various remote areas of South Africa may be less accurate because it is based entirely on aerial




photographs. The accuracy of the sheet explanations for geological maps is inadequate as the focus was never intended to be on palaeontological material.

The entire South Africa has not been studied palaeontologically. Similar Assemblage Zones but in different areas, might provide information on the presence of fossil heritage in an unmapped area. Desktop studies of similar geological formations generally assume that unexposed fossil heritage is present within the development area. Thus, the accuracy of the Palaeontological Impact Assessment is improved by a field-survey.

Site Visit

29° 36' 37"S; 24° 06' 19"e	
29° 36' 25.86"S; 24° 06' 23.44"e	

<p>29° 36' 25"S; 24° 06' 17"e</p>	
<p>29° 36' 26"S; 24° 06' 15"e</p>	
<p>29° 36' 31"S; 24° 05' 56"e</p>	

<p>29° 36' 33.38"S; 24° 05' 44.09"E</p>	
<p>29° 36' 35"S; 24° 05' 33"E</p>	
<p>29° 36' 35.716"S; 24° 05' 24.62"E</p>	

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. Each impact is also assessed according to the following project phases:

- Construction
- Operation
- Decommissioning

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

Table 1: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
The Nature of the Impact is the possible destruction of fossil 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	Impact will certainly occur (Greater than a 75% chance of occurrence).

Table 1 Continues

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 but 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 time span 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 system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	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	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 often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
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Table 1 Continues

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 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 marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result 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 but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of 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

Table 1 Continues

SIGNIFICANCE		
<p>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:</p> <p>(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.</p> <p>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.</p>		
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
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FINDINGS AND RECOMMENDATIONS

The geology of the proposed development footprint is entirely underlain by the Lower Permian sediments of the Ecca Group (Prins Albert Formation) of the Karoo Basin. According to the SAHRIS PalaeoMap the Ecca Group (Prins Albert Formation) has a high Palaeontological sensitivity. During a field survey of the development footprint (on foot and by motor vehicle), no fossiliferous outcrops were found. For this reason, a **low palaeontological sensitivity** is assigned to the development footprint. The scarcity of fossil heritage at the proposed development footprint indicates that the impact of the Hopetown Sewage Gravity Line/Outfall will be of a low significance in palaeontological terms. It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. Construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further Palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

In the event that fossil remains are discovered during any phase of construction, either on the surface or unearthed by fresh excavations, the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected (preferably *in situ*) and the ECO must report to SAHRA so that appropriate mitigation (e.g. recording, collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

REFERENCES

Almond, J., PETHER, J., 2009. Palaeontological heritage of the Northern Cape. SAHRA Palaeotechnical Report, 143pp

ALMOND, J., PETHER, J, and GROENEWALD, G. 2013. South African National Fossil Sensitivity Map. SAHRA and Council for Geosciences.

- ANDERSON, A.M. 1976. Fish trails from the Early Permian of South Africa. *Palaeontology* 19: 397-409, pl. 54.
- ANDERSON, A.M. 1981. The *Umfolozia* arthropod trackways in the Permian Dwyka and Ecca Groups of South Africa. *Journal of Palaeontology* 55: 84-108, pls. 1-4.
- ANDERSON, A.M. & MCLACHLAN, I.R. 1976. The plant record in the Dwyka and Ecca Series (Permian) of the south-western half of the Great Karoo Basin, South Africa. *Palaeontologia Africana* 19: 31-42.
- ANDERSON, J.M. & ANDERSON, H.M. 1985. Palaeoflora of southern Africa. Prodrum of South African megaflores, Devonian to Lower Cretaceous, 423 pp. Botanical Research Institute, Pretoria & Balkema, Rotterdam.
- BAMFORD, M.K. 2004. Diversity of woody vegetation of Gondwanan southern Africa. *Gondwana Research* 7, 153-164.
- BENDER, P.A. 2004. Late Permian actinopterygian (palaeoniscid) fishes from the Beaufort Group, South Africa: biostratigraphic and biogeographic implications. *Council for Geoscience Bulletin* 135, 84 pp
- BRINK, J.S. *et al.* 1995. A new find of *Megalotragus priscus* (Alcephalini, Bovidae) from the Central Karoo, South Africa. *Palaeontologia africana* 32: 17-22.
- BUATOIS, L. & MANGANO, M.G. 1995. The paleoenvironmental and paleoecological significance of the lacustrine *Mermia* ichnofacies: an archetypal subaqueous nonmarine trace fossil assemblage. *Ichnos* 4: 151-161.
- DU TOIT, A., 1954. The geology of South Africa. Xii+611pp. Olicier and Boyd, Edinburgh.
- GRADSTEIN, F.M., J.G.OGG, M.D. SCHMITZ & G.M.OGG. (Co-ordinators). 2012. The Geologic Time Scale 2012. Boston, USA: Elsevier, 2 volumes plus chart, 1176 pp.
- KENT, L.E. 1980. Part 1: Lithostratigraphy of the Republic of South Africa, South West Africa/Namibia and the Republics of Bophuthatswana, Transkei and Venda. SACS, Council for Geosciences, pp. 535-574.

MACRAE, C. 1999. Life etched in stone. Fossils of South Africa. 305 pp. The Geological Society of South Africa, Johannesburg.

MCCARTHY, T. & RUBIDGE, B. 2005. The story of Earth and life: a southern African perspective on a 4.6-billion-year journey. 334pp. Struik, Cape Town.

TANKARD, A.J., JACKSON, M.P.A., ERIKSSON, K.A., HOBDAK, D.K., HUNTER, D.R. & MINTER, W.E.L. 1982. Crustal evolution of southern Africa – 3.8 billion years of earth history, xv + 523pp. Springer Verlag, New York.

QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty-three years. She has extensive experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa for 10 years. She has been conducting Palaeontological Impact Assessments since 2014.

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;

- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

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

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SIGNATURE:

