



## **PROPOSED MGWALI SOUTH WATER SUPPLY**

**iDutywa, Mbhashe Municipality, Amatole District Municipality Eastern  
Cape Province**

**Heritage Impact Report**

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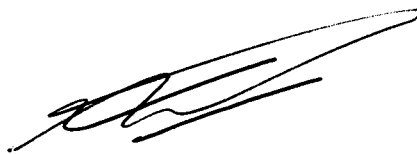
**Client:** THM Civil and Structural Engineers

## **Declaration of Independence**

*This report has been compiled by PGS Heritage & Grave Relocation Consultants, an appointed Heritage Specialist for THM Civil and Structural Engineers. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment.*

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## EXECUTIVE SUMMARY

PGS Heritage & Grave Relocation Consultants (PGS) was appointed by THM Civil and Structural Engineers to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the Proposed Mgwali South Water Supply, iDutywa, Mbhashe Municipality, Amatole District Municipality Eastern Cape Province.

### Pipeline Alignments

During the survey a total of 54 heritage sites were identified of which 53 were cemeteries or single graves, containing approximately 282 graves in total. A single Late Iron Age stone walled site (**MGS010**) was the only other heritage feature found to be close to construction activities. ***All these heritage site are close to or in the reserve of the proposed pipeline alignments.*** The following mitigation and direct management measures will be required during construction:

#### *Heritage Structures*

- The site should be demarcated and fenced during construction activity and a buffer of at least 10 meters around the site kept ;
- If the site must be impacted on due to development constraint a permit under Section 35 of the NHRA will be required for further mitigation work that must include excavations and the mapping of the layout of the site as a minimum; and
- It must also be kept in mind that infant burials could occur at the site and the mitigation measures with regards to cemeteries also pertain.

#### *Cemeteries*

- Adjust the alignments and demarcate grave sites with at least a 25 meter buffer.
- In the event that the sites cannot be excluded from the pipeline foot print, a grave relocation process as described in Section 5 of this report needs to be implemented.
- The consultation with regards to construction close to graves and cemeteries needs to be done before construction starts in order to agree on the process to be followed with the community in case the graves are damaged or work needs to be done very close to graves.

The grave relocation process must include:

- A detailed social consultation process, which will be at least 60 days in length that will trace the next-of-kin and obtain their consent for the relocation of the graves,;
- Site notices indicating the intent of the relocation;
- Newspaper Notice indicating the intent of the relocation;
- A permit from the local authority;
- A permit from the Provincial Department of Health;
- A permit from the South African Heritage Resources Agency, if the graves are older than 60 years, or unidentified and thus presumed to be older than 60 years;
- An exhumation process that keeps the dignity of the remains and family intact;
- The whole process must be done by a reputable company that is well versed in such relocations;
- The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the company responsible for the development/construction.

### *Palaeontology*

The development might have an impact on the palaeontology of the site and therefore monitoring and mitigation in terms of the palaeontological heritage are required.

A significant part of the study area proposed for the development of Mgwali water supply development is located on areas underlain by Karoo aged sedimentary rocks of the Permian to Early Triassic Adelaide Subgroup as well as the Triassic Katberg Formation of the Tarkastad Subgroup. Fossils are expected in the Permian and Triassic sediments, cutting the significant Permian Extinction zone.

It is recommended that:

- A Phase 1 palaeontological impact assessment is to be done for areas with a significant rating for the occurrence of fossils (orange colour in **Figure 22**).

- The ECO of the project team should be made aware of the possible occurrence of fossils. If any fossils are recorded a trained palaeontologist must be notified to remove the fossils as per SAHRA legislation.

### **Borrow Pits**

The survey and evaluation of the borrow pit positions revealed no archaeological or historically significant structures. The recommendation as listed under Palaeontology above will need to be implemented for all borrow pits excluding pits 3, 4 and 5.

### **General**

Further to these recommendations the general Heritage Management Guidelines in Section 6.1 need to be incorporated into the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels.

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## **1 INTRODUCTION**

PGS Heritage & Grave Relocation Consultants (PGS) was appointed by THM Civil and Structural Engineers to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the Proposed Mgwali South Water Supply, iDutywa, Mbhashe Municipality, Amatole District Municipality Eastern Cape Province.

### **1.1 Scope of the Study**

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The Heritage Impact Assessment aims to inform the EIA in the development of a comprehensive EMP to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

### **1.2 Specialist Qualifications**

This Heritage Scoping Report was compiled by PGS Heritage & Grave Relocation Consultants (PGS).

The staff at PGS has a combined experience of nearly 40 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where the staff has the relevant expertise and experience to undertake that work competently.

Wouter Fourie, Principal Archaeologist for this project, is registered with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within said organisation.

### **1.3 Assumptions and Limitations**

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects



not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such 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. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

#### **1.4 Legislative Context**

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- i. National Environmental Management Act (NEMA), Act 107 of 1998
- ii. National Heritage Resources Act (NHRA), Act 25 of 1999
- iii. Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002
- iv. Development Facilitation Act (DFA), Act 67 of 1995

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- i. National Environmental Management Act (NEMA) Act 107 of 1998
  - a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
  - b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
  - c. Environmental Impact Assessment (EIA) – Section (32)(2)(d)
  - d. Environmental Management Plan (EMP) – Section (34)(b)
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
  - a. Protection of Heritage Resources – Sections 34 to 36; and
  - b. Heritage Resources Management – Section 38
- iii. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
  - a. Section 39(3)
- iv. Development Facilitation Act (DFA) Act 67 of 1995
  - a. The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...” NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA and the DFA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008):

The NEMA 23(2)(b) states that an integrated environmental management plan should, “...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage”.

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

## **1.5 Terminology and Abbreviations**

### *Archaeological resources*

This includes:

- i. material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- ii. 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 which is older than 100 years, including any

area within 10m of such representation;

- iii. wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, 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;
- iv. features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

#### *Cultural significance*

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

#### *Development*

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- i. construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- ii. carrying out any works on or over or under a place;
- iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- iv. constructing or putting up for display signs or boards;
- v. any change to the natural or existing condition or topography of land; and
- vi. any removal or destruction of trees, or removal of vegetation or topsoil

#### *Early Stone Age*

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

#### *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*

This means any place or object of cultural significance

### *Holocene*

The most recent geological time period which commenced 10 000 years ago.

### *Late Stone Age*

The archaeology of the last 20 000 years associated with fully modern people.

### *Late Iron Age (Early Farming Communities)*

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

### *Middle Stone Age*

The archaeology of the Stone Age between 20-300 000 years ago, associated with early modern humans.

### *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 which contains such fossilised remains or trace.

<b>ABBREVIATIONS</b>	<b>DESCRIPTION</b>
<b>AIA</b>	<b>Archaeological Impact Assessment</b>
<b>ASAPA</b>	<b>Association of South African Professional Archaeologists</b>
<b>CRM</b>	<b>Cultural Resource Management</b>
<b>DEA</b>	<b>Department of Environmental Affairs</b>
<b>DWA</b>	<b>Department of Water Affairs</b>
<b>EIA practitioner</b>	<b>Environmental Impact Assessment Practitioner</b>

<b>EIA</b>	<b>Environmental Impact Assessment</b>
<b>ESA</b>	<b>Early Stone Age</b>
<b>GPS</b>	<b>Global Positioning System</b>
<b>HIA</b>	<b>Heritage Impact Assessment</b>
<b>I&amp;AP</b>	<b>Interested &amp; Affected Party</b>
<b>LSA</b>	<b>Late Stone Age</b>
<b>LIA</b>	<b>Late Iron Age</b>
<b>MSA</b>	<b>Middle Stone Age</b>
<b>MIA</b>	<b>Middle Iron Age</b>
<b>NEMA</b>	<b>National Environmental Management Act</b>
<b>NHRA</b>	<b>National Heritage Resources Act</b>
<b>PHRA</b>	<b>Provincial Heritage Resources Authority</b>
<b>PSSA</b>	<b>Palaeontological Society of South Africa</b>
<b>SADC</b>	<b>Southern African Development Community</b>
<b>SAHRA</b>	<b>South African Heritage Resources Agency</b>

Refer to **Appendix C** for further discussions on heritage management and legislative frameworks

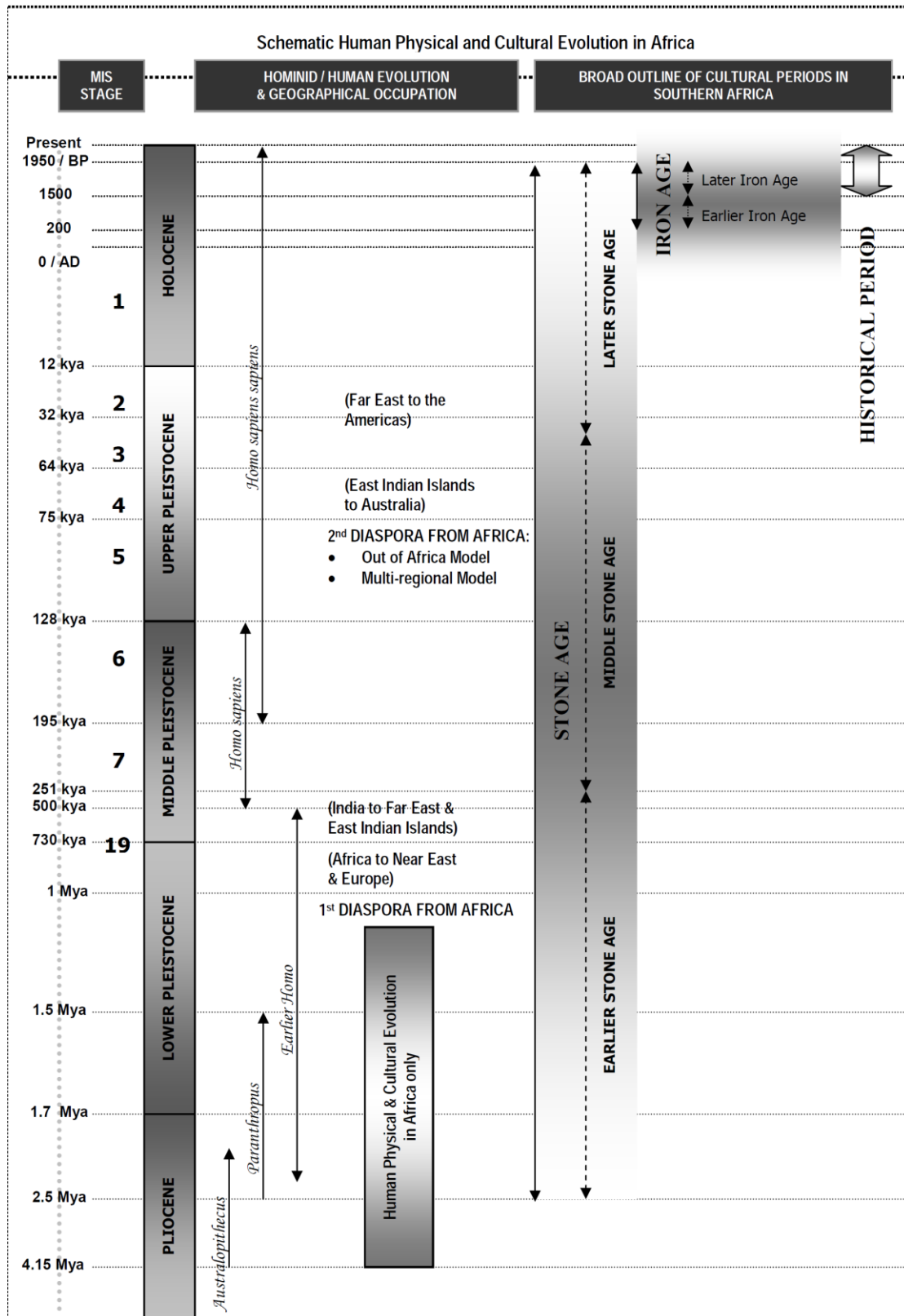


Figure 1 – Human and Cultural Timeline in Africa (Morris, 2008)

## 2 TECHNICAL DETAILS OF THE PROJECT

### 2.1 Site Location and Description

The study area is situated around the town of iDutywa some 40 kilometres to the north of Butterworth in the Eastern Cape (Figure 2).

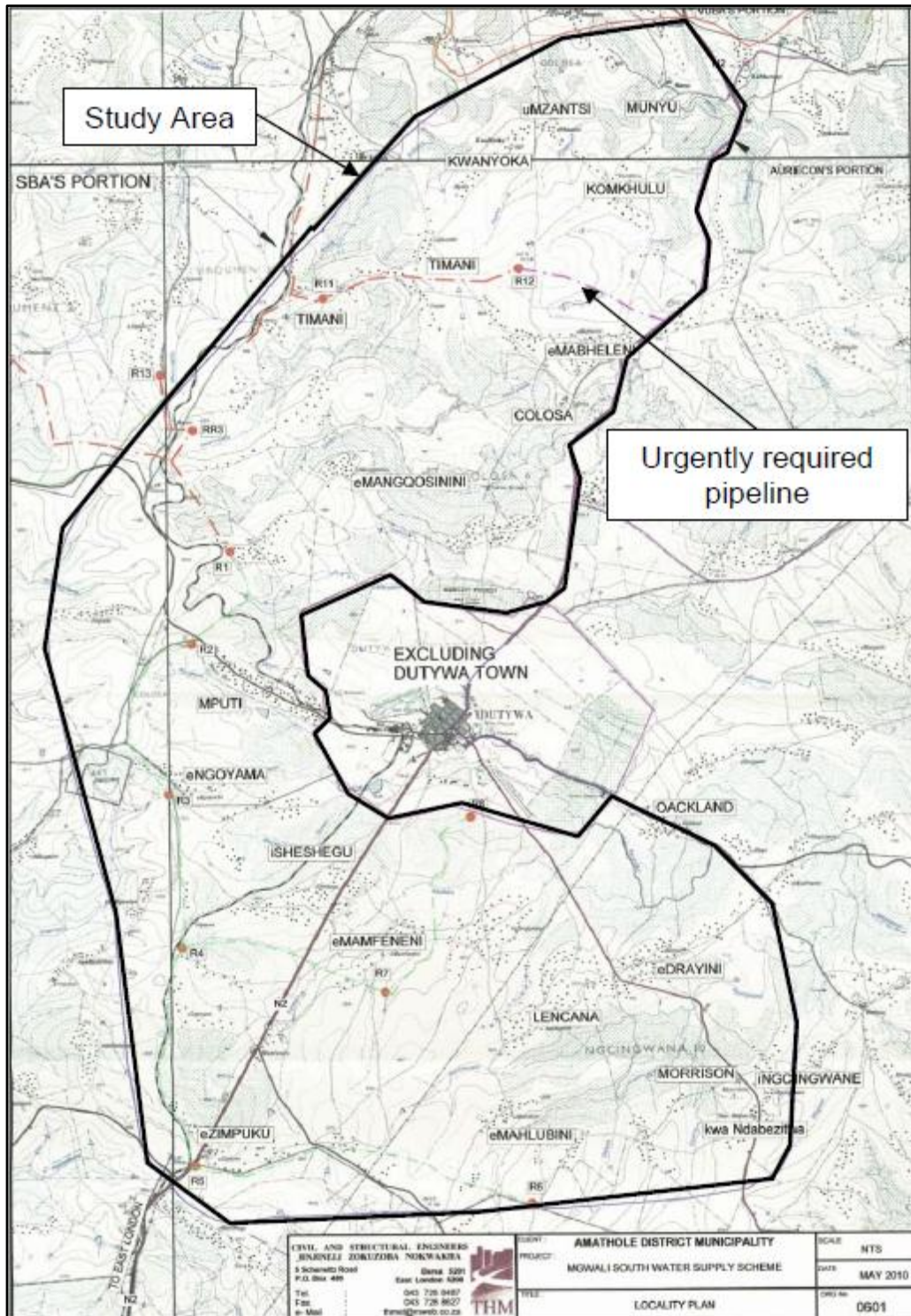


Figure 2 – Study area locality

## 2.2 Site Description

The area of study stretches from Komkhulu in the north of the study area to Emadokisini some 22 kilometres to the south down the N2, between iDutywa and Butterworth (**Figure 2**).

The area is characterised by undulating grass lands with low density settlements on ridges and hill tops (**Figure 3**).

The northern section of the project has already seen some construction activity on the pipelines with the area classified as **Phase 1** subject to construction of reservoir R1 at an earlier stage for which no Environmental Authorisation was required (**Figure 4**). Current construction activity is on-going in the region of reservoir R11 in Phase 1, while this report covers the project's Phases 2 to 7 (**Figure 5**).



*Figure 3 – General view of study area – rural landscape with low density settlement*





*Figure 4 – Reservoir R1 – Already installed during first Phase of the project*



*Figure 5 – Construction activity at reservoir R11 as part of construction in Phase 1*



*Figure 6 – View of the Borrow Pit 1 area*



*Figure 7 – View of the Borrow Pit 2 area*



*Figure 8 – View of the Borrow Pit 3 area*



*Figure 9 – View of the Borrow Pit 4 area*



*Figure 10 – Borrow Pit 5 area*



*Figure 11 – Borrow pit 6 area*



*Figure 12 – Borrow Pit 7 area*



*Figure 13 – Borrow Pit 8 area*



*Figure 14 – Borrow Pit 9 area*

### **2.3 Technical Project Description**

Amathole District Municipality are developing water supply proposals for villages currently without water in the Mbhashe Municipality. The project comprises the construction of 12 service reservoirs with a series of gravity supply pipelines to supply treated water to up to 25 villages. Village reticulation will then be provided through gravity pipelines to a total of 265 standpipes spaced throughout the villages to ensure a maximum walking distance of 200m from any household to a given standpipe. Wherever possible the pipelines will be placed adjacent to the existing gravel road network.

The total capacity of the 12 service reservoirs is 2150kℓ. A total length of 52+km of bulk pipeline and a total length of 49+km of supply pipelines will be constructed. 4700+ rural households are expected to benefit from the Project. The Project is to be implemented over a course of 3 years.

Terreco Environment cc has been appointed to undertake the legally required Environmental Impact Assessment (EIA) studies for the environmental authorisation

application process for the Project. This application will be made to Department of Economic Development and Environmental Affairs (DEDEA), East London.

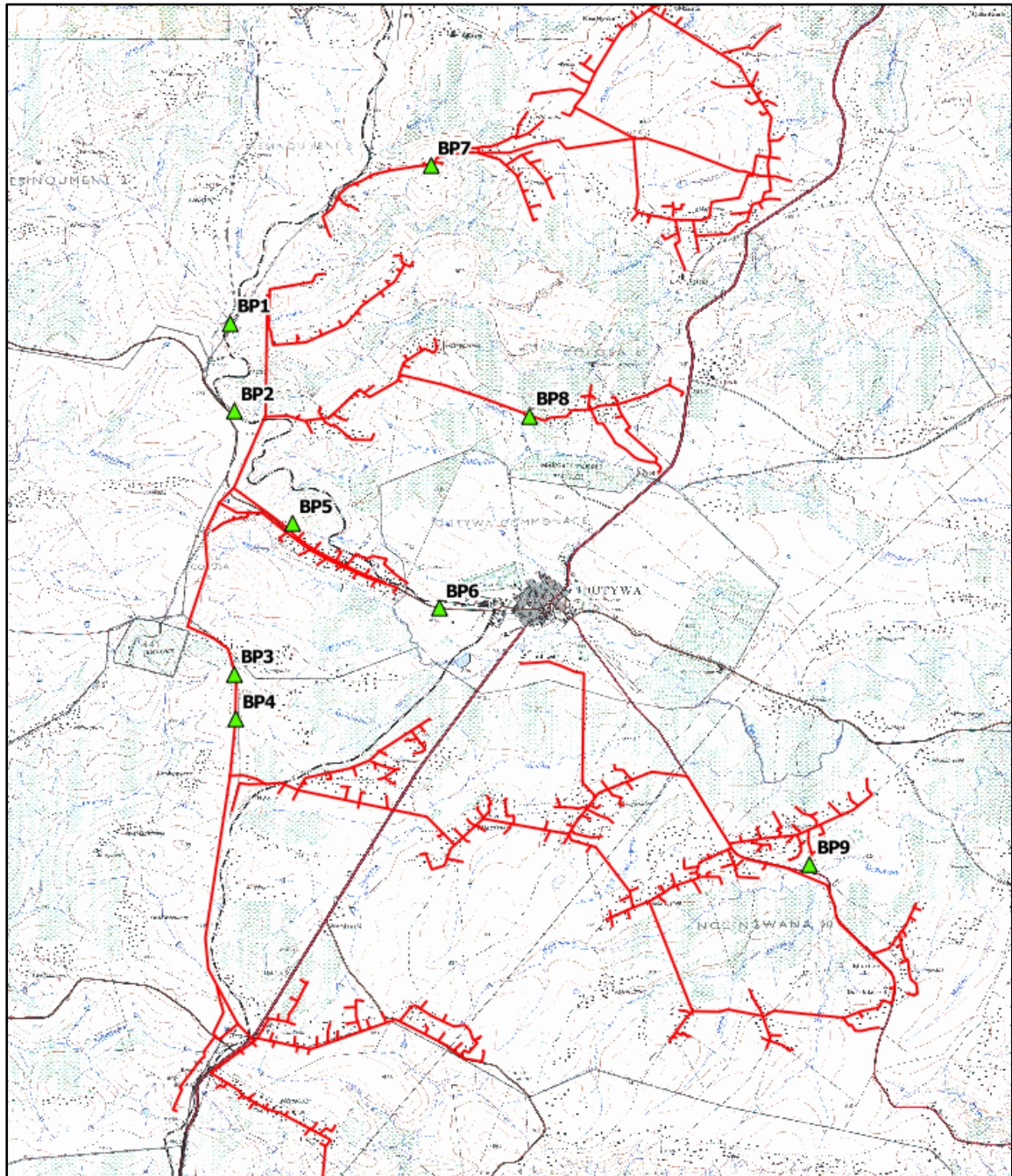


Figure 15 – Project layout

### **3 ASSESSMENT METHODOLOGY**

The section below outlines the assessment methodologies utilised in the study.

#### **3.1 Methodology for Assessing Heritage Site significance**

This Heritage Impact Assessment (HIA) report was compiled by PGS Heritage and Grave Relocation Consultants (PGS) for the proposed Mgwali South Project. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: The background information to the field survey relies greatly on the Heritage Background Research.

Step II – Physical Survey: A physical survey was conducted on foot through the proposed project area by qualified archaeologists (June 2012), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
  - Low - <10/50m<sup>2</sup>
  - Medium - 10-50/50m<sup>2</sup>
  - High - >50/50m<sup>2</sup>
- Uniqueness; and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:



- A - No further action necessary;
- B - Mapping of the site and controlled sampling required;
- C - No-go or relocate development activity position;
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site.

Impacts on these sites by the development will be evaluated as follows:

### *Site Significance*

Site significance classification standards prescribed by the SAHRA (2006) and approved by the ASAPA for the Southern African Development Community (SADC) region, were used for the purpose of this report.

*Table 1: Site significance classification standards as prescribed by SAHRA.*

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

### **3.2 Methodology for Impact Assessment**

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in **Table 2**.

*Table 2: Quantitative rating and equivalent descriptors for the impact assessment criteria*

<b>RATING</b>	<b>SIGNIFICANCE</b>	<b>EXTENT SCALE</b>	<b>TEMPORAL SCALE</b>
1	VERY LOW	<i>Isolated site</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

A more detailed description of each of the assessment criteria is given in the following sections.

#### *Significance Assessment*

Significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these since their importance in the rating scale is very relative. For example, the magnitude (i.e. the size) of area affected by atmospheric pollution may be extremely large (1000 km<sup>2</sup>) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed, the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in Table 3 below.

Table 3: Description of the significance rating scale

RATING		DESCRIPTION
5	VERY HIGH	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	HIGH	Impact is of substantial order within the bounds of impacts which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	MODERATE	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	LOW	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	VERY LOW	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity is needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	NO IMPACT	There is no impact at all - not even a very low impact on a party or system.

### *Spatial Scale*

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table 4**.

Table 4: Description of the significance rating scale

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of impacts possible, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the proposed site.
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect a route corridor / site not exceeding the boundary of the site.
1	Isolated Sites / proposed site	The impact will affect an area no bigger than the site.

*Duration Scale*

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The temporal scale is rated according to criteria set out in **Table 5**.

Table 5: Description of the temporal rating scale

RATING		DESCRIPTION
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium term	The environmental impact identified will operate for the duration of life of the project.
4	Long term	The environmental impact identified will operate beyond the life of operation.
5	Permanent	The environmental impact will be permanent.

*Degree of Probability*

The probability or likelihood of an impact occurring will be described as shown in **Table 6** below.

Table 6: Description of the degree of probability of an impact occurring

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very Likely
5	It's going to happen / has occurred

#### Degree of Certainty

As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard “degree of certainty” scale is used, as discussed in **Table 7**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 7: Description of the degree of certainty rating scale

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.

#### Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner, in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale as described below:

$$\text{Impact Risk} = (\text{SIGNIFICANCE} + \text{Spatial} + \text{Temporal}) \times \text{Probability}$$

3

5

An example of how this rating scale is applied is shown below:

*Table 8: Example of Rating Scale*

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	LOW	Local	Medium Term	Could Happen	
Impact to heritage	2	3	3	3	1.6

**Note:** The significance, spatial and temporal scales are added to give a total of 8, that is divided by 3 to give a criterion rating of 2.67. The probability (3) is divided by 5 to give a probability rating of 0.6. The criteria rating of 2.67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to 5 classes as described in the table below.

*Table 9: Impact Risk Classes*

RATING	IMPACT CLASS	DESCRIPTION
0.1 – 1.0	1	Very Low
1.1 – 2.0	2	Low
2.1 – 3.0	3	Moderate
3.1 – 4.0	4	High
4.1 – 5.0	5	Very High

Therefore with reference to the example used for air quality above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

## 4 CURRENT STATUS QUO

### 4.1 Archival findings

The archival research focused on available information sources that were used to compile a background history of the study area and surrounds. This data then informed the possible heritage resources to be expected during field surveying.

The findings can be compiled as follows:

As archaeological and heritage surveys deal with the locating of archaeological and heritage resources in a prescribed cartographic landscape, the study of archival and historical data,

and especially cartographic material, can represent a very valuable supporting tool in finding and identifying such resources.

The historical background and timeframe can be divided into the Stone Age, Iron Age and Historical timeframes. These can be outlined as follows:

### **Stone Age**

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

- *Early Stone Age:* The period dates from  $\pm$  2.5 million yrs -  $\pm$  250 000 yrs ago. Acheulean stone tools are dominant.
- *Middle Stone Age:* Various lithic industries in SA dating from  $\pm$  250 000 yrs – 22 000 yrs before present.
- *Late Stone Age:* The period from  $\pm$  22 000-yrs before present to the period of contact with either Iron Age farmers or European colonists.

### **Iron Age**

The Iron Age as a whole represents the spread of Bantu-speaking people and includes both the Pre-Historic and Historic periods. Similarly to the Stone Age, it can be divided into three periods:

- *The Early Iron Age:* Most of the first millennium (0 – 900 AD).
- *The Middle Iron Age:* 10th to 13th centuries (900 - 1200 AD)
- *The Late Iron Age:* 14th century to colonial period (1300 – 1500 AD).

### **Historic Timeframe**

17<sup>th</sup> Century to present AD (1600 – 2000)

#### **4.1.1 Idutywa**

Idutywa forms part of the Mbhashe Municipality, and was part of the former Transkei Bantustan. The name Idutywa translates to “Place of disorder” in Xhosa. The spelling of the town’s name was officially changed on 16 July 2004 to Dutywa. The town was named after

the Dutywa River, a tributary of the Mbhashe River. Dutywa is also known as a venue for the Abakhwetha dances, which is part of the initiation ceremony for young men (*EC21 Mbhashe local municipality Idutywa www.mbhashemun.gov.za*). Dutywa is a predominantly African community, with IsiXhosa the home language of 99, 3% of the area's inhabitants.

#### **4.1.2 Historical background**

The Idutywa Reserve is located approximately 16 km from the site of the present town. The Reserve was founded by Col. Gawler in 1858 immediately after the Nongawuse cattle killing episode in 1857 and served as a military post. During the Nongawuse cattle killing episode (April 1856 to May 1857) Xhosa from the Gcaleka chiefdom killed an estimated 400 000 of their cattle and destroyed their corn. This mass killing was the result of prophesy witnessed by the daughter of Mklakaza. The prophecy foretold that if all the cattle were slaughtered the whole nation will rise from dead. As a result the population was devastated; an estimated 40,000 Xhosa people succumbed to starvation and a further 40,000 fled their homes in search of food. This action broke the sustained resistance from the Xhosa and most of their lands were either given to white settlers or black clients of the Cape colonial government (*Hummel, 1989*).

Idutywa was moved to its present location following the war between the Gcaleka and Mfengu (Fingo) in 1877/1878 after the battle of Gwadana (*Gon, 1982*). Idutywa is also known as the birthplace of former South African president Thabo Mbeki, born on 18 June 1942 (*www.sahistory.org.za, EC21 Mbhashe local municipality Idutywa www.mbhashemun.gov.za*)

#### **4.1.3 Culture and Heritage**

Dutywa, formerly situated in Fingoland is a predominantly Mfengu Xhosa community. The Mfengu (meaning wanderers) were defeated and left landless by Zulu expansion under the rule of King Shaka (Mfecane 1815 – 1840). The Mfengu slowly started migrating into Xhosa territory and by the 1830's a centre of Mfengu settlement was established around the Methodist Missionary station in Butterworth where Reverend John Ayliff was stationed. By 1835 the relations between the Mfengu people and other Xhosa groups under the leadership of King Hinsta became strained and they look to the Reverend J Ayliff as a source of political patronage. In 1835 Sir Benjamin D'Urban replied to the letter Reverend John Ayliff wrote him on behalf the Mfengu people. D'Urban accepted the Mfengu people as



British subjects on 3 May 1835. The Mfengu would be granted land in accordance with Government notice No 14. On 14 May 1836 Mfengu leaders gathered at Peddie and in the presence of Reverend John Ayliff undertook the “Fingo Oath”. They swore to obey God and listen to the missionaries, to be loyal to the government, and to educate their children. The Mfengu people became the first Nguni people to convert to Christianity and become subjects of the British Empire (*South African History Online, www.sahistory.org.za* ). As subjects and military allies of the British Empire the Mfengu’s became wealthy peasant farmers and provided some of the first Western-type political leaders among Africans in the Eastern Cape ([www.britanica.com/EBchecked/topic/379579/Mfengu](http://www.britanica.com/EBchecked/topic/379579/Mfengu)).

### ***Graves of former Xhosa kings***

Graves of former Xhosa kings such as King Hintsa which is located in Mbangcolo; and King Sarhili at Tyholora across the Mbhashe river (*Scheub & EC21 Mbhashe local municipality Idutywa [www.mbhashemun.gov.za](http://www.mbhashemun.gov.za)*).

### **Fort Malan**

Forts dating back to the Frontier wars (1779 – 1878) are also found in the Mbhashe Municipal area. Fort Malan is situated near the town of Butterworth, approximately 30km from Dutywa. The fort was constructed during the ninth Frontier war (1877 – 1878) and named after Major CH Malan, commander of the Gordon Highlanders. He later resigned from the army and founded the Malan’s mission. The mission closed down soon after its founding due to a shortage of funds. However, a new mission with the same name was later established in the same area by the Presbyterians. During 1943 a training institution was run by the Methodists at the location of the original mission (Hummel: 1989).

### **Fort Bowker**

Fort Bowker was constructed in 1860 and was named after Commandant JH Bowker. The fort was constructed in order to keep the Gcaleka east of the Mbhashe River. Only ruins remain at the site of the fort. The site is located 32km from Dutywa on the road to Dwesa Ramra trading store (Hummel, 1989).

### ***The Collywobbles***

The Collywobbles is a 64km stretch of the Mbhashe river which snakes through the canyons and was named after sir George Pomeroy Colley who served as the special magistrate in Idutywa from 1858 – 1860. It is visible from the road between Elliotdale (Xhora) and The

Haven. Sir George Pomeroy Colley was killed at the battle of Majuba hill on 7 February 1881(BUTLER; [www.historyinanhour.com](http://www.historyinanhour.com)).

#### 4.1.4 Archaeology

The Sinqumeni Caves which contain San Rock art can be found within the Dutywa area – unfortunately the only information available on these caves was the short listing found in the Mbhashe municipality profile (*EC21 Mbhashe local municipality Idutywa* [www.mbhashemun.gov.za](http://www.mbhashemun.gov.za)).

No other recorded archaeological sites were found in or near the immediate area of Dutywa during the literature study. There are however several registered Early Iron Age sites east of the N2 highway near Elliotdale (Xhora) between the Mbhashe River and Mthatha River (Feely & Bell-Cross, 2011).

#### 4.1.5 Palaeontology of the area

The following section is an extract from the Palaeontological Desktop Study attached as **Appendix D**.

The study area is mainly underlain by Permian sedimentary rocks of the Karoo Supergroup (**Figure 16**). These Permian sedimentary rocks are classified as the Adelaide Subgroup and the Katberg Formation of the Tarkastad Subgroup. Jurassic aged dolerite sills and Quaternary aged Alluvium also occurs sporadically across the development area.

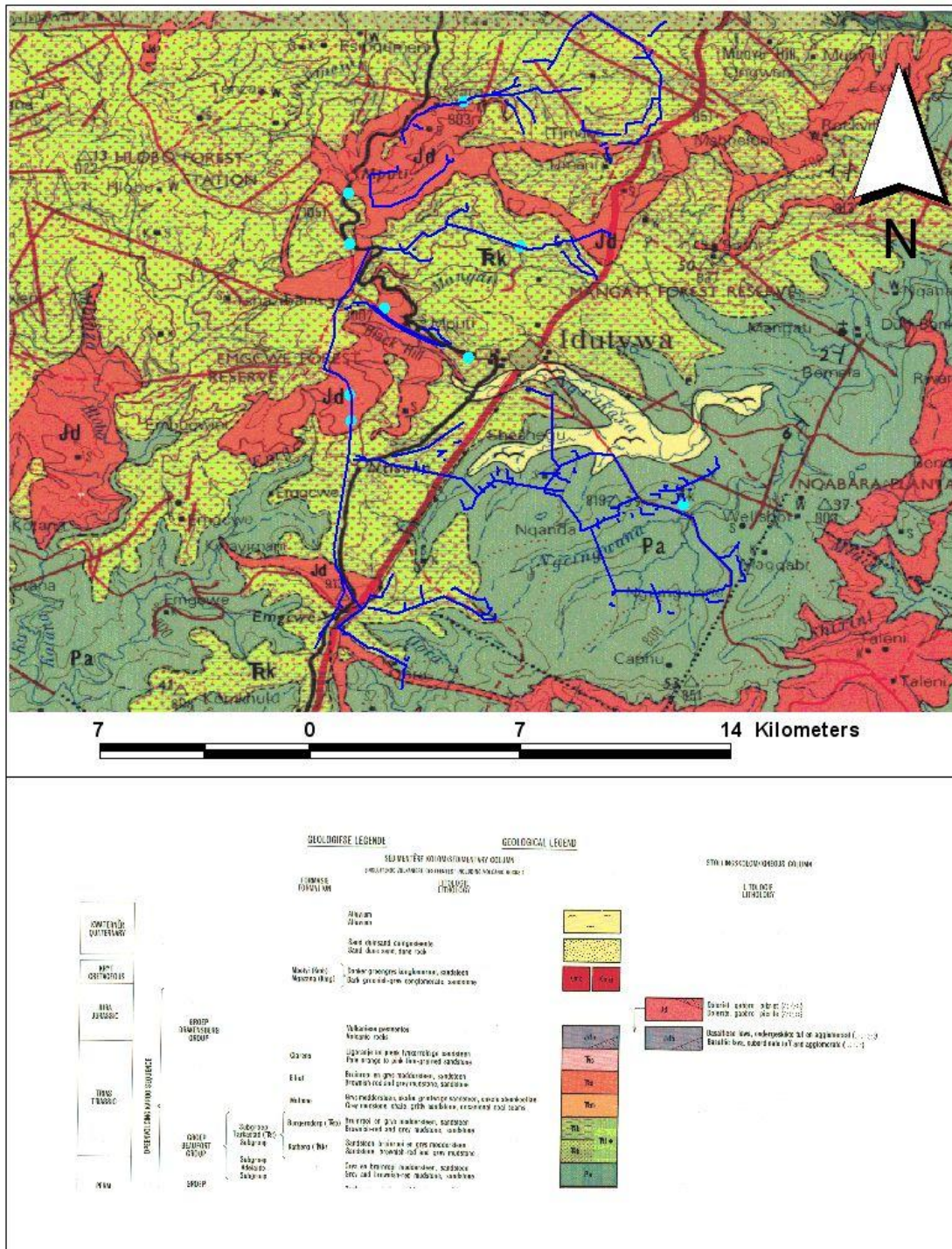


Figure 16 – Geology of the study area (Geo Map 3228 Kei Mouth)

### Adelaide Subgroup

The Permian Adelaide Subgroup (Pa) is well known to contain fossils and is interpreted as a meandering river deposit grading upwards into a lacustrine environment. The subgroup is known to contain very good examples of *Glossopteris* flora. The upper Balfour Formation is correlated with the *Dicynodon* Assemblage zone which is known as a productive fossil

bearing strata (Rubidge et al, 1995). The upper part of the Balfour Formation is known as the Palingkloof Member which in turn is associated with the Lystrosaurus Assemblage zone (Groenewald, 1996).

This sequence of rock also represents the major Permian Extinction Event and can contain important palaeontological information related to the event that eradicated up to 85% of life on earth.

***Katberg Formation***

The Triassic Katberg Formation (Trk) is associated with the Lystrosaurus Assemblage zone. This group of rock represent an important sedimentological and tectonic event in the geological history of the Karoo Supergroup with major deposition of sandstone with associated vertebrate fossils as well as well-defined casts of vertebrate burrows (Groenewald, 1991; Groenewald, 1996; Rubidge, ed, 1995).

***Dolerite***

Dolerite (Jd) is an igneous rock type and will not contain any fossils.

***Alluvium***

No fossils are expected in the alluvial deposits of recent rivers.

**4.1.6 Palaeontological significance**

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews. The palaeontological significance is summarised in Table

*Table 10 - Palaeontological Significance of Geological Units on Site*

Geological Unit Palaeontological	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Sensitivity
<b>Tarkastad Subgroup Katberg Formation</b>	Red Mudstone, Sandstone and Shale TRIASSIC	Vertebrate fossils of <i>Lystrosaurus</i> and <i>Procolophon</i> . Casts of vertebrate	<i>Lystrosaurus</i> of assemblage zone	High sensitivity

		burrows			
<b>Adelaide</b>	Red and Grey	Vertebrate	<i>Lystrosaurus</i>	High sensitivity	
<b>Subgroup</b>	Mudstone	& fossils of the	and <i>Dicynodon</i>		
<b>Balfour</b>	Sandstone	<i>Therapsids</i>	assemblage		
<b>Formation</b>	PERMIAN	group e.g. zones			
		<i>Gorgonopsian</i>			
		and			
		Dicynodonts.			
		Plant fossils e.g.			
		<i>Glossopteris</i>			
		trees and			
		leaves.			

There is a possibility that fossils could be encountered during excavation of non-doleritic bedrock within the development footprint and these fossils would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation will be a beneficial palaeontological impact.

Unfortunately within the Katberg Formation and Adelaide Subgroup, there is no way of assessing the likelihood of encountering fossils during excavation. As evidenced in other similar areas with exposures, fossils were apparently absent or very scarce over large areas but locally dense accumulations were found.

#### 4.2 Fieldwork findings

Due to the nature of cultural remains, with the majority of artefacts occurring below the surface, a controlled-exclusive surface survey was conducted over a period of 4 days on foot and by an archaeologist from PGS. The field work was conducted in the week of 26 June 2012.

The survey focussed directly on the proposed alignments of the pipelines as well as the borrow pit positions as provided by the client (**Figure 17**). Track logs were also recorded for the field work and is available on request.

During the survey a total of 54 heritage sites were identified of which 53 were cemeteries or single graves and with a single Late Iron Age stone walled site being the only other heritage feature found to be close to construction activities.

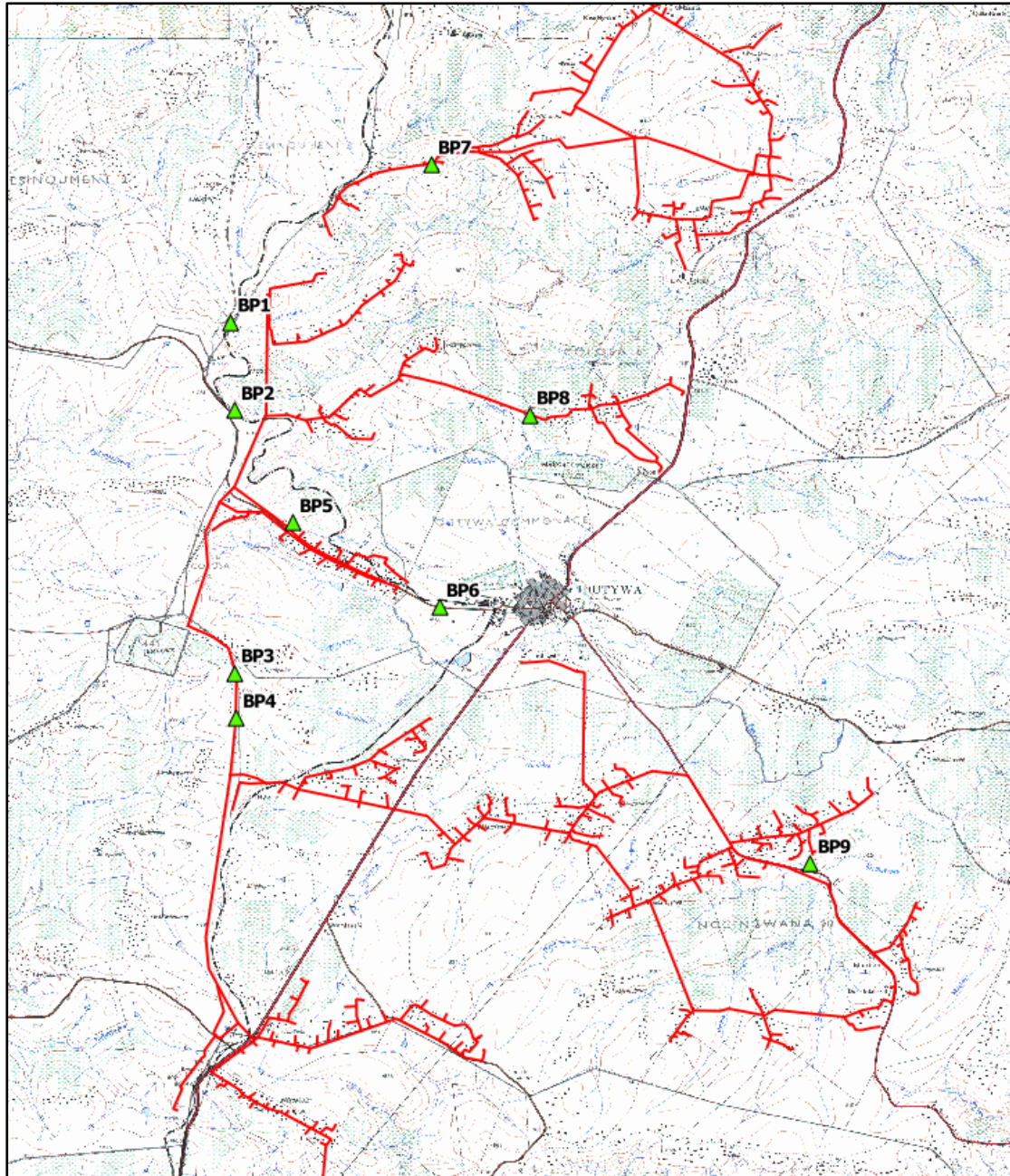


Figure 17 – Pipeline alignments and positions of borrow pits as assessed during the field work

#### 4.2.1 Heritage Structure

The site is situated on a ridge to the back of the Mazwayi settlement in **Phase 3** of the proposed project. The site shows indications of two settlement periods with the stone

walling being older with indications of hut foundations to the back of the stone walling, possibly more recent (**Figure 18**). The site is graded as Generally Protected A (GP.A).

Although the site falls outside the alignment of the proposed pipeline in its vicinity the site will require demarcation with a 10 meter buffer.

*Table 11: List of Heritage Structures identified during the field work*

Site	Description	Heritage Significance	S	E	Mitigation
MGS010	Late Iron Age stone walled site	Medium	-28.277288	32.04292	Demarcate and buffer Monitor during construction



*Figure 18 – Late Iron Age Stone walling with some later remnants of foundations in the foreground*



Figure 19 – Late Iron Age Stone walling layout as seen from the air – Alignment of pipeline indicated in red

*Impact Evaluation:*

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Moderate	Study area	Permanent	Could happen	
Impact on heritage structures	3	2	5	3	2

*Mitigation:*

- The site should be demarcated and fenced during construction activity and a buffer of at least 10 meters around the site kept ;
- If the site must be impacted on due to development constraint a permit under Section 35 of the NHRA will be required for further mitigation work that must include excavations and the mapping of the layout of the site as a minimum; and



- It must also be kept in mind that infant burials could occur at the site and the mitigation measures with regards to cemeteries also pertain.

#### 4.2.2 Cemeteries

During the fieldwork, 53 sites containing graves and cemeteries were identified close to where construction activities will take place (see **Table 12**). Most of the smaller cemeteries and single graves are located within the fenced yards of the next-of-kin of the graves (**Figure 21**), although a few cases of single none fenced graves do exist (**Figure 20**). All graves and cemeteries are graded as **Grade 3A**.

*Table 12: List of cemeteries identified and verified during the field work*

Site Number	Description	Number of	S	E
MGS001	Cemetery	50	-32.02653	28.30005
MGS002	Grave	1	-32.01859	28.2949
MGS003	Grave	1	-32.0107	28.30249
MGS004	Cemetery	6	-31.99696	28.31902
MGS005	Cemetery	20	-31.99663	28.32449
MGS006	Cemetery	6	-32.00394	28.33656
MGS007	Cemetery	3	-32.03123	28.33261
MGS008	Cemetery	3	-32.03031	28.33252
MGS009	Cemetery	2	-32.02379	28.33903
MGS011	Cemetery	60	-32.06524	28.2574
MGS012	Cemetery	3	-32.06605	28.26595
MGS013	Grave	1	-32.06103	28.27254
MGS014	Grave	1	-32.05918	28.2785
MGS015	Cemetery	13	-32.08952	28.27442
MGS016	Grave	1	-32.0891	28.26486
MGS017	Grave	1	-32.09127	28.26923
MGS018	Cemetery	12	-32.09516	28.2784
MGS019	Grave	1	-32.08214	28.25581
MGS020	Grave	1	-32.07571	28.25103
MGS021	Cemetery	12	-32.10085	28.24287

MGS022	Cemetery	10	-32.1277	28.25382
MGS023	Cemetery	2	-32.13006	28.26351
MGS024	Cemetery	3	-32.13084	28.2666
MGS025	Grave	1	-32.13127	28.26844
MGS026	Cemetery	7	-32.11833	28.28287
MGS027	Cemetery	2	-32.12445	28.27411
MGS028	Cemetery	3	-32.12612	28.27017
MGS029	Grave	1	-32.12795	28.26597
MGS030	Cemetery	3	-32.12804	28.27125
MGS031	Cemetery	2	-32.12812	28.27185
MGS032	Cemetery	2	-32.12802	28.27334
MGS033	Cemetery	3	-32.13659	28.30365
MGS034	Grave	1	-32.13555	28.30466
MGS035	Cemetery	2	-32.13704	28.30565
MGS036	Cemetery	2	-32.1484	28.31913
MGS037	Cemetery	2	-32.14921	28.3217
MGS038	Grave	1	-32.13495	28.35323
MGS039	Grave	1	-32.1553	28.36475
MGS040	Cemetery	2	-32.168	28.32992
MGS041	Cemetery	3	-32.16883	28.28503
MGS042	Cemetery	3	-32.17907	28.24734
MGS043	Cemetery	2	-32.18035	28.24961
MGS044	Cemetery	3	-32.1835	28.25383
MGS045	Cemetery	3	-32.18417	28.25514
MGS046	Cemetery	2	-32.18512	28.25762
MGS047	Cemetery	2	-32.18523	28.25788
MGS048	Grave	1	-32.18555	28.25868
MGS049	Cemetery	3	-32.19096	28.26654
MGS050	Cemetery	4	-32.17703	28.24865
MGS051	Cemetery	5	-32.16954	28.25758
MGS052	Grave	1	-32.16288	28.26248
MGS053	Grave	1	-32.16578	28.24813
MGS054	Grave	1	-32.17892	28.24265



*Figure 20 –Single graveat MGS003*



*Figure 21 – Graves inside plot – Site MGS006*

*Impact Evaluation*

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	LOW	Study area	Permanent	Could happen	
Impact to graves and cemeteries	2	2	5	3	2

*Mitigation:*

- Adjust the alignments and demarcate grave sites with at least a 25 meter buffer.
- In the event that the sites cannot be excluded from the pipeline foot print, a grave relocation process as described in Section 5 of this report needs to be implemented.
- The consultation with regards to construction close to graves and cemeteries needs to be done before construction starts, in order to agree on the process to be followed with the community in case graves are damaged or work needs to be done very close to graves.

Refer to Appendix A for distribution maps of heritage sites.

**4.2.3 Palaeontology**

The development might have an impact on the palaeontology of the site and therefore monitoring and mitigation in terms of the palaeontological heritage are required.

The following colour coding method is used to classify a development area's palaeontological impact as illustrated in **Figure 22**:

- **Red colouration** indicates a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops on the site/route and the chances of finding fossils during the construction phase are very high.
- **Orange colouration** indicates a possibility of finding fossils of a specific assemblage zone either in outcrops or in bedrock on the site/route. Fossils will probably be present on the site/route and the chances of finding fossils during the excavation phase are high.
- **Green colouration** indicates that there is no possibility of finding fossils in that section of the site/route development.

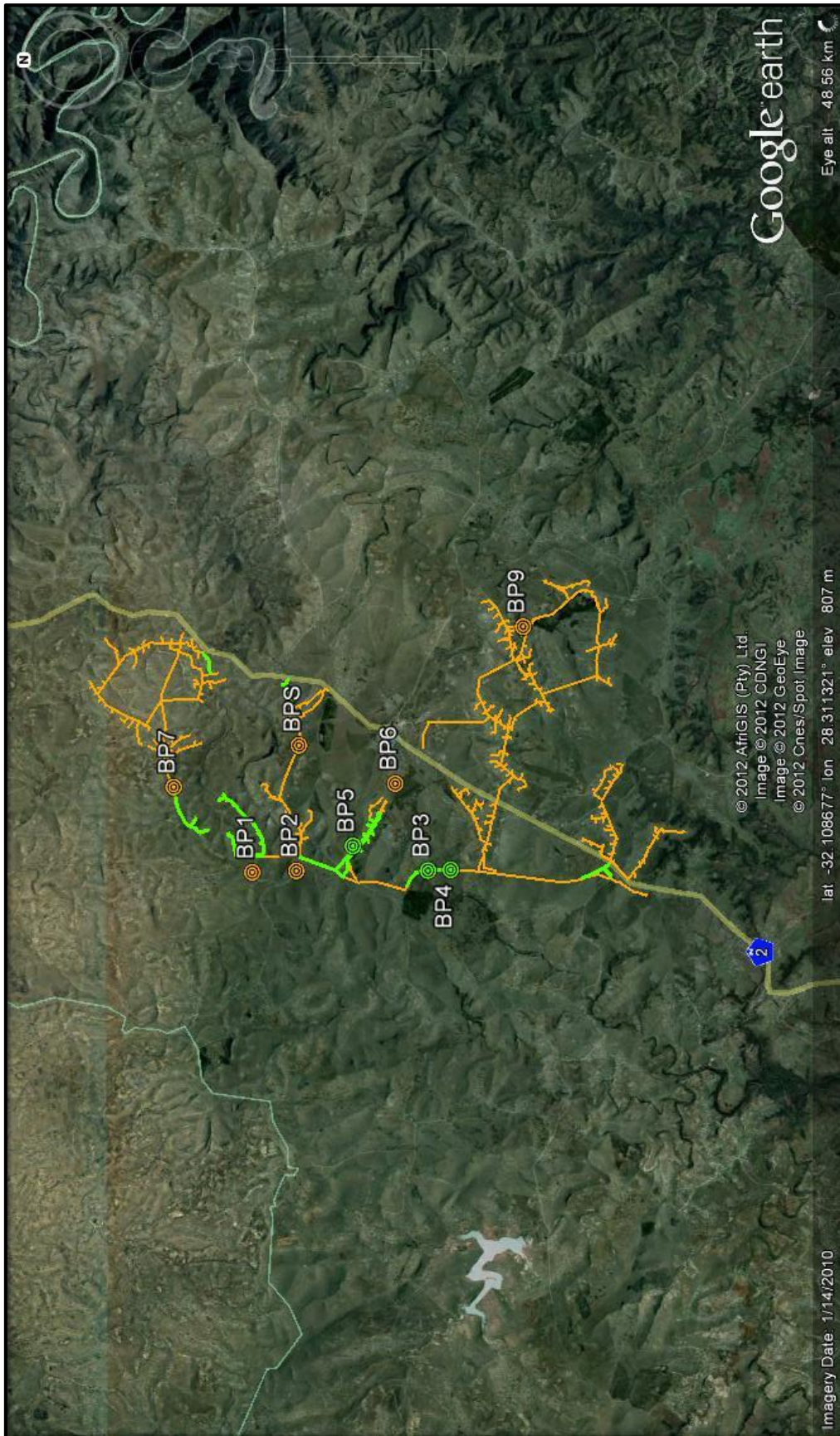


Figure 22 – Palaeontological Sensitivity

### Impact Evaluation

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	MODERATE	Study area	Permanent	Could happen	
Impact to palaeontological sites	3	2	5	3	2

The desktop survey indicates that the entire development area and specifically some of the borrow pits have well defined significance for which, depending on the number of and quality of outcrops, a Phase I Palaeontological Assessment is recommended.

The sections of the pipelines and borrow pits (Pit 3, 4 and 5) that are coloured green has no potential for yielding any fossils.

## 5 CONCLUSIONS AND RECOMMENDATIONS

### Pipeline Alignments

During the survey a total of 54 heritage sites were identified of which 53 were cemeteries or single graves, containing approximately 282 graves in total. A single Late Iron Age stone walled site (**MGS010**) is the only other heritage feature found to be close to construction activities. The following mitigation and direct management measures during construction will be required:

#### Heritage Structures

- The site should be demarcated and fenced during construction activity and a buffer of at least 10 meters around the site kept ;
- If the site must be impacted on due to development constraint a permit under Section 35 of the NHRA will be required for further mitigation work that must include excavations and the mapping of the layout of the site as a minimum; and
- It must also be kept in mind that infant burials could occur at the site and the mitigation measures with regards to cemeteries also pertain.

#### Cemeteries

- Adjust the alignments and demarcate grave sites with at least a 25 meter buffer.

- In the event that the sites cannot be excluded from the pipeline foot print, a grave relocation process as described in Section 5 of this report needs to be implemented.
- The consultation with regards to construction close to graves and cemeteries needs to be done before construction starts, the agree on the process to be followed with the community, in the case that graves are damaged or work needs to be done very close to graves.

The grave relocation process must include:

- A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, which will be at least 60 days in length;
- Site notices indicating the intent of the relocation;
- Newspaper Notice indicating the intent of the relocation;
- A permit from the local authority;
- A permit from the Provincial Department of Health;
- A permit from the South African Heritage Resources Agency, if the graves are older than 60 years, or unidentified and thus presumed older than 60 years;
- An exhumation process that keeps the dignity of the remains and family intact;
- The whole process must be done by a reputable company that is well versed in relocations;
- The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the development company.

### *Palaeontology*

The development might have an impact on the palaeontology of the site and therefore monitoring and mitigation in terms of the palaeontological heritage are required.

A significant part of the study area proposed for the development of Mgwali water supply development is located on areas underlain by Karoo aged sedimentary rocks of the Permian to Early Triassic Adelaide Subgroup as well as the Triassic Katberg Formation of the Tarkastad Subgroup. Fossils are expected in the Permian and Triassic sediments, cutting the significant Permian Extinction zone.

It is recommended that:

- A Phase 1 palaeontological impact assessment is done for areas with a significant rating for the occurrence of fossils (orange colour in **Figure 22**).
- The ECO of the project team should be made aware of the possible occurrence of fossils. If any fossils are recorded a trained palaeontologist must be notified to remove the fossils as per SAHRA legislation.

### **Borrow Pits**

The survey and evaluation of the borrow pit positions revealed no archaeological or historical significant structures. The recommendation as listed under Palaeontology above will need to be implemented for all borrow pits excluding pits 3, 4 and 5.

### **General**

Further to these recommendations the general Heritage Management Guidelines in Section 6.1 need to be incorporated into the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and impacts can be mitigated to acceptable levels.

## **6 HERITAGE MANAGEMENT GUIDELINES**

### **6.1 General Management Guidelines**

1. The National Heritage Resources Act (Act 25 of 1999) states that, any person who intends to undertake a development categorised as-
  - (a) the construction of a road, wall, transmission line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
  - (b) the construction of a bridge or similar structure exceeding 50m in length;
  - (c) any development or other activity which will change the character of a site-
    - (i) exceeding 5 000 m<sup>2</sup> in extent; or
    - (ii) involving three or more existing erven or subdivisions thereof; or
    - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
  - (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or



- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

**In the event that an area previously not included in an archaeological or cultural resources survey is to be disturbed, the SAHRA needs to be contacted. An enquiry must be lodged with them into the necessity for a Heritage Impact Assessment.**

- 2. In the event that a further heritage assessment is required it is advisable to utilise a qualified heritage practitioner, preferably registered with the Cultural Resources Management Section (CRM) of the Association of Southern African Professional Archaeologists (ASAPA).

This survey and evaluation must include:

- (a) The identification and mapping of all heritage resources in the area affected;
  - (b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7 of the National Heritage Resources Act;
  - (c) An assessment of the impact of the development on such heritage resources;
  - (d) 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;
  - (e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
  - (f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
  - (g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.
- 3. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:
    - a. Heritage;

- b. Graves;
- c. Archaeological finds; and
- d. Historical Structures.

This module must be tailor made to include all possible finds that could be expected in that area of construction.

4. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.
5. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
6. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.
7. After mitigation, an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
8. If during the initial survey sites of cultural significance are discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
9. In the event that human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made.
10. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

***The purpose of an archaeological/palaeontological monitoring programme<sup>1</sup> is:***

- To allow, within the resources available, the preservation by recording of archaeological/palaeontological deposits, the presence and nature of which could not be

---

<sup>1</sup> The definition of an archaeological/palaeontological monitoring programme is a formal program of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, in the inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

established (or established with sufficient accuracy) in advance of development or other potentially disruptive works

- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological/palaeontological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.
- A monitoring programme is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.
- The objective of the monitoring programme is to establish and make available information about the archaeological resource existing on a site.

PGS can be contacted on the way forward in this regard.

*Table 13: Roles and responsibilities of archaeological and heritage management*

ROLE	RESPONSIBILITY	IMPLEMENTATION
A responsible specialist needs to be allocated and should attend all relevant meetings, especially when changes in design are discussed, and liaise with SAHRA.	The client	Archaeologist and a competent archaeology support team
If chance finds and/or graves or burial grounds are identified during construction or operational phases, a specialist must be contacted in due course for evaluation.	The client	Archaeologist and a competent archaeology support team
Comply with defined national and local cultural heritage regulations on management plans for identified sites.	The client	Environmental Consultancy and the Archaeologist
Consult the managers, local communities and other key stakeholders on mitigation of archaeological sites.	The client	Environmental Consultancy and the Archaeologist
Implement additional programs, as appropriate, to promote the safeguarding of our cultural heritage. (i.e. integrate the archaeological components into the employee induction course).	The client	Environmental Consultancy and the Archaeologist,

If required, conservation or relocation of burial grounds and/or graves according to the applicable regulations and legislation.	The client	Archaeologist, and/or competent authority for relocation services
Ensure that recommendations made in the Heritage Report are adhered to.	The client	The client
Provision of services and activities related to the management and monitoring of significant archaeological sites.	The client	Environmental Consultancy and the Archaeologist
After the specialist/archaeologist has been appointed, comprehensive feedback reports should be submitted to relevant authorities during each phase of development.	Client and Archaeologist	Archaeologist

## 6.2 All phases of the project

### 6.2.1 Archaeology

Based on the findings of the HIA, all stakeholders and key personnel should undergo an archaeological induction course during this phase. Induction courses generally form part of the employees' overall training and the archaeological component can easily be integrated into these training sessions. Two courses should be organised – one aimed more at managers and supervisors, highlighting the value of this exercise and the appropriate communication channels that should be followed after chance finds, and the second targeting the actual workers and getting them to recognize artefacts, features and significant sites. This needs to be supervised by a qualified archaeologist. This course should be reinforced by posters reminding operators of the possibility of finding archaeological/palaeontological sites.

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small scale infrastructure development associated with the project/operations.

It is possible that cultural material will be exposed during operations and may be recoverable, but this is the high-cost front of the operation, and so any delays should be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, but construction trenches do offer a window into the past and it thus

may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project and these must be catered for. Temporary infrastructure is often changed or added to during the subsequent history of the project. In general these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction/operational phase, it is important to recognise any significant material being unearthed, and to make the correct judgment on which actions should be taken. A responsible archaeologist/palaeontologist must be appointed for this commission. This person does not have to be a permanent employee, but needs to attend relevant meetings, for example when changes in design are discussed, and notify SAHRA of these changes. The archaeologist would inspect the site and any development on a recurrent basis, with more frequent visits to the actual workforce and operational areas.

In addition, feedback reports can be submitted by the archaeologist to the client and SAHRA to ensure effective monitoring. This archaeological monitoring and feedback strategy should be incorporated into the Environmental Management Plan (EMP) of the project. Should an archaeological/palaeontological site or cultural material be discovered during construction (or operation), such as burials or grave sites, the project needs to be able to call on a qualified expert to make a decision on what is required and if it is necessary to carry out emergency recovery. SAHRA would need to be informed and may give advice on procedure. The developers therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. The project thus needs to have an archaeologist/palaeontologist available to do such work. This provision can be made in an archaeological/palaeontological monitoring programme.

### **6.2.2 Graves**

In the case where a grave is identified during construction the following measures must be taken:

- Upon the accidental discovery of graves, a buffer of at least 20 meters should be implemented.
- If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the

remains a permit must be applied for from SAHRA and other relevant authorities.  
The local South African Police Services must immediately be notified of the find.

- Where it is recommended that the graves be relocated, a full grave relocation process that includes comprehensive social consultation must be followed.

The grave relocation process must include:

- i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
- ii. Site notices indicating the intent of the relocation;
- iii. Newspaper notices indicating the intent of the relocation;
- iv. A permit from the local authority;
- v. A permit from the Provincial Department of Health;
- vi. A permit from the South African Heritage Resources Agency, if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
- vii. An exhumation process that keeps the dignity of the remains intact;
- viii. The whole process must be done by a reputable company that is well versed in relocations;
- ix. The exhumation process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the developing company.

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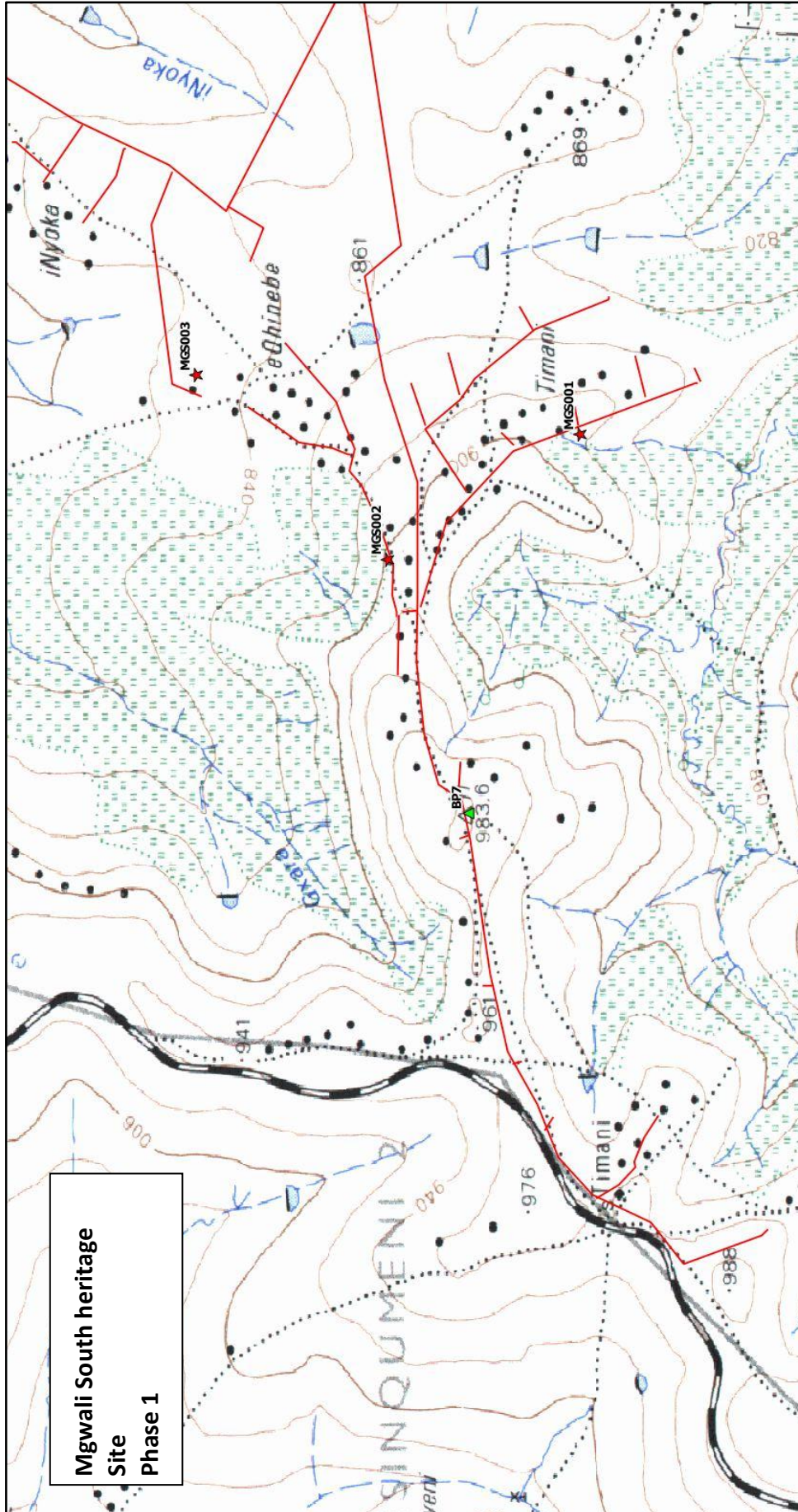
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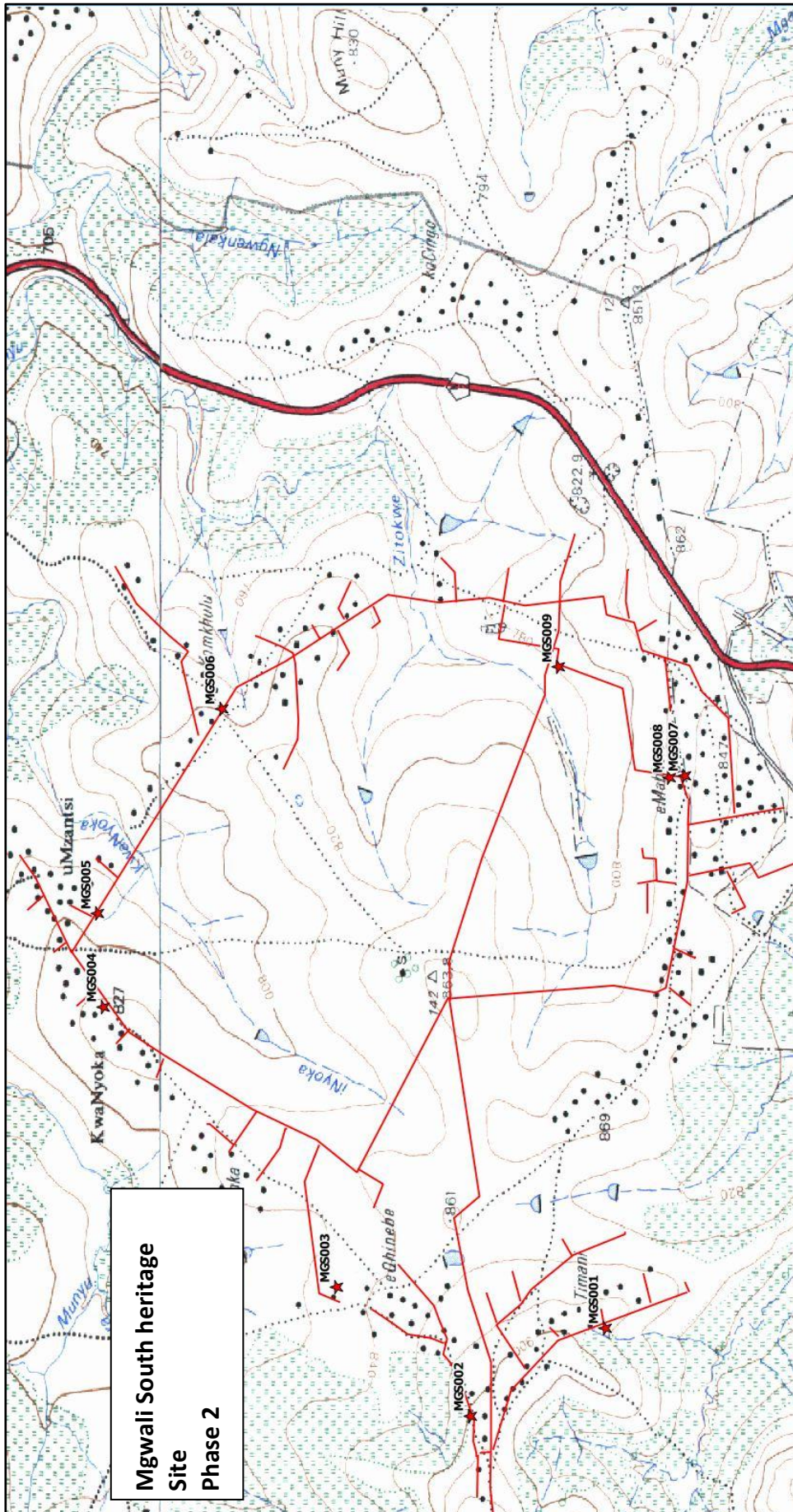
## **7.2 Internet Resources**

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[www.sahistory.org.za](http://www.sahistory.org.za)  
[www.britanica.com/EBchecked/topic/379579/Mfengu](http://www.britanica.com/EBchecked/topic/379579/Mfengu)

**HERITAGE SITE DISTRIBUTION MAPS**















Appendix B  
**PHOTOGRAPHS OF HERITAGE SITES**

MGS001-1



MGS001-2





MGS003-1



MGS003-2



MGS003-3



MGS004



MGS005



MGS006



MGS007



MGS008



MGS010-1



MGS010-2



MGS011



MGS011-2



MGS012



MGS013



MGS014



MGS015





MGS016



MGS017



MGS018



MGS019



MGS020



MGS021



MGS022-1



MGS022-2



MGS023



MGS024



MGS025



MGS026



MGS027



MGS028



MGS028-2



MGS029





MGS030



MGS031



MGS032



MGS033



MGS034



MGS035



MGS036



MGS037



MGS038



MGS039



MGS040



MGS041



MGS042



MGS043



MGS044



MGS045





MGS046



MGS047



MGS048



MGS049



MGS050



MGS051



MGS052



MGS053



MGS054



**LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA****3.1 General principles**

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In the NHRA, permits are required to damage, destroy, alter, or disturb them. People who already possess material are required to register it. The management of heritage resources is integrated with environmental resources and this means that before development takes place heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves, which are older than 60 years and are not in a formal cemetery (such as ancestral graves in rural areas), are protected. The legislation protects the interests of communities that have an interest in the graves: they should be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle are to be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resource authority and if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the construction company's cost. Thus, the construction company will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 ( Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection to, all historic and pre-historic cultural remains, including graves and human remains.

### **3.2 Graves and cemeteries**

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the

grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery 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.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.



**PALAEONTOLOGICAL DESKTOP ASSESSMENT**

# **PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED MGWALI WATER SUPPLY DEVELOPMENT WITHIN THE MBHASHE LOCAL MUNICIPALITY.**

**FOR**

**Amathole District Municipality**

**HIA CONSULTANTS**



**Complete Heritage Solutions**  
Heritage Impact Assessments | Grave Relocations | Archaeological Impact Assessments

**PGS**  
HERITAGE & GRAVE  
RELOCATION CONSULTANTS

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**DATE: 4 JULY 2012**

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## EXECUTIVE SUMMARY

Metsi-Metseng Geological and Environmental Services CC was appointed by PSG Heritage and Grave relocation consultants to undertake a desktop survey, assessing the potential palaeontology impact for the proposed Mgwali Water Supply Development within the Mbhashe Local Municipality that forms part of the Amathole District Municipality.

This report forms part of the Environmental Impact Assessment for the proposed development of the Mgwali Water Supply Development and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint.

The proposed Mgwali Water Supply Development is located near the town of Dutywa, situated next to the N2 Highway, approximately 135km towards the north east of East London, within the Mbhashe Local Municipality that forms part of the Amathole District Municipality. The Amathole District Municipality proposes to supply water to rural villages within the Mbhashe Local Municipality that is currently not supplied with piped water. The development includes service reservoirs, bulk pipelines, supply pipelines, standpipes and borrow pits.

A basic assessment of the topography and geology of the area was made by using appropriate geological (1:250 000, 3228 Kei Mouth) maps in conjunction with Google Earth. The only limitation on this methodology is the scale of mapping, which restricts comparison of the geology to the 1:250 000 scale. This restriction only applies in areas where major changes in the geological character of the area occur over very short distances or on the geological transformation zones.

A review of the literature on the geological formations underlying the development site and the fossils that have been associated with these geological strata was undertaken.

The study area is mainly underlain by Permian sedimentary rocks of the Karoo Supergroup, classified as the Adelaide Subgroup and the Katberg Formation of the Tarkastad Subgroup. Jurassic aged dolerite sills and Quaternary aged Alluvium also occurs across the development area.

The Adelaide Subgroup consists mainly of grey mudstone, shale and sandstone and is interpreted as a lacustrine deposit correlated with the *Dicynodon* Assemblage zone which is known as a productive fossil bearing strata. The Tarkastad Subgroup consist of a lower sandstone rich Katberg Formation and an overlying Burgersdorp Formation, dominated by red mudstone. The upper part of the Balfour Formation is known as the Palingkloof Member and together with the Katberg Formation is associated with the *Lystrosaurus* Assemblage zone

There is a possibility that fossils could be encountered during excavation of non-doleritic bedrock within the development footprint and these fossils would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation will be a beneficial palaeontological impact.

Unfortunately within the Katberg Formation and Adelaide Subgroup, there is no way of assessing the likelihood of encountering fossils during excavation. As evidenced in other similar areas with exposures, fossils were apparently absent or very scarce over large areas but locally dense accumulations were found.

It is therefore recommended that a Phase 1 palaeontological impact assessment is done for the proposed Mgwali Water Supply Development.

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## **1 INTRODUCTION**

Metsi-Metseng Geological and Environmental Services CC was appointed by PSG Heritage and Grave relocation consultants to undertake a desktop survey, assessing the potential palaeontology impact for the proposed Mgwali Water Supply Development within the Mbhashe Local Municipality that forms part of the Amathole District Municipality.

### **1.1 Legal Requirements**

This report forms part of the Environmental Impact Assessment for the proposed development of the Mgwali Water Supply Development and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999. In accordance with Section 38 (Heritage Resources Management), a Heritage Impact Assessment (HIA) is required to assess any potential impacts to palaeontological heritage within the development footprint.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;
- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

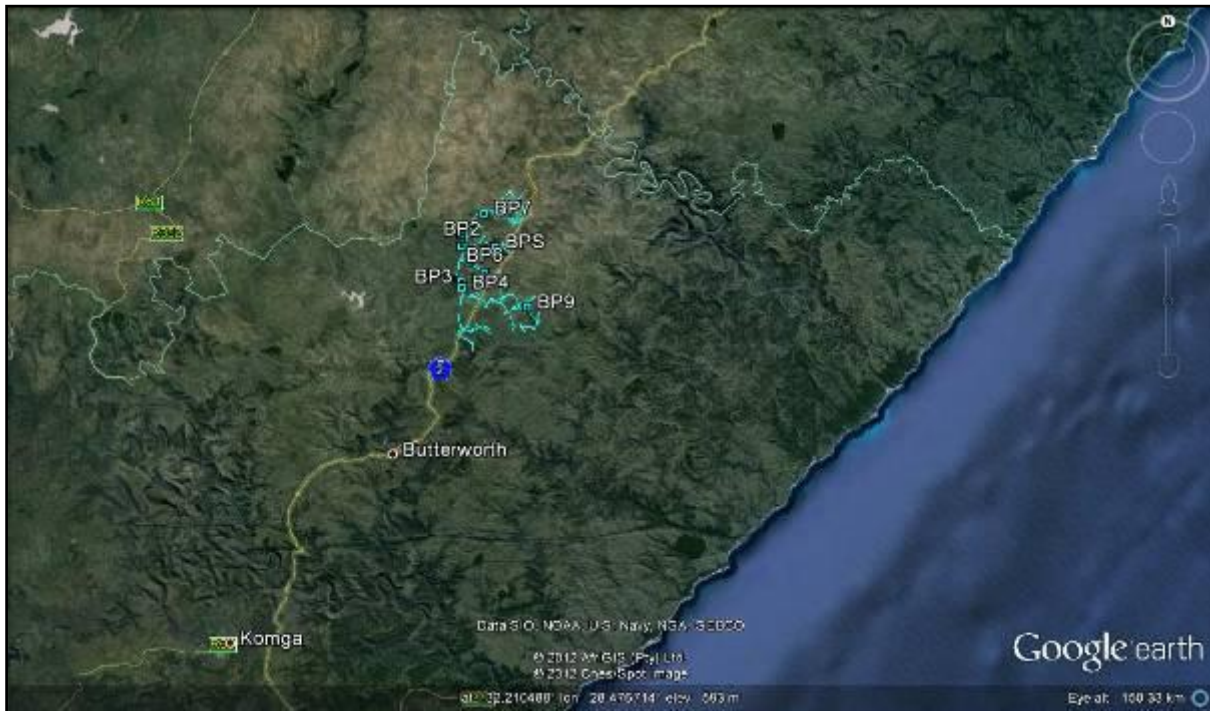
## **2 PROPOSED DEVELOPMENT DESCRIPTION**

The proposed Mgwali Water Supply Development is located near the town of Dutywa, situated next to the N2 Highway, approximately 135km towards the north east of East London, within the Mbhashe Local Municipality that forms part of the Amathole District Municipality. The Amathole District Municipality proposes to supply water to rural villages within the Mbhashe Local Municipality that is currently not supplied with piped water (Figure 2.1).

The proposed development includes the construction of 12 service reservoirs with gravity supply pipelines to 25 villages. The village reticulation system will be done with gravity fed pipelines to 265 standpipes which will be spaced throughout the villages so that each standpipe is within 200m walking distance from any household to a given standpipe. Where possible the pipelines will be placed adjacent to existing gravel roads.

The capacity of the 12 service reservoirs is 2.15ML. The bulk pipelines will have a combined length of approximately 52km and the supply pipelines will have a combined length of approximately 49km. More than 4 700 household will benefit from this development.

The project will be done implemented over a period of three years except the bulk supply pipeline which is urgently required in the vicinity of Timane. Several borrow pits will form part of the development.



**Figure Error! No text of specified style in document..23 Locality map for proposed Mgwali Water Supply Development**

### 3 AIMS AND METHODS

Following the “SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports” the aims of the PIA were:

- identifying exposed and subsurface rock formations that are considered to be palaeontologically significant;
- assessing the level of palaeontological significance of these formations;
- commenting on the impact of the development on these exposed and/or potential fossil resources;
- making recommendations as to how the developer should conserve or mitigate damage to these resources.

A basic assessment of the topography and geology of the area was made by using appropriate geological (1:250 000, 3228 Kei Mouth) maps in conjunction with Google Earth. The only limitation on this methodology is the scale of mapping, which restricts comparison of the geology to the 1:250 000 scale. This restriction only applies in areas where major changes in the geological character of the area occur over very short distances or on the geological transformation zones.

A review of the literature on the geological formations underlying the development site and the fossils that have been associated with these geological strata was undertaken.

### 4 GEOLOGY OF THE AREA

The study area is mainly underlain by Permian sedimentary rocks of the Karoo Supergroup (Figure 4.1). These Permian sedimentary rocks are classified as the Adelaide Subgroup and the Katberg Formation of the Tarkastad Subgroup. Jurassic aged dolerite sills and Quaternary aged Alluvium also occurs sporadically across the development area.

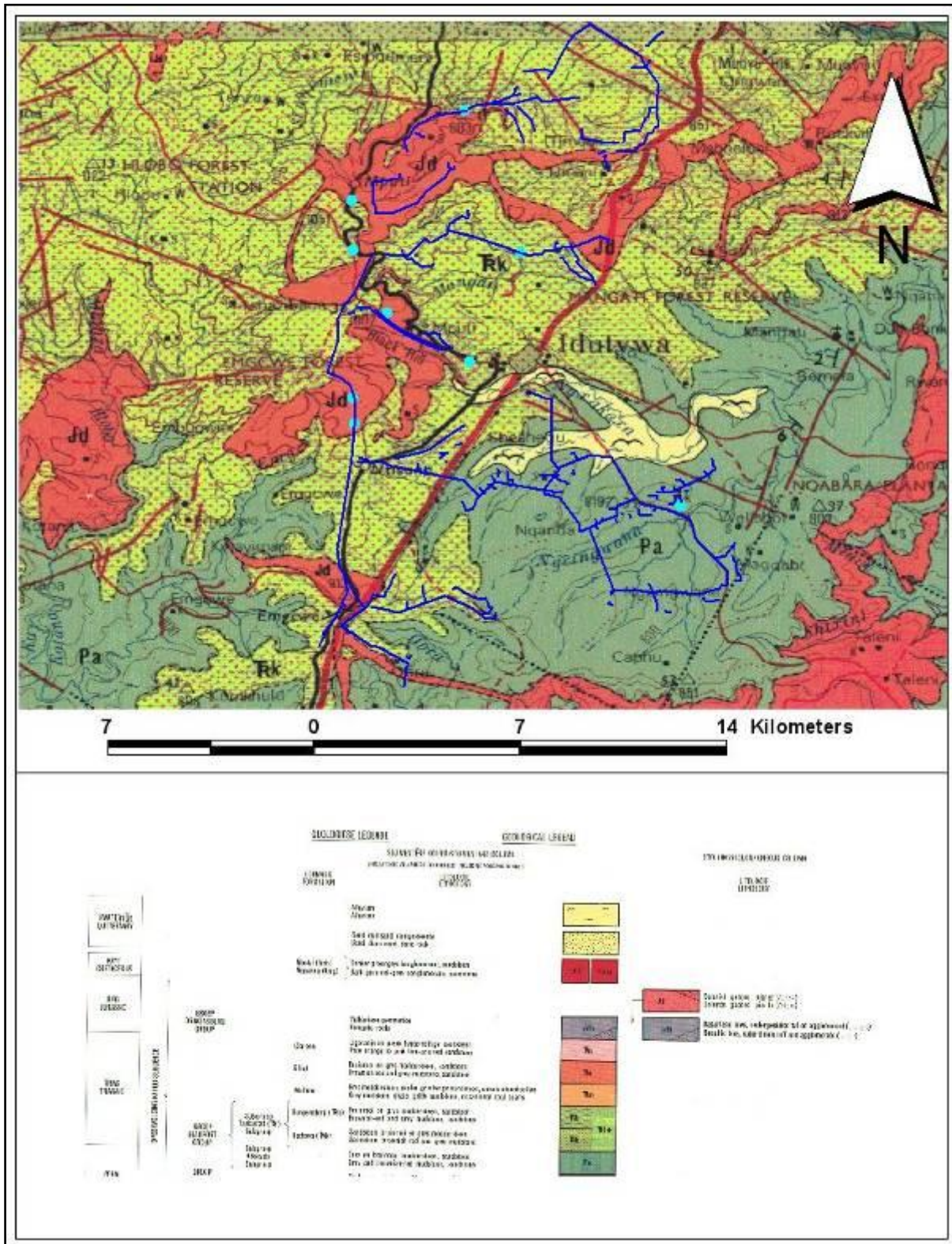


Figure Error! No text of specified style in document..24 Geology of the study area (Geo Map 3228 Kei Mouth)

#### 4.1 The Adelaide Subgroup

The Adelaide Subgroup (Pa) consists mainly of grey mudstone, shale and sandstone and is interpreted as a mixed fluvial and lacustrine deposit with major meandering river systems (Johnson et al 2010). Although not mapped out on the scale of the map (Figure 4.1), the

upper part of the Adelaide Subgroup is known as the Balfour Formation with a prominent red mudstone unit known as the Palingkloof Member (Groenewald, 1996). The Palingkloof Member is interpreted as a lacustrine deposit.

#### **4.2 The Tarkastad Subgroup**

The Triassic Tarkastad Subgroup consist of a lower sandstone rich Katberg Formation and an overlying Burgersdorp Formation, dominated by red mudstone. There are no outcrops of the Burgersdorp Formation in the study area.

#### **4.3 The Katberg Formation**

The Katberg Formation (Trk) is defined as a sedimentary unit dominated by well feined cross-bedded sandstones with thin red mudstone beds (Groenewald, 1996; Johnson et al, 2006).

#### **4.4 Dolerite**

Dolerite (Jd) is a very hard igneous rock that intruded the sedimentary layers and can occur either as sills or dykes. Sills can be from a few meters to tens of meters thick.

#### **4.5 Alluvium**

The alluvium is alluvial deposits, deposited by rivers. These deposits occur in the valley floors.

### **5 PALAEOLOGY OF THE AREA**

#### **5.1 Adelaide Subgroup**

The Permian Adelaide Subgroup (Pa) is well known to contain fossils and is interpreted as a meandering river deposit grading upwards into a lacustrine environment. The subgroup is known to contain very good examples of *Glossopteris* flora. The upper Balfour Formation is correlated with the *Dicynodon* Assemblage zone which is known as a productive fossil bearing strata (Rubidge et al, 1995). The upper part of the Balfour Formation is known as the Palingkloof Member which in turn is associated with the *Lystrosaurus* Assemblage zone (Groenewald, 1996). This sequence of rock also represents the major Permian Extinction Event and can contain important palaeontological information related to the event that eradicated up to 85% of life on earth.

#### **5.2 Katberg Formation**

The Triassic Katberg Formation (Trk) is associated with the *Lystrosaurus* Assemblage zone. This group of rock represent an important sedimentological and tectonic event in the geological history of the Karoo Supergroup with major deposition of sandstone with associated vertebrate fossils as well as well defined casts of vertebrate burrows (Groenewald, 1991; Groenewald, 1996; Rubidge, ed, 1995).

#### **5.3 Dolerite**

Dolerite (Jd) is an igneous rock type and will not contain any fossils.

#### **5.4 Alluvium**

No fossils are expected in the alluvial deposits of recent rivers.



## 6 PALAEOLOGICAL SIGNIFICANCE

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews. The palaeontological significance is summarised in Table 6.1.

**Table Error! No text of specified style in document..14 Palaeontological Significance of Geological Units on Site**

Geological Unit	Rock Type and Age	Fossil Heritage	Vertebrate Biozone	Palaeontological Sensitivity
Tarkastad Subgroup Katberg Formation	Red Mudstone, Sandstone and Shale TRIASSIC	<i>Vertebrate fossils of Lystrosaurus and Procolophon.</i> Casts of vertebrate burrows	<i>Lystrosaurus</i> assemblage zone	High sensitivity
Adelaide Subgroup Balfour Formation	Red and Grey Mudstone & Sandstone PERMIAN	Vertebrate fossils of the <i>Therapsids</i> group e.g. <i>Gorgonopsian</i> and <i>Dicynodonts</i> . Plant fossils e.g. <i>Glossopteris</i> trees and leaves.	<i>Lystrosaurus</i> and <i>Dicynodon</i> assemblage zones	High sensitivity

There is a possibility that fossils could be encountered during excavation of non-doleritic bedrock within the development footprint and these fossils would be of international significance. The damage and/or loss of these fossils due to inadequate mitigation would be a highly negative palaeontological impact. The exposure and subsequent reporting of fossils (that would otherwise have remained undiscovered) to a qualified palaeontologist for excavation will be a beneficial palaeontological impact.

Unfortunately within the Katberg Formation and Adelaide Subgroup, there is no way of assessing the likelihood of encountering fossils during excavation. As evidenced in other similar areas with exposures, fossils were apparently absent or very scarce over large areas but locally dense accumulations were found.

## 7 PALAEOLOGICAL IMPACT AND MITIGATION

The development might have an impact on the palaeontology of the site and therefore monitoring and mitigation in terms of the palaeontological heritage are required.

The following colour coding method is used to classify a development area's palaeontological impact as illustrated in Figure 7.1:

- Red colouration indicates a very high possibility of finding fossils of a specific assemblage zone. Fossils will most probably be present in all outcrops on the site/route and the chances of finding fossils during the construction phase are very high.
- Orange colouration indicates a possibility of finding fossils of a specific assemblage zone either in outcrops or in bedrock on the site/route. Fossils will probably be present on the site/route and the chances of finding fossils during the excavation phase are high.
- Green colouration indicates that there is no possibility of finding fossils in that section of the site/route development.



**Figure Error! No text of specified style in document..25 Palaeontological sensitivity**

The desktop survey indicates that the entire development area and specifically some of the borrow pits have well defined significance for which, depending on the number of and quality of outcrops, a Phase I palaeontological assessment is recommended.

The sections of the pipelines and borrow pits (Pit 3, 4 and 5) that are coloured green has no potential for yielding any fossils.

## 8 CONCLUSION

A significant part of the study area proposed for the development of Mgwali water supply development is located on areas underlain by Karoo aged sedimentary rocks of the Permian to Early Triassic Adelaide Subgroup as well as the Triassic Katberg Formation of the Tarkastad Subgroup. Fossils are expected in the Permian and Triassic sediments, cutting the significant Permian Extinction zone.

It is recommended that:

- A Phase 1 palaeontological impact assessment is done for areas with a significant rating for the occurrence of fossils (orange colour in Figure 7.1).
- The ECO of the project team should be made aware of the possible occurrence of fossils. If any fossils are recorded a trained palaeontologist must be notified to remove the fossils as per SAHRA legislation.

## 9 REFERENCES

- Groenewald GH.1996.** Stratigraphy and Sedimentology of the Tarkastad Subgroup, Karoo Supergroup, South Africa. Unpubl PhD Thesis, University of Port Elizabeth.
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- Rubidge BS (ed) 1995.** Biostratigraphy of the Beaufort Group (Karoo Supergroup), South Africa. South African Committee for Stratigraphy.

## 10 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the Nelson Mandela Metropolitan University (1996) and the National Diploma in Nature Conservation from the University of South Africa (1990). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

### Declaration of Independence

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

A handwritten signature in black ink, reading "Gideon Groenewald", with a horizontal line underneath it. The signature is written in a cursive style.

**Dr Gideon Groenewald**  
**Geologist**