MYEZO ENVIRONMENTAL MANAGEMENT SERVICES

Environmental Stewardship

ESKOM – INGULA – BASIC ASSESSMENT

SPECIALIST REPORTS FOR THE PROPOSED RELOCATION OF DWELLERS AT INGULA PUMPED STORAGE SCHEME LOCATED IN THE FREE STATE PROVINCE, WITHIN THE THABO MOFUTSANYANA DISTRICT MUNICIPALITY, UNDER THE JURISDICTION OF PHUMELELA AND MALUTI A PHOFUNG LOCAL MUNICIPALITIES.

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Tel: 012 998 7642 | Fax: 012 998 7641 | Cell: 082 772 2418 | Email: babalwa@myezo.co.za
Postnet Suite B165, Private Bag, X18, Lynnwood Ridge, 0040, Pretoria, South Africa, 1250

Appendix D: Specialist Reports

Appendix D1: Habitat and Biodiversity Assessment Report

Habitat and Biodiversity Assessment: Ingula Relocation Project

Myezo EMS

Client: Eskom SOC Holdings Ltd

BIOASSETS
biological assessments

Dr Wynand Vlok (Pr. Sci. Nat. 400109/95)

40 Candlewood Ave
Acorn Creek
Sitari
7130

082 200 5312

wynand.vlok@gmail.com

Co-author: **Mr. AE van Wyk**
Prism EMS
12A Beacon Road
Poortview
2040

EXECUTIVE SUMMARY

BioAssets CC was appointed by Myezo Environmental Management Services (Pty) Ltd (on behalf of Eskom SOC Holdings Ltd) to do a general habitat and biodiversity assessment of the site earmarked for the relocation of six (6) families.

The objectives were:

- To do a rapid habitat assessment on site - to determine how the physical and biological aspects of the environment may be and have been affected by the historic and current activities
- To do a survey and determine the current wildlife activity on the site.
- To do a rapid avifaunal survey to determine species currently active on the site.

General comments, recommendations and mitigating actions:

- Main concern for the habitat and vegetation is high erodibility of soils in the area
- The site is undulating – the slopes are increasing the erosion potential
- Current erosion in areas severe – needs rehabilitation
- Trampling, grazing and poorly maintained roads are the main problems contributing to the erosion
- From an ecological perspective, it is recommended that the new buildings are constructed near the road
- The remainder of the property to the west can be divided for grazing
- It is recommended that the drainage line is excluded from the grazing allocation
- It is recommended that the southern area adjacent to the flood plain and river excluded from the allocated land – there are a number of seep and springs that will be susceptible to erosion
- It is recommended that no access to the river must be given from the property
- A clear strategy must be in place for grazing in the reserve – don't use a single entry point as this will increase erosion potential
- Off-channel watering points must be supplied in the reserve to prevent drinking and trampling of the flood plain and river zones
- Recommend construction of a permanent crossing over the wetland
- In addition, the road crossing the wetland must be cordoned off to prevent sheep and cattle entering the wetland for grazing and drinking
- It is highly recommended that a follow up avifaunal survey be conducted during the summer months prior to any construction or operational phase due to the limited time and season of this site survey.
- Due to the high possibility of nesting sites for one of the threatened bird species (African marsh Harrier - *Circus ranivorus*), it is recommended that the indicated high sensitivity area should not only be protected but also be classified as a no-go zone.
- It is recommended that the highly sensitive area be fenced off and indicated as a no-go area.

- This is recommended due to agricultural activities in specific the grazing of livestock and development of croplands that will have a high impact on the wetland areas and critical habitat area (High Sensitive Areas) for the said species.
- The exclusions is linked to the potential trampling when grazing and crop development can damage existing and future nesting sites of threatened bird species.

Conclusions – Avifaunal survey

- The study area consists of 3 habitat types that was observed and assessed during the site survey.
- One of the observed habitats (wetland and riparian) which is classified as a highly sensitive area should be avoided by all times.
- This sensitive zone provides a large area of habitat for not only general bird species but also threatened bird species.
- The threatened bird species observed are highly restricted to their associated habitats and re-occurring use of specific nesting sites are significant and specific use of foraging areas.
- Special care is required and needed for the protection of this unique habitats for observed bird species and threatened bird species, by restricting disturbance and minimizing transformation in these areas.

Declaration of Independence

The Environmental Impact Assessment Regulations (Regulation 17 of Government Notice No R354 of 2010), requires that certain information is included in specialist reports. The terms of reference, purpose of the report, methodologies, assumptions and limitations, impact assessment and mitigation (where relevant to the scope of work) and summaries of consultations (where applicable) are included within the main report. Other relevant information is set out below:

Expertise of author:

- Working in the field of ecology since 1996 and in specific vegetation related assessments since 2000.
- Worked in the field of freshwater ecology and wetlands since 2000.
- Involved with visual assessments since 2009.
- Is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Reg. No. 400109/95).

Declaration of independence:

BioAssets in an independent consultant and hereby declare that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by BioAssets is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

Disclosure:

BioAssets undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to BioAssets by the client, and in addition to information obtained during the course of this study, BioAssets present the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practise.

28 July 2020

Dr Wynand Vlok — Date

Assumptions and limitations

Availability of baseline information

Baseline information for the study of the site was obtained from historic maps, photographs and reports. The desktop survey provided adequate baseline information for the area and therefore this was not a constraint.

Constraints

The survey was conducted during the winter at is was a daytime survey only. All the different habitats at the site was investigated and it was therefore possible to complete a rapid survey and obtain information on the habitats that are present and the site, or that are likely to occur there.

Bio-physical constraints

Weather conditions during the period were cold with a moderate wind blowing. The region has received no rainfall prior to the site visit and the vegetation was dry (late winter conditions). There was no standing water in the veld during the time of the survey, but the wetlands (seeps, channels and the Wilge River) had water. This will have obvious implications on the biodiversity that are likely to occur in the area. The winter survey is not ideal for a more detailed biodiversity survey, but it gave a good indication of the current habitat changes and impacts. The full EIA documents compiled for the larger project is comprehensive and is therefore suitable background information to use for this survey.

Confidentially constraints

There were no confidentially constraints.

Implications for the study

Apart from the prevailing weather conditions at the site and the winter conditions, there were no other significant constraints that would negatively impact upon the study. Access to all areas of the study site was possible. There is sufficient good quality data available in the literature that partially negates the negative effect that the type of survey had on the quality of the assessment.

Contents

1 INTRODUCTION

The study was undertaken to do a general habitat and general biodiversity (flora, fauna and avifaunal) survey at the site allocated for the proposed relocation of families. The area will be developed to give housing for the six (6) affected families who have opted for relocation to this site.

For this particular report, the focus is on the general habitat and a broad biodiversity survey of the proposed site for the relocation of the six families. The water resources associated with the study area where not part of the survey, but because of its importance in the landscape, it will be considered in the habitat assessment and recommendations for the relocation project.

One of the important documents into which this report will feed information is the "Ingula Nature Reserve: Management Plan (January 2017) Eskom Holdings" which was compiled to:

- "Provide the primary strategic tool for management of Ingula Nature Reserve, informing the need for specific programmes and operational procedures.
- Provide for capacity building, future thinking and continuity of management.
- Enable Eskom Holdings Pty Ltd to develop and manage Ingula Nature Reserve in such a way that its values and the purpose for which it has been established are protected.
- Very importantly, within the context of the Ingula Nature Reserve, to ensure the integration of the management of the nature reserve and the Ingula Pumped Storage Scheme (IPSS), so as to ensure continued operation of the pumped storage scheme, without impacting on the biodiversity value of the site" (Eskom 2017).

The most important areas that will be enhanced with the information from this study is listed in Section 3.4 (Objectives and strategic outcomes) with Table 3.2 (Objectives and strategic outcomes for Ingula Nature Reserve) listing the Key Performance Areas as follows:

- Key performance area 2: Compliance to legislation and standards
  - This section implies that the formal proclamation of the reserve is critical, as this will give the ability for the rest of actions and activities to follow.
- Key performance area 5: Regional Planning
  - In this section, the establishment of buffer zones is listed – an important aspect that needs attention for the protection of biodiversity and the habitat.
- Key performance area 6: Biodiversity Management
  - 6.2 focus on grazing and its impacts
  - 6.3 focus on erosion and rehabilitation
  - 6.4 focus on the management of invasive alien species
- Key performance area 7: Infrastructure Development and Management
  - This will feed into the issues raised in this report, especially erosion, trampling and rehabilitation and the exclusion of certain sensitive areas, including buffer zones.
- Key performance area 9: Social Aspects
  - From this report, the focus will be on the relocation of the dwellers and potential impacts to biodiversity and habitat of the grazing etc.

Section 4 of the document focus on the "Operational Management Framework" and give guidance to the establishment of Advisory Committees. These groups will be responsible to set the finer goals with regards to the objectives and goals set in Section 4. The recommendations from this report can assist these specialists in the final assessment of the conservation plans and strategies.

- Table 4.2 (Description of the Zones in Ingula Nature Reserve) talks to the different zones and sub-zones to be established and gives guidance to "Permissible Activities" and "Non-Permissible Activities". As an example it differentiate between the "High Intensity Utilisation", "Medium Intensity Utilisation" and "Low Intensity Utilisation" of the different areas. This then must refer to grazing intensity, herd numbers and ecological processes and its protection.

Section 5 (Operational Management) gives more detail on the activities and how it should be implemented.

- Section 5.5 (Buffer zone protection and regional management) give guidance in Table 5.5 on issues related to the buffer zones.
- In Section 5.6 the focus is on Biodiversity Management with detail listed in a number of tables. It focus on aspects such as management objectives, management activities, management targets, metrics (measurable), reporting frequency, timing of surveys, priority for strategic outcomes and responsibility.
    - For example:
        - Table 5.6.2: Framework for Biodiversity Management (Grazing)
        - Table 5.6.3: Framework for Rehabilitation (including erosion)
        - Table 5.6.4: Framework for Invasive Alien Species
        - Table 5.6.5: Framework for Biodiversity Management (Ecosystem)
        - Table 5.6.6: Framework for Biodiversity Management (Priority spp.)
        - Table 5.6.7: Framework for Biodiversity Management (Wildlife Management)
        - Table 5.6.8: Framework for Biodiversity Management (Fish Management)
- Section 5.7 (Infrastructure development and management) and Section 5.9 (Social aspects) focus on access, roads, buildings and sustainable livelihood and resource utilisation. All the studies done as part of this report will give inputs into these sections.
- In table 6.1 (Key Monitoring Requirements/ Monitoring schedule for Ingula Nature Reserve) the outputs from this report will add value. A concern is the mostly biannual activities recommended for wetlands and erosion. It is recommended that during the first few years (especially during construction and relocation) this must be done more frequently. A 6-month interval after the relocation must be implemented until rehabilitation is completed and the areas restored have stabilised.

1.1 Terms of Reference

BioAssets CC was appointed by Myezo Environmental Management Services (Pty) Ltd (on behalf of Eskom SOC Holdings Ltd) to do a general habitat and biodiversity assessment of the relocation site.

1.2 Objectives of the Survey

The objectives were:

- To do a rapid habitat assessment on site - to determine how the physical and biological aspects of the environment may be and have been affected by the historic and current activities
- To do a survey and determine the current wildlife activity on the site.
- To do a rapid avifaunal survey to determine species currently active on the site.

1.3 The Study Area

The locality map for the study area is depicted in Figure 1 and 2 – the study area falls within Phumelela Local Municipality (on the boundary of the Maluti a Phofung Municipality), Free State Province and is approximately 25km northeast of Van Reenen.

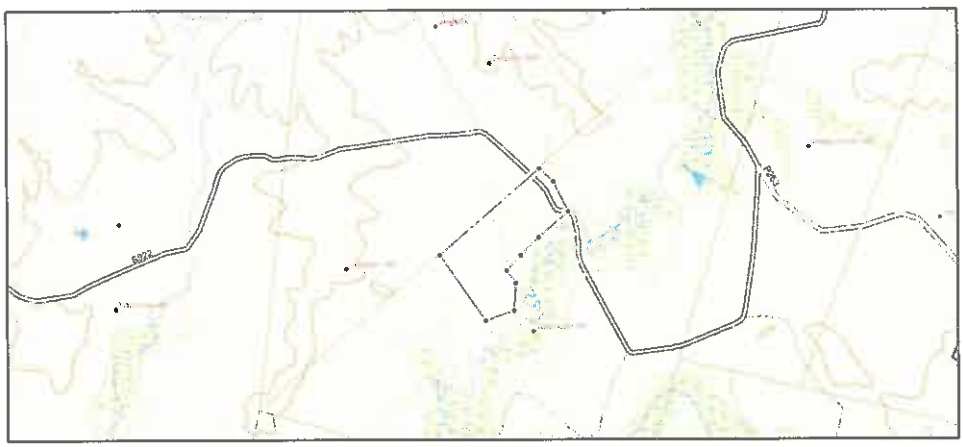

Figure 1: Map of the study area – northeast of Van Reenen.

Figure 2: Aerial view of the study area.

Vegetation

The vegetation at the study site in known as the Eastern Free State Sandy Grassland (Gm 4) (Mucina and Rutherford, 2006) and was previously known as the Highland Sourveld to *Cymbopogon–Themeda* Veld Transition (Eastern Free State Highveld) and the *Cymbopogon–Themeda* Veld (sandy) (Acocks 1953) and later as the Moist Cold Highveld Grassland (Low and Rebelo 1996).

According to Mucina and Rutherford (2006) the vegetation and its associated landscape features (larger vegetation unit description) is dominated by the "flat to slightly undulating and undulating terrain with streams and rivers that drain the foothills of the Drakensberg. The closed grassland is dominated by *Eragrostis curvula, Tristachya leucothrix* and *Themeda triandra* and other dominant grasses include *E. capensis, E. racemosa, Cymbopogon pospischilii, Elionurus muticus, Eragrostis plana* and *Aristida junciformis*. Numerous herb species (especially Asteraceae: species of *Helichrysum, Vernonia* and *Berkheya*) increase the alpha diversity considerably".

To the south of the study area the vegetation type is currently known as the Low Escarpment Moist Grassland (Gs 3) and previously referred to as the Highland Sourveld and Dohne Sourveld (Acocks 1953) and the Wet Cold Highveld Grassland (Low and Rebelo 1996). This unit type is associated with the complex mountain topography with the steep, generally east- and south-facing slopes and a large altitudinal range (Mucina and Rutherford, 2006). Although the veld type is associated with the escarp, one can expect elements of the vegetation to be present on or near the study area.

Water resources

The study area is associated with the Upper Vaal Water Management Area (WMA 3) with the Wilge River the sub Water Management Area (Sub quad – C81A). The area south of the proposed development have an extensive floodplain zone with numerous oxbow lakes (Figure 3).

When looking at the PES (**Present Ecological State**, 1999) the section of the Wilge River associated with the study area was considered in an Ecological Class (EC) "B" with the Mean Ecological Importance (EI) "high" and the Mean Ecological Sensitivity (ES) class recorded as "very high".

The following impacts were noted to contribute to the integrity of the water resources and habitat: road crossings, cultivation, abandoned lands and mining impacts in the Bedford Stream.

Figure 3: Image of the floodplain and oxbow lakes associated with the Wilge River – arrow indicating north.

2 METHODOLOGY

2.1 Habitat assessment

The field survey was preceded by a desktop study to determine the status of the ecosystem and to get an understanding of the present and historic impacts related to changes on the habitat integrity.

During July 2020, the field survey was conducted and was done by a walk-down study in the area (Figure 1 and 2) and all of the possible impacted areas were visited. The photographs depict the general habitat associated with the study site.

The survey focussed on the current habitat status related to land use and the resulting impacts to determine how the proposed relocation will affect the site in future.

2.2 Vegetation assessment

The desktop assessment was based on the detailed EIA reports that was reviewed and the information from Mentis (2006) was used. In the report, two main vegetation unit are mentioned to be associated with the study area and were identified as the *Themeda triandra-Tristachya leucothrix* terrestrial grasslands and the *Harpochloa falx-Tristachya leucothrix* floodplain grasslands.

A rapid vegetation walk-down was conducted and focused more on the cover of the basal layer, as the winter survey isn't effective in the identification of species (e.g. the grasses are without seeds). The species list compiled in the EIA for the larger project is used as baseline.

2.3 Faunal assessment

With regards to the mammals and other vertebrates, a visual assessment was conducted to see if any animals are present. This include movements and activities (e.g. burrows and droppings). Table 3 is a

list of species recorded in the area and one can assume that the proposed development site can be used as a forage area. No clear evidence were found of any animals actively occupying the site. This can be due to current activities which include grazing and hunting. Hunting with dogs were observed in the area and no snares were seen during the survey on the proposed development area.

2.4 Avifaunal survey

A desktop study and literature review of the study area was conducted to gather information prior to the site assessment. The following literature was consulted and is considered key references for the assessment:

- Hockey *et al.* (2005) was used for general information of relevant bird species. This provided the basic information with regards to the breeding, location and preferred nesting habitat of relevant bird species. Where necessary, species were verified using Sasol Birds of Southern Africa (Sinclair *et al.*, 2011).
- The conservation status of the threatened bird species observed or that could potentially occur on the study area was categorised using the National Red List Categories (IUCN, 2014) of IUCN (International Union for Conservation of Nature).
- Distributional data was collected from the South African Bird Atlas Project 1 and 2 (SABAP2; 2020). The distribution of bird species is very important especially based on their preference for habitat and climate. The main difference between SABAP 2, which started in 2007 from SABAP 1, is that sampling is done on a more detailed scale in terms of pentad grids (5minute x 5minute), which forms 9 pentads in one QDGC (Quarter Degree Grid Cells). Therefore, the data collected in SABAP2 is more site-specific and this study area falls within the 2810_2930 pentad grid.

Field survey and data collection

A list of expected species was obtained from SABAP2 and used as reference during the field survey. This ensured that bird species, especially threatened species, could be focussed on during the survey. The site survey was conducted during the winter season on the 7th of July 2020 and a total of 4 hours was specifically spent on identification of species. All recognisable habitats were identified on site and assessed to observe any associated avifauna species present in the specific habitat. Besides visual observations, bird species were identified by means of their calls and other signs (nests, droppings and feathers).

The geographical position of each bird species observed during the site survey was logged using the Bird Lasser Smart Phone Application. The recorded data illustrates the coverage of the study area (Figure 4).

The bird species list obtained for the occurring species in the specific pentad cannot only be used as an absolute accurate list in terms of the species occurring within the study area. A more comprehensive species list for the study area was compiled, using all the species previously recorded in and around the 2810_2930 QDGC (Southern African Bird Atlas Project 2, 2020).

All bird observations during the site survey were processed and submitted to the SABAP 2.

Figure 4: Mapped GPS waypoints of different bird species observed.

Avifauna sensitivity (Threatened and Near Threatened bird species)

The SABAP2 (Southern African Bird Atlas Project 2, 2020) data base was consulted to determine any previously recorded threatened or near-threatened species within the 2810_2930 QDGC. The threatened species previously recorded within the QDGC was examined prior to the site survey (Roberts VII, Hockey *et al.* 2005; Taylor *et al.*, 2015). Therefore, special attention was applied to identify these listed threatened species. A full array of observation methods, such as visual sightings, nesting sites, bird calls and possible habitat was utilised during the assessment. As seen in Figure 5 (Important Bird Areas Map), this study area falls within the Ingula Nature Reserve which forms part of one of the Important Bird Areas (IBA) of South Africa.

Figure 5: Important Bird Areas Map (Southern African Bird Atlas Project 2, 2020) – linked to the proposed nature reserve boundaries.

Avifauna sensitivity scale

- **High** – This is regarded as a sensitive ecosystem with a high vulnerability towards disturbing factors and important features with regards to protecting and maintaining the existing ecosystem on the specific site. These areas usually represent important bird features such as bird flight paths, high bird diversity and/or suitable habitat for threatened bird species. This area should be protected and be classified as a no-go area.

- **Medium** - These areas are slightly lower than the **high** category in terms of sensitivity and may therefore occur along a sensitive ecosystems or ecological area. These areas should be protected through implementing adequate mitigation measures. This will prevent the area from any potential threats introduced to the area.

- **Low** – This area may be highly disturbed or degraded and therefore have little ecological function. This may also be categories as a low disturbance area with regards to the specific project.

Limitations and assumptions for this survey

1. Most of the data obtained from references such as SABAP 1 and 2 and other research platforms where assumed to be true and accurate.
2. The avifauna habitat assessment was conducted during the winter months (July 2020), hence falling outside of the preferred birding months for avifauna assessments. Therefore all the summer visitor bird species and bird species within their nesting/laying periods could not have been sighted during this assessment resulting in an inaccurate data sampling.
3. There were no nocturnal surveys conducted therefore the sighting nocturnal species such as owl and nightjar species were not possible.
4. A one-day field assessment was conducted and this potentially resulted in not recording all species within the study area.
5. The weather during the site visit (strong winds) made it difficult to record bird species.

3 RESULTS and DISCUSSION

3.1 Habitat assessment

According to Partridge and Maud (2004) floodplains, valley bottom wetlands without channels, valley bottom wetlands with channels, hillslope seepage wetlands, oxbows, sheetrock wetlands and pans are all wetland types present in the area. The hillslope seepage wetlands that occur in the study area are associated with sandy (Clovelly) soil forms and the soils specifically within the seepage wetlands being Nomanci form.

Channelisation in hillslope seeps occurs naturally but some channelisation (accelerated) has developed due to erosion as a result of overgrazing and trampling by cattle and roads being built on highly erodible soils and at the wrong angle to the slopes (Partridge and Maud, 2004).

During the desktop assessment and the field survey it was clear that the habitat associated with the study site is in a modified state and this is reflected by the trampling and erosion. The drainage line (Figure 5), draining from north to south through the site, is an example of the impacts. Apart from the erosion to the channel, a number of head cuts were noted and these will increase the degradation of the habitat in future. In addition to this, numerous erosion areas were noted along the southern and western slopes of the site (these will be mapped and listed in a spreadsheet – Table 3). These erosion points are linked to small drainage areas and seeps or springs. Some of the drainage areas that was identified as "unchannelled drainage lines" have eroded to become "channelled" systems. Areas such as these are earmarked for rehabilitation to prevent further erosion and it is recommended that it is excluded from the grazing pastures to be allocated to the new residents. These seeps and springs are on steep slopes and as was noted in the soils studies (Partridge and Maud, 2004) are susceptible to erosion. Erosion of cattle tracks and roads on the property is increasing and with the proposed increase in cattle and sheep number, this must be addressed in the management strategies implemented for the site.

It is clear that the main threat to the habitat and ecosystem integrity for the site is erosion and this will be aggravated by grazing, trampling and driving on the existing tracks. Figure 9 – 25 are some general images of the study site.

Figure 5: The sensitive habitat areas identified – red line represent the areas for exclusion (to the east), the yellow line (with the red line next to it) is the crossing to be excluded and is the area were a bridge or permanent crossing can be constructed, blue lines is the drainage line to be excluded from the grazing areas.

Figure 5a: Close-up of the exclusions to the east, including the seeps and steep slopes.

Figure 5b: The exclusion of the central drainage line and the crossing to be rehabilitated (circled).

3.2 Vegetation assessment

The vegetation assessment was just a rapid walk down on the site. As the winter is not the best time for a vegetation survey, this study used the information from the EIA reports (specifically the wetlands study – Mentis, 2006) as a baseline. The walk down was therefore a survey of the current status of the general vegetation cover and structure (integrity) on the study site.

According to the wetlands report (Mentis, 2006), there are two vegetation types that one can associate with the relocation site, the *Themeda triandra-Tristachya leucothrix* terrestrial grasslands and the *Harpochloa falx-Tristachya leucothrix* floodplain grasslands. Other types listed in the report (Mentis, 2006) can be present. As this was not a detailed plant survey, these two types are the most likely to be associated with the study site.

***Themeda triandra-Tristachya leucothrix* terrestrial grasslands:** These grassland plant communities occur in contact with the wetlands throughout the study area and occur on undulating slopes surrounding the wetlands. Common and conspicuous species include *Monocymbium ceresiiforme, Themeda triandra, Eragrostis capensis, Eragrostis racemosa, Alloteropsis semialata, Commelina africana, Helichrysum aureonitens* and *Helichrysum pilosellum*. Terrestrial grasslands are relatively uniform across the study area, but a large difference in species composition was found between the two sampling periods based on the seasonal appearance of a number of species. Grasslands are known to contain a large proportion of suffrutex forbs with woody rootstocks or underground storage organs and the appearance of annual above-ground stems that may only be detected at certain times of the year (Mentis, 2006).

Harpochloa falx-Tristachya leucothrix floodplain grasslands: These floodplain grasslands occur on the main floodplain in the lower reaches of the catchment, adjacent to the main river channel where relatively permanent dry conditions are found. Common and conspicuous species include *Tristachya leucothrix, Themeda triandra, Eragrostis capensis, Commelina africana, Helichrysum aureonitens* and *Helichrysum pilosellum*. A group of species, namely *Harpochloa falx, Pelargonium luridum, Andropogon appendiculatus, Chlorophytum sp., Euphorbia striata, Eucomis autumnalis* and

Helictotrichon turgidulum, is found in the floodplain grasslands, but not in the terrestrial grasslands. An average of 24 species per 100 m^2 is found in this plant community (Mentis, 2006).

According to Mentis (2006) two threatened species have a HIGH probability of occurring in the area, namely *Kniphofia ensifolia subsp. autumnalis* (classified as Vulnerable) and *Kniphofia typhoides* (classified as Near Threatened). Both of these species occur in damp or marshy areas and could, therefore, occur in any of the marsh wetlands in both study areas. None were observed during the current survey.

The current vegetation cover is in a fair to good condition, but in some small areas over grazing was noted – especially near water sources. On the sloped areas, erosion was noted and in some areas urgent rehabilitation is needed to protect the landscape and vegetation for sustainable utilisation after the relocation of the six families to the site.

3.3 Faunal assessment

Table 4 is a summary of the possible mammals associated with the site. The data is collated from various sources for the "Ingula Booklet" (pers. comm. P. Nelson, 2020). Larger mammals that may occur can include *Papio ursinus* (low to moderate – observed near Lake Bedford), *Sylvicapra grimmia* (moderate to high) (NSS, 2012), *Pelea capreolus* (moderate to high (NSS, 2012) – observed south of the site) and *Redunca fulvorufula* (low – associated with larger wetted areas) (NSS, 2012). There was no observation of any wild animals (tracks, scat or visual observations) during the survey on the study site.

Burrows of *Orycteropus afer, Hystrix africaeaustralis* and *Cryptomys hottentotus* were noted, but no recent activities at the sites were noted. Apart from the cool conditions, hunting with dogs can be a reason for the lack of any fresh activities at the burrows (mostly weeks old).

3.4 Avifaunal assessment

Habitat types

A total of 3 habitat types was observed for the study area. All habitats had its own diversity in terms of bird species recorded. However, the bird diversity is not limited to each habitat as bird's species uses different habitats for different purposes. The three habitats types observed during the site visit consist of the following (Figure 6 and 7):

Wetland and riparian zone

This is the most sensitive habitat within the study area with regards to foraging and possible nesting ground for some bird species and more specifically the threatened bird species. During the summer months of the year this area will also support a higher species richness and diversity. This area includes bird species such as African marsh Harrier (*Circus ranivorus*) and Flufftails (*Sarothrura* sp.) which uses the habitat and vegetation for nesting ground.

Ridge-like Grassland

A small section of the study area includes a ridge like or rocky ridges area which is mixed with shrubland and grassland features. Some bird species such as the Eastern Long-billed Lark (*Certhilauda semitorquata*) prefers this type of habitat for foraging purposes and nesting ground.

Grassland

The larger area of the study area is covered with open plain of grassland with scattered trees along the riparian zone. Apart from the wetland and riparian zone the rest of the study area is only covered with grassland features. Bird species in this habitat include species such Cape Longclaw (*Marcronyx capensis*) and some *Cisticola* sp.

Figure 6: A Collage of images illustrating the dominant habitat types observed during the study area.

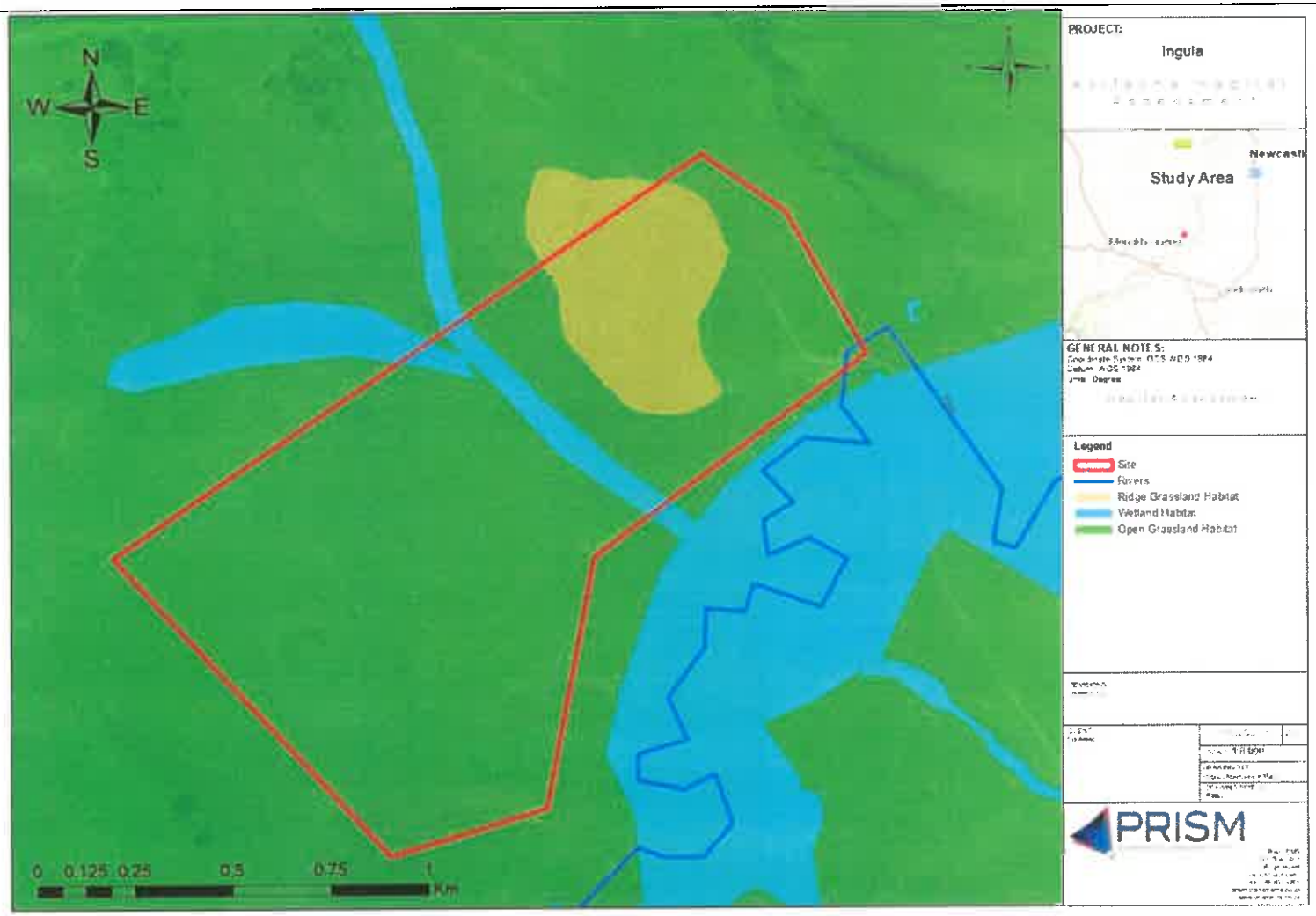

Figure 7: Habitat Assessment Map – compiled after the survey.

Species richness and summary statistics

According to the SABAP 2 (2020), a total of 166 bird species and 16 threatened and near-threatened species have been recorded in the 2810_2930 QDGC (Addendum 2 – Expected and observed bird species). This equals to 49% of approximate 342 species listed for this region (HOCKEY *et al.*, 2005).

Despite the high bird diversity in this region, the proposed project site is limited with regards to habitat diversity. This due to the fact that the study site has the grassland habitat type dominating the study area. Small number of scattered trees are found along the riparian zone (exotic *Salix babylonica*) and a few alien invasive (*Acacia mearnsii*) on the hills to the north. Based on the habitat that is present and was observed during the site assessment, only a total of 20 species which includes 3 threatened bird species was confirmed during the investigation. This represent 12% of the expected number of bird species and 19% of the expected threatened and near-threatened species obtained from SABAP2.

Table 1: A summary table of the total number of species and red listed species expected to occur and observed within the proposed study area.

	Expected (SABAP2, 2020)	Observed	Observed percentage (%)
Total number of species	166	20	12
Number of Red Listed Species	16	3	19

The amount of observed species (Table 2) during the survey (including the red listed species) is very low in comparison with the total number of expected species for the study area. This is due to the listed limitations for the site assessment: weather conditions during the survey (wet and cold with a strong wind), limited time spent on-site and the seasonal constraints (winter). It must be noted that the study area provides good habitat in terms of foraging and suitable environment for ground nesting species on the "expected species and red list.

Species of conservation concern

Table 2: Threatened and near-threatened bird species that could occur within the proposed site area based on their distribution and suitable habitat.

Species	Global Conservation Status (Bird Life SA, 2016)	Regional Conservation Status(Bird Life SA, 2016)	Recorded during SABAP 2	Recorded during site assessment	Preferred Habitat (Hockey, *et al.*, 2005)	High likelihood of occurrence
Neotis denhami (Denham's Bustard)	Near Threatened	Vulnerable	Yes	No	Grassland Biome, inhabits high-lying, open grassland, often in rocky areas and plateau.	Likely, breeds and forages in grassland areas.
Anthropoides paradiseus (Blue Crane)	Vulnerable	Near Threatened	Yes	No	Natural grassland, wetland, cultivated pastures and croplands.	Likely, only for foraging purposes. No breeding habitat.
Balearica regulorum (Grey Crowned Crane)	Endangered	Endangered	Yes	No	Breeds in marshes, pans, and dams' margins with tall emergent vegetation. Feeds in medium height grassland and wetlands	Likely, foraging purposes and breeding purposes
Grus carunculate (Wattled Crane)	Vulnerable	Critical	Yes	No	Fairy shallow wetland.	Likely, for foraging and breeding purposes
Falco biarmicus (Lanner Falcon)	Least Concern	Vulnerable	Yes	No	Favours open grassland or woodland. Breeding sites near cliffs or pylons.	Occasional foraging visitor on the study area. No breeding habitat.
Polemaethus bellicosus (Martial Eagle)	Vulnerable	Endangered	Yes	No	Open savanna and woodland on pains, also semi-arid shrublands; rare in mountain areas.	Occasional foraging visitor on the study area. No breeding habitat.
Tyto capensis (African Grass-owl)	Least Concern	Vulnerable	Yes	No	Favours tall rank or dense short grasslands	Likely, foraging and breeding.
Circus maurus (Black Harrier)	Endangered	Endangered	Yes	No	Fynbos, renosterveld, Karoo shrublands, dry grassland and croplands.	Likely for breeding purposes and occasional forager.
Circus macrourus (Pallid Harrier)	Near Threatened	Near Threatened	Yes	No	Grassland associated with open pans or floodplains. Breeding = extralimital	Only sighted once on site. Visitor to the study area for foraging.
Geronticus calvus (Southern Bald Ibis)	Vulnerable	Vulnerable	Yes	Yes	Favours high-altitude short grassland. Breeds on cliffs	Likely, for foraging purposes. A few individuals were observed a few km away from the study area. No breeding habitat.

Eupodotis senegalensis (White-bellied Korhaan)	Least Concern	Vulnerable	Yes	No	Tall grassland or open savanna. Breeding on the ground.	Likely to occur because of preferred habitat. However, recorded long ago within the specific pentad.
Circus ranivorus (African Marsh Harrier)	Least Concern	Endangered	Yes	Yes	Inland and coastal wetlands and adjacent moist grassland. Nest usually placed over water, wetlands and sometimes in dryland sites	High, an individual was observed during site assessment with a possible nest. Another induvial spotted a few km away from the site
Coracias garrulus (European Roller)	Least Concern	Near Threatened	Yes	No	Open woodlands, perching om open dead branches. Do not breed in South Africa	Likely, for foraging purposes. Non breeder to South Africa.
Sagittarius serpentarius (Secretarybird)	Vulnerable	Vulnerable	Yes	Yes	Favours open grassland with scattered trees or shrubs. Nest usually placed on flat thorn trees.	High, for foraging purposes. Feather was observed during the site assessment. Two individuals were observed a few km away from the study site. No, breeding habitat.
Ciconia nigra (Black Stork)	Least Concern	Vulnerable	No	No	Associated with mountains regions, but not restricted to them.	Unlikely, foraging purposes. Only recorded once in SABAP 1, not one recording in SABAP2. No, breeding habitat
Gyps coprotheres (Cape Vulture)	Endangered	Endangered	Yes	No	Linked to cliff breeding areas.	Unlikely, might be for foraging purposes. No, breeding habitat

Avifaunal sensitivity

Areas of high avifaunal sensitivity

Areas with a "high sensitivity" rating includes the wetland and riparian zones along the Wilge River and its tributaries (Figure 8).

The sensitive habitat not only provides foraging areas and nesting ground for the general bird species but possibly for the observed threatened and near-threatened bird species such as the African Marsh Harrier (*Circus ranivorus*), White-winged Flufftail (*Sarothrura albigularis*), African Grass-owl (*Tyto capensis*) and some threatened Crane species.

Areas of medium avifaunal sensitivity

The "medium sensitive areas" are the sections associated with the outer boundaries of the "high sensitive zones" as this is a result of the high protection of the wetland and riparian zones found on the study area (Figure **8: Avifaunal Sensitive Areas** 8). This area not only provides suitable foraging areas for threatened Crane species such as the Blue Crane (*Anthropoides paradiseus*) and Grey Crown Crane (*Balearica regulorum*) but it is suitable habitat for a threatened species, the White-bellied Korhaan (*Eupodotis senegalensis*).

Areas of low avifaunal sensitivity

Areas with a "low sensitivity" rating includes the grassland and rocky grassland area on site (Figure 8). Although this area has been regarded as having a "low sensitivity" it does not mean that it this space don't provide any foraging or breeding areas for bird species. Threatened bird species such as the Secretarybird (*Sagittarius serpentarius*) would use this area as suitable foraging habitat while smaller species such as the Eastern Long-billed Lark (*Certhilauda semitorquata*) prefers rocky habitats which was observed within a small section of the study area.

Conclusions

- The study area consists of 3 habitat types that was observed and assessed during the site survey.
- One of the observed habitats (wetland and riparian) which is classified as a highly sensitive area should be avoided by all times.
- This sensitive zone provides a large area of habitat for not only general bird species but also threatened bird species.
- The threatened bird species (three) observed are highly restricted to their associated habitats and re-occurring use of specific nesting sites are significant and specific use of foraging areas.
- Special care is required and needed for the protection of this unique habitats for observed bird species and threatened bird species, by restricting disturbance and minimizing transformation in these areas.

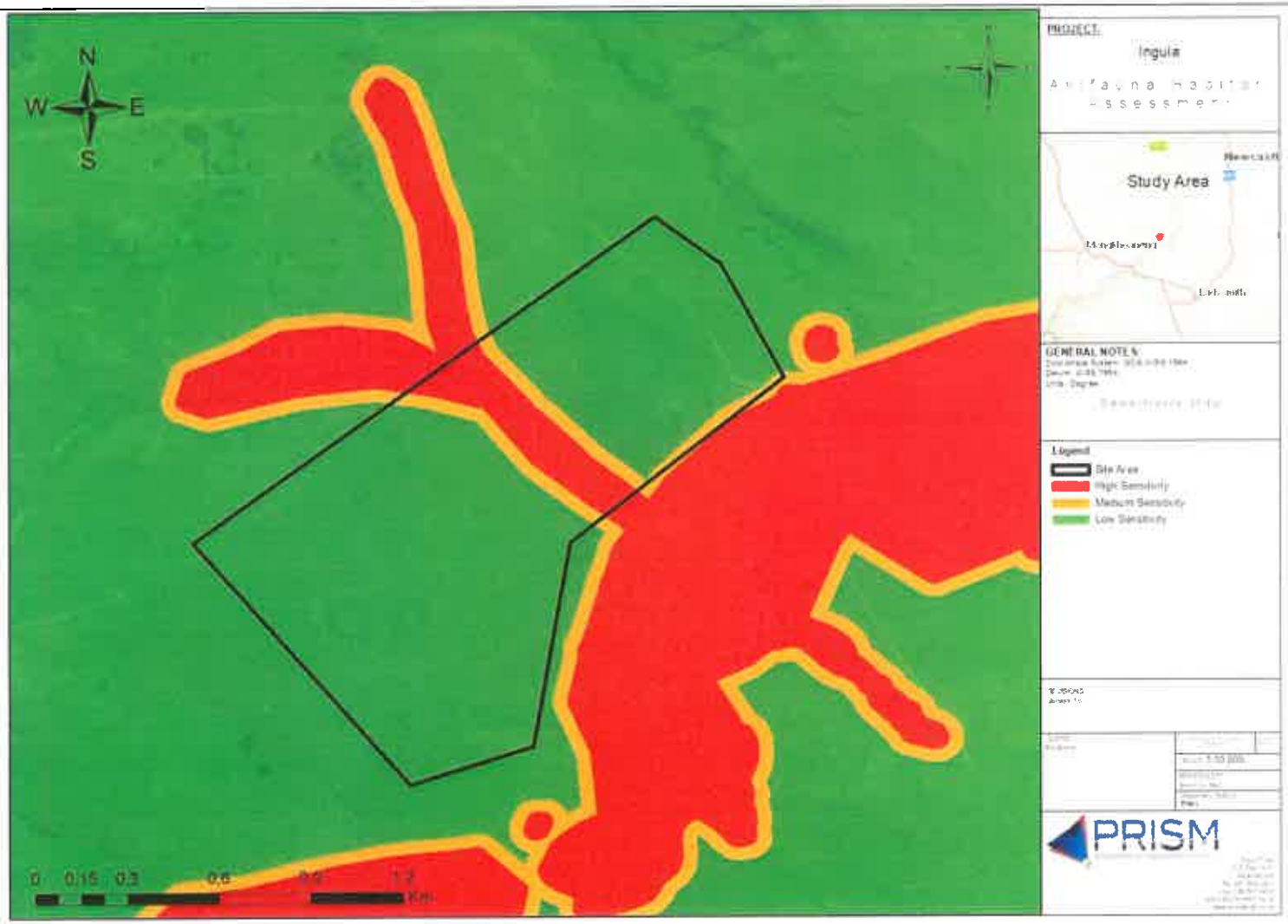

Figure 8: Avifaunal Sensitive Areas – as mapped from the historic and current surveys and data.

4 GENERAL COMMENTS, RECOMMENDATIONS and MITIGATING ACTIONS

The recommendations will feed into the different sections of the "Ingula Nature Reserve: Management Plan (January 2017) Eskom Holdings" which was compiled to:

- "Provide the primary strategic tool for management of Ingula Nature Reserve, informing the need for specific programmes and operational procedures.
- Provide for capacity building, future thinking and continuity of management.
- Enable Eskom Holdings Pty Ltd to develop and manage Ingula Nature Reserve in such a way that its values and the purpose for which it has been established are protected.
- Very importantly, within the context of the Ingula Nature Reserve, to ensure the integration of the management of the nature reserve and the Ingula Pumped Storage Scheme (IPSS), so as to ensure continued operation of the pumped storage scheme, without impacting on the biodiversity value of the site" (Eskom 2017).

- The recommendations are summarised as follows:
  - Main concern for the habitat and vegetation is high erodibility of soils in the area
  - The site is undulating – the slopes are increasing the erosion potential
  - Current erosion in areas severe – needs rehabilitation
  - Trampling, grazing and poorly maintained roads are the main problems contributing to the erosion
  - From an ecological perspective, it is recommended that the new buildings are constructed near the road
  - The remainder of the property to the west can be divided for grazing
  - It is recommended that the drainage line is excluded from the grazing allocation
  - It is recommended that the southern area adjacent to the flood plain and river excluded from the allocated land – there are a number of seep and springs that will be susceptible to erosion
  - It is recommended that no access to the river must be given from the property
  - A clear strategy must be in place for grazing in the reserve – don't use a single entry point as this will increase erosion potential
  - Off-channel watering points must be supply in the reserve to prevent drinking and trampling of the flood plain and river zones
  - Recommend construction of a permanent crossing over the wetland
  - In addition, the road crossing the wetland must be cordoned off to prevent sheep and cattle entering the wetland for grazing and drinking
  - It is highly recommended that a follow up avifaunal survey be conducted during the summer months prior to any construction or operational phase due to the limited time and season of this site survey.
  - Due to the high possibility of nesting sites for one of the threatened bird species (African marsh Harrier - *Circus ranivorus*), it is recommended that the indicated high sensitivity area should not only be protected but also be classified as a no-go zone.
  - It is recommended that the highly sensitive area be fenced off and indicated as a no-go area.

- This is recommended due to agricultural activities in specific the grazing of livestock and development of croplands that will have a high impact on the wetland areas and critical habitat area (High Sensitive Areas) for the said species.
- The exclusions is linked to the potential trampling when grazing and crop development can damage existing and future nesting sites of threatened bird species.

Table 3: List of the important habitat concerns noted with some mitigation and management recommendations added.

Coordinates	Description of concern
S28.20092 E29.55192	Erosion and head cuts - needs urgent rehabilitation
S28.20590 E29.55251	Erosion and head cuts - needs urgent rehabilitation
S28.20802 E29.55261	Exclusion boundary to protect spring/seep
S28.20844 E29.55238	Seep/spring to be protected (excluded)
S28.20866 E29.55210	Seep/spring to be protected (excluded)
S28.20982 E29.55260	Move boundary to protect the Wilge River floodplain
S28.21003 E29.55221	Erosion on slope that needs rehabilitation
S28.21009 E29.55151	Grave - to be confirmed by the archaeologist
S28.21046 E29.55028	Small seep on slope - exclude
S28.21087 E29.54925	Erosion on slope that needs rehabilitation

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Figure 9 General view of the grassveld – good condition and cover.

Figure 10: The condition of the basal layer in a fair condition.

Figure 13: Example of a stream crossing (severe erosion) with poorly constructed road – needs rehabilitation.

Figure 12: The current crossing of the tributary of the Wilge River – rehabilitation and permanent structure need to accommodate increased and sustained traffic.

Figure 14: Example of runoff channel – because of run-off from road and trampling, the unchannelled channels are modified to channelled systems.

Figure 11: View of the outcrop with some *Acacia mearnsii* present.

Figure 15: An example of an ephemeral channel being modified from unchannelled to channeled.

Figure 16: Modified drainage channel (tributary upstream of road crossing) – needs rehabilitation.

Figure 17: Modified drainage channel with accelerated erosion – rehabilitation recommended.

Figure 18: The modified stream channel – trampling by cattle (drinking area) contribute to severe erosion in the section.

Figure 19: A view of the tributary showing the erosion that must be stopped and the stream rehabilitated.

Figure 20: Although the road is on a flat section of the property, early signs of erosion present – it will be important to include the maintenance of the road as part of the future management strategy.

Figure 21: Historic activity of the steep slopes resulted in erosion – recommend "soft" structures to rehabilitate.

Figure 22: An old footpath/cattle path forming erosion – again if rehabilitated now, severe damage in future can be avoided.

Figure 23: Example of a spring (seep) that must be excluded from the general grazing areas –trampling will result in severe erosion and siltation into the Wilge River.

Figure 24: Another spring/seep with erosion and trampling damage present – recommended exclusion from the grazing areas.

Figure 25: Example of some activity of nocturnal animal on the site – no evidence of permanent habitation, possible of the existing activities and possible hunting.

Table 4: List of species compiled from various sources for the Ingula Booklet (Nelson, 2020).

Common Name	**Scientific name**	**Threat Status**	**Endemism**	**Method of record**	**Camera Trap Study**
		LC - Least Concern NT - Near Threatened VU - Vulnerable EN - Endangered CR - Critically Endangered	E - Endemic to South Africa NE - Near Endemic	CT - Camera Trapping Study SMS - Small Mammal Study	
Antelopes					
Blesbok	*Damaliscus pygargus phillipsi*	LC	E		
Bushbuck	*Tragelaphus sylvaticus*	LC		CT	Grassland; Forest
Duiker Common	*Sylvicapra grimmia*	LC		CT	Grassland; Forest
Eland	*Tragelaphus oryx*	LC		CT	Forest
Kudu	*Tragelaphus strepsiceros*	LC			
Oribi	*Ourebia ourebi ourebi*	EN	NE	CT	Grassland
Reedbuck Common	*Redunca arundinum*	LC		CT	Grassland
Reedbuck Mountain	*Redunca fulvorufula fulvorufula*	EN	NE	CT	Grassland; Forest
Rhebuck Grey	*Pelea capreolus*	NT	E	CT	Grassland
Steenbok	*Raphicerus campestris*	LC		CT	Grassland
Crustacean					
Crab Forest (Unidentified)				CT	Forest
Predators					

Aardvark	*Orycteropus afer*	LC		CT	Grassland
Aardwolf	*Proteles cristata*	LC		CT	Forest
African Striped Weasel	*Poecilogale albinucha*	NT		CT	Grassland
Badger Honey	*Mellivora capensis*	LC		CT	Grassland; Forest
Caracal	*Caracal caracal*	LC		CT	Grassland; Forest
Genet Large Spotted (Cape)	*Genetta tigrina*	LC	E	CT	Grassland; Forest
Leopard	*Panthera pardus*	VU		CT	Grassland; Forest
Mongoose Large grey	*Herpestes ichneumon*	LC		CT	Grassland; Forest
Mongoose Slender	*Herpestes sanguineus*	LC		CT	Grassland; Forest
Mongoose Small grey	*Herpestes pulverulentus*	LC	NE	CT	Grassland; Forest
Mongoose Water	*Atilax paludinosus*	LC		CT	Grassland; Forest
Mongoose Yellow	*Cynictis penicillata*	LC		CT	Grassland
Otter Cape Clawless	*Aonyx capensis*	NT		CT	Grassland
Otter Spotted Necked	*Hydrictis maculicollis*	VU		CT	Grassland
Polecat Striped	*Ictonyx striatus*	LC		CT	Grassland
Serval	*Leptailurus serval*	NT		CT	Grassland; Forest
Primates					
Baboon Chacma	*Papio ursinus*	LC		CT	Grassland; Forest
Monkey Vervet	*Chlorocebus pygerythrus*	LC		CT	Grassland; Forest
Hares					
Hare Scrub	*Lepus saxatilis*	LC	NE	CT	Grassland
Rodents					
Field Mouse Striped	*Rhabdomys dilectus*	LC		CT, SMS	Forest
Gerbil Highveld	*Gerbilliscus brantsii*	LC		SMS	
Hyrax Rock	*Procavia capensis*	LC		CT	Grassland; Forest
Mole Hottentot's Golden	*Amblysomus hottentotus*	LC	E	FO	
Mouse Multimammate	*Mastomys spp.*	LC		SMS	

Mouse, Grey African Climbing	*Dendromus melanotis*	LC		CT	Forest
Porcupine	*Hystrix africaeaustralis*	LC		CT	Grassland; Forest
Rat African Water				SMS	
Shrew Forest	*Myosorex varius*	LC	E	SMS	
Shrew Greater Red Musk	*Crocidura flavescens*	LC	NE	SMS	
Shrew Lesser Dwarf	*Suncus varilla*	LC		SMS	
Shrew Reddish-grey Musk	*Crocidura cyanea*	LC		SMS	
Shrew Tiny Musk	*Crocidura fuscomurina*	LC		SMS	
Shrew, Unidentified				CT	Forest; Wetland
Springhare	*Pedetes capensis*	LC		CT	Grassland
Scavengers					
Bushpig	*Potamochoerus larvatus*	LC		CT	Grassland; Forest
Hyena Brown	*Parahyaena brunnea*	NT		CT	Grassland
Hyena Spotted	*Crocuta crocuta*	NT		CT	Grassland
Jackal Black-backed	*Canis mesomelas*	LC		CT	Grassland; Forest
Warthog	*Phacochoerus africanus*	LC		CT	Forest
Amphibians				CT	Forest
Frog Clicking Stream	*Strongylopus grayii*	LC			
Frog Common River	*Amietia quecketti*	LC			
Frog Rattling	*Semnodactylus wealii*	LC			
Frog Snoring Puddle	*Phrynobatrachus natalensis*	LC			
Kassina Bubbling	*Kassina senegalensis*	LC			
Painted Reed Frog	*Hyperolius marmoratus*	LC			
Toad Guttural	*Amietophrynus gutturalis*	LC			
Lizards					
Agama Eastern Ground	*Agama aculeata distanti*	LC	E		
Agama Southern Rock	*Agama atra*	LC	NE		

Chameleon Common Flap-necked	*Chamaeleo dilepis*	LC			
Crag Lizard Drakensberg	*Pseudocordylus melanotus melanontus*	LC	E		
Lizard Cape Grass	*Chamaesaura anguina*	LC	E		
Lizard Yellow-throated Plated	*Gerrhosaurus flavigularis*	LC		CT	Forest
Sandveld Lizard Delalande's	*Nucras lalandii*	LC	E		
Seps Breyer's Long-tailed	*Trachydactulus breyeri*	VU	E		
Skink Cape	*Trachylepis capensis*	LC			
Skink Striped or Speckled Rock	*Trachylepis punctatissima*	LC			
Monitors					
Monitor Nile or Water	*Varanus niloticus*	LC		CT	Forest
Snakes					
Adder Puff	*Bitis arientans arientas*	LC			
Blind snake Bibron's	*Typhlops bibronii*	LC	NE		
Bush Snake Spotted	*Phylothamnus semivariegatus*	LC			
Egg-eater Rhombic	*Dysypeltis scabra*	LC			
Garter Snake Sundevall's	*Elapsoidea sudevalli*	LC			
Grass Snake Cross -marked	*Psammophis crucifer*	LC	NE		
Green Snake Natal	*Philothamnus natalensis occidentalis*	LC	E		
House Snake Aurora	*Lamprophis aurora*	LC	E		
House Snake Brown	*Boaedon capensis*	LC			
Mole Snake	*Pseudapsis cana*	LC			
Night Adder Rhombic	*Causus rhombeatus*	LC			
Rinkhals	*Hemachatus haemachatus*	LC	NE		
Skaapsteker Spotted (Striped morph)	*Psammophylax rhombeatus rhombeatus*	LC		CT	Wetland
Snake Many-spotted (Green Morph)	*Amplorhinus multimaculatus*	LC	NE		
Snake Olive Whip	*Psammophis mossambicus*	LC			

Spitting Cobra Mozambique	*Naja nivea*	LC			
Water Snake Common Brown	*Lycodonomorphus rufulus*	LC			
Water Snake Dusky-bellied	*Lycodonomorphus laevissimus*	LC	E		
Butterflies					
Acraea, Dusky	*Acraea eserbria*	LC			
Acraea, Garden	*Acraea horta*	LC			
Acraea, Marsh	*Telchinia rahira rahira*	LC			
Acraea, Natal	*Acraea natalica*	LC			
Acraea, Orange	*Telchinia anacreon anacreon*	LC	NE		
Acraea, Speckled Red	*Acraea violarum*	LC			
Acraea, Wandering donkey	*Acraea neobule neobule*	LC			
Bar, Mozambique	*Cigaritis mozambica*	LC			
Beauty, Table Mountain	*Aeropetes tulbaghia*	LC			
Blue, Common Meadow	*Cupidopsis cissus cissus*	LC			
Blue, Cupreous	*Eicochrysops messapus mahallakoaena*	LC	NE		
Blue, Dotted	*Tarucus sybaris sybaris*	LC			
Blue, Galka	*Zizula hylax*	LC			
Blue, Long-tailed	*Lampedes boeticus*	LC			
Blue, Natal Spotted	*Azanus natalensis*	LC			
Blue, Patrician	*Lepidochrysops patricia*	LC			
Blue, Sooty	*Zizeeria knysna*	LC			
Blue, Variable	*Lepidochrysops varabilis*	LC			
Border, Common dotted	*Mylothris agathina agathina*	LC			
Bronze, Common geranium	*Cacyreus marshalli*	LC			
Brown, False silver bottom	*Pseudonympha magoides*	LC	NE		
Brown, Rainforest	*Cassionympha cassius*	LC	NE		

Charaxes, Forest King	*Charaxes xiphares xiphares*	LC	E		
Charaxes, Foxy	*Charaxes jasius saturnus*	LC			
Charaxes, Green veined	*Charaxes candiope candiope*	LC			
Commodore, Garden	*Junonia archesia*	LC			
Commodore, Gaudy	*Precis Octavia sesamus*	LC			
Commodore, Marsh	*Precis ceryne ceryne*	LC			
Copper, Eastern sorrel	*Lycaena clarki*	LC	NE		
Copper, Giant Mountain	*Aloeides pallida pallida*	LC	E		
Copper, Karoo Daisy	*Chrysoritis chrysantas*	LC			
Copper, Roodepoort	*Aloides dentatis maseruna*	LC	NE		
Diadem, Common	*Hypolimnas misippus*	LC			
Eye, Common black	*Gonatomyrina gorgias gorgias*	LC			
Flat, Western Large	*Celaenorrhinus mokeezi mokeezi*	LC	E		
Hairtail, Black striped	*Anthene amarah amarah*	LC			
Hottentot, Common	*Gegenes niso niso*	LC			
Joker, Common	*Byblia antavara*	LC			
Joker, Spotted	*Byblia ilithyia*	LC			
Lady, Painted	*Vanessa cardui*	LC			
Migrant, African	*Catopsilia florella*	LC			
Monarch, African	*Danaus Chrysippus*	LC			
Opal, Burnished	*Chrysoritis chrysaor*	LC	E		
Pansy, Blue	*Junonia oenone oenone*	LC			
Pansy, Eyed	*Junonia orithya madagascariensis*	LC			
Pansy, Soldier	*Junonia terea elgiva*	LC			
Pansy, Yellow	*Junonia hierta cebrene*	LC			
Pie, Black	*Tuxentius melaena melaena*	LC			
Pirate,	*Catacroptera cloanthe cloanthe*	LC			

Policeman, Striped	*Coeliades forestan forestan*	LC			
Protea, Orange banded	*Capys alphaenus extentus*	LC	E		
Protea, Russet	*Capys disjuctus disjuntus*	LC			
Ranger, Fulvous	*Kedestes mohozutza*	LC			
Ranger, Pale	*Kedestes callicles*	LC			
Ranger, Wallengren's	*Kedestes wallengrenii wallengrenii*	LC			
Rocksitter, Amakoza	*Durbania amakosa amakosa*	LC	E		
Rocksitter, Natal	*Durbania amakosa*	LC	E		
Sandman, Mountain	*Spiacia spio*	LC			
Scarlet, Common	*Axiocerses tjoane*	LC			
Swallowtail, Citrus	*Princeps demodocus demodocus*	LC			
Swallowtail, Emperor	*Princeps ophidicephalus*	LC	E		
Swallowtail, Forest	*Papilio euphranor*	LC	E		
Swallowtail, Green banded	*Papilio nireus nireus*	LC			
Sylph, Gold spotted	*Metisella metis paris*	LC			
Tip, Queen Purple	*Colotis Regina*	LC			
White, African Common	*Belenois creona severina*	LC			
White, Brown veined	*Belenois aurota aurota*	LC			
White, Cabbage	*Pieris brassicae*	LC			
Yellow, Broad Bordered Grass	*Eurema brigitta brigitta*	LC			

Appendix D2: Socio-economic Impact Assessment Report

Eskom

MYEZO ENVIRONMENTAL MANAGEMENT SERVICES

Environmental Stewardship

ESKOM – INGULA – BASIC ASSESSMENT

SOCIO-ECONOMIC IMPACT ASSESSMENT REPORT FOR THE RELOCATION OF DWELLERS AT THE INGULA PUMPED STORAGE SCHEME LOCATED WITHIN THE BOARDERS OF FREE STATE AND KWAZULU NATAL PROVINCES

Document Name: EIB – BAR Socio-economic report

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Tel: 012 998 7642 | Fax: 102 998 7641 | C: 082 772 2418 | email: babalwa@myezo.co.za
Postnet Suite B165, Private Bag X18, Lynnwood Ridge, 0040, Pretoria, South Africa
1250

ESKOM – INGULA – BASIC ASSESSMENT

SOCIO-ECONOMIC IMPACT ASSESSMENT REPORT FOR THE RELOCATION OF DWELLERS AT THE INGULA PUMPED STORAGE SCHEME LOCATED WITHIN THE BOARDERS OF FREE STATE AND KWAZULU NATAL PROVINCES

Document Name: EIB – BAR Socio-economic Report

Date: 09 September 2020

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Myezo Ref No: EIB 2020/01

MYEZO ENVIRONMENTAL MANAGEMENT SERVICES

Environmental Stewardship

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DOCUMENT REVIEW AND APPROVAL

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Nobom Mfabana	45	1	17 September 2020
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Reviewer	Babalwa Fatyi		
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Declaration of Independence

I Nobom, Gcinashe, Mfabana, declare that I act as an independent specialist in the project; and, have neither vested interests in the proposed project nor any connections with Eskom and/or any of its employees. Myezo Environmental Management Services (Pty) Ltd has contracted my services as part of the specialist project team.

The full declaration of independence as required in terms of the National Environmental Management Act (Act No. 107 of 1998), as amended and the Environmental Impact Assessment (EIA) Regulation, 2014, as amended, is attached as Annexure 1 of this report.

Specialist Signature: .....

Executive Summary

The Socio-Economic Impact Assessment (SEIA) study is conducted as part of the Environmental Impact Assessment (EIA) study required prior to implementation of proposed infrastructure project to be implemented by Eskom. Eskom has contracted Myezo Environmental Management Services (Pty) Ltd., to act as the Environmental Assessment Practitioner for the project; and this assessment is part of a suite of specialist studies conducted.

The proposed project, which will be implemented at the Free State Province side of the Ingula Nature Reserve, has the following infrastructure elements: Dwellings for the six beneficiary families, each with an ablution block (one shower and toilet), rondawel and a kraal; internal access roads; storm water management; sewer and water reticulation; potable water reticulation; siting and drilling of boreholes for water use; solar power and electrical reticulation; fencing and sewer treatment works. The key aspect in how the new homesteads will look like is based on their current homesteads which will then be mirrored (like for like) but in an improved brick and mortar status than the current mud houses, the dwellers currently occupy.

The direct beneficiaries of the project are six-dweller families, who are relocated from an environmentally highly sensitive part of the nature reserve, to a low impact area. These families are the last of a group of labour tenant families that worked for the farm owners from whom Eskom purchased the land.

The purpose of the SEIA is to assess the direct and indirect potential impacts, whether positive or negative of the proposed project; as well as develop mitigation structure to lessen the effect of negative impacts. The assessment of the impacts covers the six-dweller families and communities who are directly affected; as well as those stakeholders who are indirectly affected.

Due to constraints brought about by Covid19, the primary research method was limited to a site visit and there was no engagement with the families or the stakeholders, except for virtual contact with the nominated representative of the families (Mr. Mchunu). Desktop analysis of various materials provided by Eskom officials as well as legislation pieces, policies and planning documents relevant to the study were reviewed to ensure that the design and implementation of the project is aligned to legislation.

An assessment of the socio-economic environment has been conducted as part of the SEIA study and covers the Free State province; the Local Municipalities of Phumelela and Maluti-a-Phofung as the project area falls within the jurisdiction of the two municipalities. The outcome of the review revealed some of the following features about the area:

- Their population is youthful in character and that females are in the majority; with some households being female headed.
- The unemployment rate is high both at the provincial and local levels; and, that this negatively impacts the ability of local municipalities to deliver an improved quality and level of basic services.

- The economies of the two municipalities are anchored agriculture; private household employment and to some extent community services. These three sectors are not well-paying sectors; and more so with agriculture, which is seasonal.

The design and implementation of the proposed project would have to factor in these outcomes.

Assessment of the impacts is focussed on the construction, operational and decommissioning phases of the project; and are assessed in terms of the following criteria:

- Nature
- Scale (individual, household, local regional or national)
- Duration (short-term, medium-term or long-term)
- Intensity (low, medium or high)
- Probability (low, medium or high)
- Significance (low, medium or high).

The impacts both positive and negative for all phases are presented below. Mitigation measures are not highlighted in the executive summary but are part of the section analysing the impacts.

Phases	Positive Impacts	Negative Impacts
Construction	• Employment creation. • Skills development; capacity building; and, on the job training. • Economic development.	• Health and safety hazards. • Demographical/Population changes. • Socio-cultural changes.
Operational	• Improvement in livelihoods and quality of lives. • Economic development. • Institutional changes/Access to basic services.	• Limitations on livestock numbers the families are allowed to graze. • Restrictions on families to modify or develop their houses in the future.
Decommissioning	• Employment creation.	• Loss of income

A relocation action plan (RAP) is developed as part of the study and is to be treated as a framework designed to guide the Eskom Resettlement Advisor on amongst other things the following:

- Clarifying what resources are needed to reach the goal.
- Formulate a timeframe for when specific tasks need to be completed.
- Determine what resources are required.

It should also be read or used in conjunction with the Eskom "Procedure for Management of Involuntary Resettlement and Relocation of Legal Occupiers on affected Eskom Land" dated September 2015. As a minimum requirement, the RAP must ensure that the livelihoods of people affected by the project are restored to levels prevailing before the inception of the project.

The RAP is developed under the headings outlined below.

- Identification of project impacts and affected people.
- Legal framework for land acquisition and compensation.
- Compensation framework.
- Description of resettlement assistance and restoration activities.
- Detailed budget (not discussed)
- An implementation schedule.
- Description of organisational responsibilities.
- Framework for public consultation and participation.
- Grievance procedure.
- Framework for monitoring, evaluation and reporting.

The study fully supports the implementation of the proposed project for the following reasons:

- It is socially and economically sound.
- It will create employment opportunities.
- It will develop and enhance peoples' skills.
- It will improve livelihoods and quality of lives of these families.

The relocation is also supported by the study because it moves the dweller families from the environmentally highly sensitive area they are currently located in, to a low impact area; and, because this is a nature reserve this could not be avoided. In addition, the positive impacts the implementation of the project will bring, far outweigh the negative impacts whose effect will be alleviated by the implementation of the mitigation measures suggested in the study.

Finally, the report concludes by asserting that, if the project is implemented according to the way it is designed, its impacts on the six-dweller families will over exceed the principles regarding involuntary resettlements of Development Finance Institutions like the IFC and the World Bank etc.

The suggested recommendations are:

- The update of the socio-economic data on the six-dweller families as well as the livestock they own.
- That meaningful consultation with the affected stakeholders is held, which will result in an agreed agenda for activities that can be implemented as part of the restoration of livelihood programme.
- A Skills Audit of the members of the directly affected families and affected local community should be conducted to establish the available local skills base, facilitate recruitment during the implementation phases of the project and establish training requirements.

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Abbreviations

EIA	Environmental Impact Assessment
Eskom	Eskom Holdings SOC Limited
FS	Free State
HHs	Households
IFC	International Finance Corporation
INR	Ingula Nature Reserve
IPSS	Ingula Pumped Storage Scheme
MAP	Maluti-a-Phofung Local Municipality
NEMA 1998	National Environmental Management Act 107, 1998
PLM	Phumelela Local Municipality
RAP	Relocation Action Plan
RoD	Record of Decision

1 INTRODUCTION

This Socio-Economic Impact Assessment (SEIA) report is developed as part of the Environmental Impact Assessment (EIA) study required prior to implementation of proposed project. A relocation plan will form part of the SEIA as it is a requirement of involuntary resettlement. The proposed project is comprised of the construction of a village for the last remaining six tenant families who are residing in the Ingula Nature Reserve (INR). Collaboratively, it includes their relocation from the highly environmental sensitive area within the INR to a less environmentally sensitive area where the village will be located still within the nature reserve.

The scope of works and the infrastructure elements of the village consist of the following:

- Dwellings for the six families, each with an ablution block (one shower and toilet), rondawel and a kraal. The new dwelling facilities will exactly match their current situation with respect to the number and size of dwellings.
- Internal access roads.
- Stormwater Management.
- Geotechnical Assessments.
- Sewer and Water Reticulation.
- Potable Water Reticulation.
- Geohydrological assessments, siting and drilling of boreholes for water use.
- Solar power and electrical reticulation for future energisation.
- Fencing.
- Sewer Treatment.

The EIA is conducted in line with requirements of the National Environmental Management Act (No. 107 of 1998)

Eskom Holdings SOC Limited (Eskom) has contracted Myezo Environmental Management Services (Pty) Ltd., to act as the Environmental Assessment Practitioner (EAP) for the project.

1.1 Background to the Project

Eskom is the sponsor of the proposed project, and the owner of the INR. The origins of the project can be traced back to 2002, when an EIA was conducted prior to the construction of the Ingula Pumped Storage Scheme (IPSS). One of the modules of that study recommended that Eskom engage all landowners whose land surrounding the IPSS and was comprised of the wetland ecosystem. The engagements ultimately resulted in Eskom purchasing the land, which was previously used for farming purposes by landowners and had farm tenants working on them. The recommendation is captured in the Record of Decision (RoD), Reference A24/16/3/124 of December 2002. In 2018, the IPSS and its associated land was declared as a nature reserve in terms of the National Environmental Management Protected Areas Act (2003), resulting in the birth of the INR.

Most of the landowners chose not to redeploy their farm workers elsewhere, when the farms were transferred to Eskom; and Eskom was obliged by agreement to engage on a resettlement programme

for the farm tenants. Initially, the programme started with 22 families that were impacted; and 16 of whom have since opted to move to an area outside of the INR.

The remaining six families, who are the subject of the project for cultural reasons opted to remain within the INR but agreed to be moved from the highly environmental sensitive area they are currently located on, to a common low impact area. The affected six families have agreed and are in support of the pending move; and this was also confirmed by the Community Representative on the project, Mr Mchunu in a telephone discussion of 6 August 2020. Based on material read, there is no alternative that can be considered to avoid relocation for the following reasons:

- Currently, the tenant houses are situated throughout the INR in highly sensitive environmental areas; and this has high environmental impacts. Also, where their houses are currently situated, is remote to access roads.
- Due to the fact that the households are currently scattered throughout the nature reserve, this makes it difficult and costly to provide basic services; as well as making it difficult to monitor whether their activities observe environmental good practices.
- The tenants will be able to develop sustainable farming practices, in the new common area where they will be relocated; and this is critical for food security purposes.

It is obvious that the current location is subject to risks relating to environmental, lack of basic service infrastructure and safety challenges. The main objectives of the proposed project are to improve the families' living standards of life; and to reduce environmental impacts for them by providing a village, which will provide better quality dwellings, grazing land and social infrastructure. For the nature reserve, the benefit is that negative impacts will be reduced.

Due to the fact that the village development will be implemented in a nature reserve, ownership of the land will remain vested in Eskom and the families will not be handed title deeds for the properties; but will be responsible for their maintenance.

1.2 Purpose Area

The six families are in agreement of the area that has been identified for the development of the village, which is the Wilge area (specifically the area to the West of the Wilge River), located within the INR. The location is near Van Reenen (Free State) and is approximately 8 km from the Upper Bedford site of the IPSS. Although, the site is in an isolated area with no nearby infrastructure and facilities in the immediate vicinity; it is near the road leading to some of the major towns; and, this will impact positively on ease of access to certain basic services, like mobile clinics.

As yet, two alternative options within the Wilge Area are being considered; and they are depicted as Option 1 and Option 2, as seen in the maps below. The final option to be chosen will be based on the outcomes of the geo-hydrological and geotechnical studies to be conducted by the contractor. The layouts are shown in the maps below.

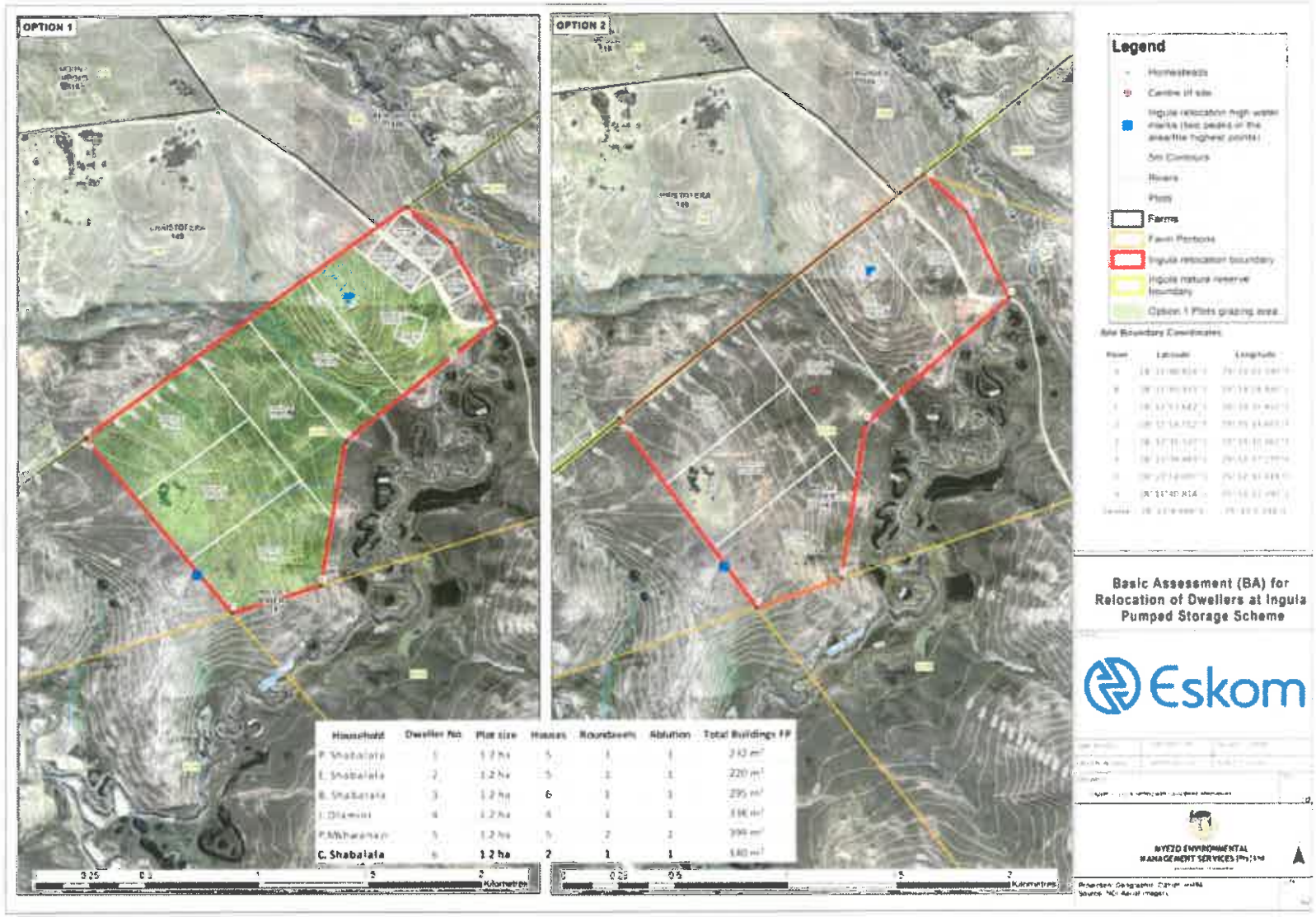

Figure 1.2-1: Options 1 & 2

Access to and availability of water is one of the most essential needs that the project should avail to the families, as they are dependent on subsistence farming for food security. The report therefore supports the notion that the final option chosen should be based on the outcomes of the geo-hydrological assessment referred to above.

Risks common to both options that were identified during the site visit on 8 July 2020 and relate to safety concerns of the dwellers are:

- The close proximity to the river and with no bridge infrastructure for dwellers to cross the river when moving to and from their households; and,
- The bad condition and uneven surface of the internal roads will have a negative effect on their motor vehicles.

Based on material provided by Eskom, indications are that these issues will be catered for in the design and construction of the infrastructure to be developed, regardless of whatever option is selected. For instance, there will be fencing around the village.

Option 1 involves sectioning the land into six areas for grazing purposes: and, developing housing in a central section along the road. The challenge associated with this option, is that houses will be clustered together with the remaining land used for farming. Currently, the tenant's houses are scattered, and this allows for an element of privacy. However, this challenge does not outweigh the risks and negative impacts, both economically and socially associated with current scattered living arrangement.

Option 2 on the other hand, involves sub-division of the land for each dweller and the farming area included within the dwelling. This option seems to be the more preferable in terms of providing privacy for the households.

As stated above the final selection of the best option should mainly be based on availability of water and should be guided by the favourable outcome of the two assessment exercises, which will precede project implementation.

1.3 Purpose and Scope of the SEIA Study

This SEIA study report is designed to assess how the proposed infrastructure development and the pending relocation will change the quality of life of the six families going forward by analysing and managing both the direct and indirect potential impacts, whether positive or negative of the proposed project. The assessment will cover the six HHs who are directly affected by the project; as well as those stakeholders who are indirectly affected (like local and district municipal levels) by the project. The study will further include appropriate mitigation measures to address negative impacts and make necessary recommendations.

Socio-economic impacts vary in both time and space. In terms of timing, projects go through a series of phases, like pre-construction, implementation (construction), operations and culminating in project closure (decommissioning). For the purposes of this study, the focus will be on preconstruction, construction, and decommissioning phases.

The contents of the report are guided by the specific terms of reference provided to Myezo by Eskom and are structured as follows:

- Study Approach and Methodology.
- Relevant Planning, Legislation and Policy framework.
- Baseline Profile Data.
- Potential Socio-Economic Impacts and Mitigation Measures.
- Resettlement and Relocation Plan highlighting Risks and Control Measures.
- Conclusion and Recommendations.

2 STUDY APPROACH AND METHODOLOGY

The SEIA study uses the qualitative research approach; and data was collected through use of primary and secondary techniques. Primary and secondary methods were used to gather data. The primary methodology took on the following forms:

- Project Team meeting with Eskom officials at the Ingula Office Park (which was partly virtual) on 8 July 2020.
- Project site visit (INR) on 8 July 2020.
- Virtual meeting with Eskom officials on 10 July 2020.

The impact of Covid-19 affected the scope of primary research methodologies used; as a result, the project team was unable to engage either the families with the exception of virtual engagement with Community Representative. Also, the meetings with Eskom officials are conducted through virtual technological means only.

Various documents provided by Eskom were reviewed as part of desktop methodology include the following:

- Final Stage of Dweller Relocation Programme July 2019.
- Ingula Annual Natural and Social Environmental Report 2019/2020.
- Ingula Final Relocations August 2017-Powerpoint Presentation
- Ingula Nature Reserve Management Plan 2017-2021.
- Scope of Work " Ingula Homesteads and Infrastructure for the Relocation of Dwellers" June 2020.
- Stakeholder Requirements Definition for Ingula Agri-village 2019.
- Various Specialist Studies prepared by Bembani Sustainability Training.

2.1 Methodology and Assessment of Impacts

The criterion used for measurement of impacts is based on the 1998 criteria of the Department of Environmental Affair and Tourism (DEAT). The following are the criteria used to measure each impact:

(a) Nature: This involves the appraisal of the type of the effect the activity will have on the affected environment.

(b) Extent: This is an indication of whether the activity will be local or will have an impact on the region or that the impact will be on a national scale.

(c) Duration: This determines whether the time frame impact of an activity will be short-term (0-5 years) or medium-term (5-15 years) or long-term, that is permanent.

(d) Intensity: Establishment of whether the impact is benign or destructive and is indicated as follows:

- **Low:** The impact affects the environment in such a way that the economic and social functions and processes are not affected.
- **Medium:** The affected environment is altered but the economic and social functions and processes continue but in a modified way; and,
- **High:** The economic and social functions and processes are altered to the extent that it will temporarily or permanently cease.

(e) Probability: Is the likelihood of the impact actually occurring and is indicated as follows:

- **Low:** The possibility of the impact materializing is low.
- **Medium:** The impact is likely to occur if no mitigation measures are taken.
- **Highly:** It is most likely that the impact will occur.

(f) Significance: Is determined through a mixture of the aspects produced in terms of their nature, duration, intensity, extent and probability. It is described as follows:

- **Low:** There is no influence on the decision.
- **Medium:** There will be an influence on the decision unless it is mitigated.
- **High:** Significance will influence the decision regardless of any possible mitigation.

Impacts are assessed within the context of the pre-construction, construction and decommissioning phases of the proposed project.

3 RELEVANT PLANNING, LEGISLATION AND POLICY FRAMEWORK

Relevant legislation, policy and planning documents are analysed in terms of the rights, principles and objectives that underpin the concept of social, economic, and environmental sustainability. It is therefore a key requirement of the SEIA process to evaluate the proposed development in terms of its alignment with the objectives and rights of relevant legislation, planning and policy documents; as done below.

3.1 Constitution of the Republic of South Africa Act (No. 108 of 1996)

Section 24 of Chapter 2 on the Bill of Rights deals with the rights of people to an environment that is not harmful to their health or wellbeing; an environment that should be protected; and, that sustainable development should be secured whilst promoting economic and social development.

Section 25, provides that "A person or community whose tenure of land is legally insecure as a result of past racially discriminatory laws or practices is entitled to the extent provided by an Act of Parliament, either to tenure which is legally secure or comparable redress".

Section 26 asserts the rights to housing and places a duty on the State to provide such; and, in this regard Eskom is a state-owned enterprise.

Section 27 of the same chapter affirms the rights of everyone to access to sufficient food and water.

3.2 National Environmental Management Act - NEMA (No. 107 of 1998)

The preamble to the NEMA and the principles contained in it, have a significant leaning towards the need to identify and assess social impacts. Chapter 1 of the NEMA deals with principles regarding development and the environment. Section 3 maintains that development must be socially, environmentally, and economically sustainable. Whilst section 4(a) (viii) stipulates that negative impact on the environment and on people's environmental right must be anticipated and prevented, and, where they cannot be altogether prevented, they must be minimized and remedied. The NEMA defines the environment as meaning "the surroundings within which humans exist and that are made up of-

i. The land, water, and atmosphere of the earth:
ii. Micro-organisms, plant, and animal life.
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being."

3.3 National Water Act - NWA (No. 36 of 1998)

Boreholes will be the means by which water will be supplied and the Act regulates their licensing. The NWA has as one of its guiding principles "the need to promote social and economic development through use of water" and also recognizes the basic human needs of current and future generations.

3.4 National Environmental Management of Protected Areas Act (No. 57, 2003)

The Act sets out the legal basis for the creation and administration of protected areas in South Africa; and, the INR has been declared in terms of the said Act and limits the kind of certain social and economic activities that can take place within the nature reserve. Also, because this is a nature reserve, ownership of the land cannot be transferred to the six families. These are some of the unintended negative impacts of resettling within the INR. The current Eskom Management Plan for the INR is developed in line with the Act.

3.5 Extension of Security of Tenure Act - ESTA (No. 62 of 1997)

The Act is of particular significance within the planning framework for relocating non-landowning households. ESTA gives occupiers who have lived on someone else's land with the permission of the owner for a period in excess of a year, a secure legal right to continue living on and using that land. Section 24 of the Act states that the tenure rights of occupants of the land being purchased are

binding on the new owner once the sale has been completed. Thus, Eskom has to implement the proposed project. In essence, ESTA protects occupiers against unfair or arbitrary evictions. It recognises three (3) categories of occupiers, namely:

- Future Occupiers (FO) - those who have lived on the land for more than one (1) year with the full knowledge of the person in charge of the land and without having been instructed to leave.
- Effective Date Occupiers (EDO) - those who lived on the land on or before 4 February 1997 with the full knowledge of the owner of the land and without having been instructed to leave.
- Long Term Occupiers (LTO) - those people who are sixty (60) years or older and who have lived on the land for ten (10) years or longer. The LTO status is also given to people who were employed by the owner and who became disabled, provided they have lived on the land for ten (10) years or longer.

3.6 Labour Related Acts

The set of Acts discussed below refers to good labour practices and socio-economic rights of workers as well as health aspects to be observed in a work environment. These Acts are:

- Labour Relations Act (LRA) (No. 66 of 1995).
- Basic Conditions of Employment Act (BCEA) (No. 75 of 1997)
- Occupational Health and Safety Act (OHSA) (No. 85 of 1993).

At various phases (preconstruction, construction, and decommissioning phases) of the proposed project there will be jobs created and therefore all these Acts are applicable. The LRA and the BCEA give effect to rights conferred in the Constitution, which are in Sections 23 and 27, respectively. The LRA aims to promote economic development, social justice, labour peace and democracy in the workplace; whilst the BCEA gives effect to the right to fair labour practices. At the workplace, the OHSA outlines clear responsibilities for both employees and employers in ensuring that a safe work environment is created and maintained at all times. This will also apply to the requirement that appropriate safety clothing, gear and equipment be provided to workers. With the prevalence of Covid-19, the issue of personal protective equipment will become critical to monitor during implementation of the project.

3.7 Promotion of Administrative Justice Act (No. 3 of 2000)

The Act encourages consultation of communities by state organs when they take decisions that impact on individuals and communities by giving them an opportunity to comment; failing which; the ultimate decision will be unlawful. Information in the possession of the project team, confirms that there have been regular consultations with the affected parties; and, that the Community Stakeholder representative is recognised by Eskom.

3.8 Spatial Planning and Land Use Management Act - SPLUMA (No. 16 of 2013)

The SPLUMA amongst other principles, provides the following key principle, which has a bearing on assessing the proposed development in line with national requirements:

- Sustainable development of land requires the integration of social, economic and environmental considerations in both forward planning and on-going land use management to ensure that development of land serves present and future generations.

3.9 Construction and Building Regulations Act (No. 103 of 1997)

The Act applies in the area of jurisdiction of any local authority and stipulates that prior to erection of any building(s), plans; specifications; and, certificates as may be prescribed by the national building regulations shall be lodged for approval with the relevant local authority. In this instance, it is Phumelela Local Municipality. The National Home Builders Registration Council as a regulatory body of the home building industry, plays a major role in respect of home inspections.

3.10 Development Plans

The implementer of the proposed project is an organ of state and therefore it is appropriate to assess the fit with Government's development plans and the South African government's commitments to international obligations. Brief focus will be on National Development Plan (NDP) 2030 and the United Nations Sustainable Development Goals (UN SDGs). The NDP is a blueprint document that provides a strategic framework for growth and development through amongst other things the implementation of socio-economic development projects. The elements of this project like housing, clean environment, sanitation water, safety and security are all elements of a decent standard of living promoted by the NDP.

The UNSDGs are a universal call to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere. South Africa as a member state of the UN has adopted the 17 goals as part of the 2030 Agenda for Sustainable Development. The project is aligned to achieving some of the goals, like Goals one on poverty; two on zero hunger; three on good health and wellbeing; and six on clean water and sanitation.

4 SOCIO-ECONOMIC PROFILES

A basic understanding of the current status quo in terms of socio-economic conditions prevailing on the project and surrounding areas is a necessary prerequisite of the SEIA. In this report, the focus of the assessment of the profile will be at various levels, starting with the provincial level, which will entail a comparison with the national picture where possible. Then, the focus will zoom in on the two Local Municipalities, Phumelela (PLM) and Maluti-a-Phofung (MAP) as the two municipalities in whose jurisdiction the project area falls.

Shortcomings with the data provided are that it is not the latest possible available data; due to the time lags between when data is available and when it is actually published. This is the common nature with such data. Also, data from Statistics South Africa does not go deep in extent to cover the rural areas but most often focuses on urban areas. In this instance, the project area is located in a very rural area and with very scant socio-economic information available.

This section will cover statistical data and brief analysis on demographics; key social and economic indicators; and, where possible a labour market overview. Various sources of data have been used

like the Statistics SA Community Survey 2016; Stats SA Quarterly Labour Force Survey Quarter 1: 2020; the latest available IDPs of both municipalities; Demarcation Board Assessment reports; the Free State Estimates of Provincial Revenue and Expenditure 2019/20 (which carries data sourced from Stats SA Mid-Year Population Estimates 2018; and, IHSMarkit, Regional eXplorer 2018).

4.1 Free State Socio-economic Profile

4.1.1 Demographics

By 2018 (Stats SA Mid-Year Population figures) the Free State (FS) province had 5.1% of the share of the national population; and this was a decrease from the 2001 2011 figures of 6% and 5.3% respectively. The implication for the downward trend in population growth is that the FS will continue receiving a smaller budget share from the national government as the formula used to allocate collected revenue is mainly driven by population count. The table below shows the comparative population figures between the FS and the National figures.

Table 4.1-1 : Total Population FS and SA

	Census	% of Total Population	Census	% of Total Population	Mid-Year Population	% of Total Population
	2001		2011		2018	
FS	2 706 775	6.0	2 745 590	5.3	2 954 300	5.1
SA	44 819 777	100.0	51 770 561	100.0	57 725 600	100.0

Source: Statistics South Africa, 2016

The share of the youth category (ages between 14 and 35 years) as a percentage of the total provincial population in the FS has declined to 36% in 2017 from 39% in 2008; whilst, during the same period the share of the children and elderly category grew. The decline in the share of the youth category does not mirror the national picture, where the population is mainly youthful in character. This situation will place a burden on the government social grant programme; and those who are economically productive. On the gender breakdown, the female population is higher than the male population, which requires sensitivity in funding programmes and giving attention to gender mainstreaming.

4.1.2 Social Indicators

The analysis on social indicators will focus on education, health, poverty and access to basic services, as well as the human development index and the Gini Coefficient.

4.1.2.1 Health

According to the 2018 Regional Explorer model from HIS Markit estimates (quoted in the FS Estimates of Provincial Revenue and Expenditure 2019/20), the FS has the third highest HIV prevalence (that is, the number of HIV positive people in the population out of the total population at a given time period) at 12.7%. This has been persistently higher than the national rates looking at period from 2008 to the latest available estimate of 11.4% in 2017. On the other hand, the number of

AIDS related deaths has declined due to amongst other things extensive rollout of government programmes like prevention of Mother-to-Child Transmission, HIV Testing, rollout of antiretroviral therapy etc.

Compared to all other provinces, the FS has the lowest life expectancy at birth. From 2001 to 2016, the life expectancy for the FS for females and males has increased from 50.6 and 46.6 in 2001-2006 to 61.5 and 55.0 in 2016-2021 respectively. The 2017 statistics quoted in the FS Estimates of Provincial Revenue and Expenditure 2019/20 is provided by the District Health System. The national life expectancy exceeds that of the FS and the implication for this is the need for more resources to fund health programmes. Added pressure on the public health care services in the FS is also exacerbated by the fact that the number of people with medical aid decreased from 18.1% in 2012 to 14.9% in 2017.

4.1.2.2 Poverty

Poverty is one of the indicators used to assess the wellbeing of people. To measure poverty the FS follows the approach of Stats SA, which focus on headcount1, poverty gap2 and poverty severity3 (see footnotes for definitions). A comparison of all three indicators with the national levels is shown in the table below. The trends are similar for both national and the FS, implying that income poverty levels have risen when looking at all three measures.

Table 4.1-2: Measures of Poverty

	Headcount		Poverty Gap		Poverty Severity	
	2011	2016	2011	2016	2011	2016
FS	41.7 %	43.1%	16.8 %	17.9%	9.1%	9.6%
SA	38.3 %40%		16.3 %	17.6%	9%	9.9%

Source: Statistics South Africa, 2016

4.1.2.3 Human Development Index (HDI) & Gini Coefficient

The source for statistics provided in this section, is IHS Markit, Regional eXplorer 2018.As an index, the HDI considers three criteria of human development, which are longevity, education and standard of living; and, it varies between 0 and 1. A maximum level of 1 is good, whilst, a minimum of 0 is a low level of development. The HDI for the FS has been constantly improving from 2007 (0.52) to the current available figure of 0.63 in 2016. The improvement has however been at a rate lower than the national figures, which were 0.55 in 2007 and 0.65 in 2016.

The Gini Coefficient measures income disparities, which vary from 0 to 1; and South Africa is known for high levels of income inequality. If the Gini Coefficient is close to 0, that is a case of perfect quality and if it is close to 1, it is an imperfect state. The table below shows that for both the FS and the Country, the figures are closer to 1 meaning therefore high levels of inequality. Also, over a period of

[1]Poverty Headcount calculates the share of the population, which is poor.
[2]Poverty Gap represents the depth of poverty.
[3]Poverty Severity also measures depth of poverty and is sensitive to inequalities among the poor.

time the Gini coefficient for both the province and SA have been stable, bringing some level of comfort, in that, the income gap is no longer widening.

Table 4.1-3: Gini Coefficient Index

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
FS	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.61	0.62
SA	0.64	0.64	0.64	0.63	0.64	0.63	0.63	0.63	0.63	0.63

Source: IHS Markit, Regional explorer, 2018

4.1.2.4 Access to Basic Services

Accessibility to basic household infrastructure/services is depicted in the table below; and there has been a moderate improvement from 2008 to 2017.

Table 4.1-4: Access to Basic Household Infrastructure

Households with access to piped water	97.5%
Households with electricity connection	92.6%
Households with access to sanitation	82.7%
Formal housing	82.3%
Refuse removal	77.4%

Source: IHS Markit, Regional explorer, 2018

4.1.3 Free State Economy and Labour Market Overview

The average annual growth rate of the FS was 1.6% between 2011 and 2017; and the province's economy is estimated to have declined by 1.4% in 2018. According to the 2019/2020 report on the Overview of Provincial Revenue and Expenditure, the 2015/16 drought was the most significant challenge to the economic growth rate of the province between 2011 and 2017. There was however a recovery in 2017 due to the recovery of the agriculture industry, the growth in the mining industry: as well as a rise in commodity prices (agriculture and mining). Sectors that are dominant in the economy are:

- Primary Industries: Agriculture and Mining.
- Secondary Industries: Manufacturing, Electricity and Construction.
- Tertiary Industries: Trade, Transport, Finance and Community Services.
- All Industries.

The formal sector and the private household industry are the biggest employers of those employed. Between Q4: 2019 and Q1: 2020, the number of employed people decreased in five of the nine provinces, with the largest employment decrease recorded in the FS (down by 29 000). The table below provides a comparative picture of the official and expanded unemployment rates for both the country and the FS for 2020: Q1.

Table 4.1-5: Official and Expanded Unemployment Rates

	Official Unemployment Rate[4]	Expanded Unemployment Rate[5]
FS	38.4%	44.5%
SA	30.1%	39.7%

Source: Statistics South Africa, QLFS, Quarter 1, 2020

During this period, the official unemployment rate in the Country increased in seven of the nine provinces: with the FS recording the second largest increase (3.4% after the North West at 4.4%). With regards expanded unemployment rate, all the provinces recorded increases, with the largest recorded in the FS (2.2%).

4.2 Maluti-a-Phofung (MAP) and Phumelela Local Municipalities (PLM)

The socio-economic profiles of the two local municipalities will be presented in a comparative manner and focus on demographics, social indicators; dominant economic sectors and where possible provide labour market overview. Information is mainly sourced from the IDPs of the two municipalities; the Stats SA Community Survey 2016; and the Municipal Demarcation Board Capacity Assessments 2018.

[4]Official Unemployment Rate measures the number of people actively looking for a job as a percentage of the labour force.
[5] Expanded Unemployment Rate includes people who have stopped looking for work

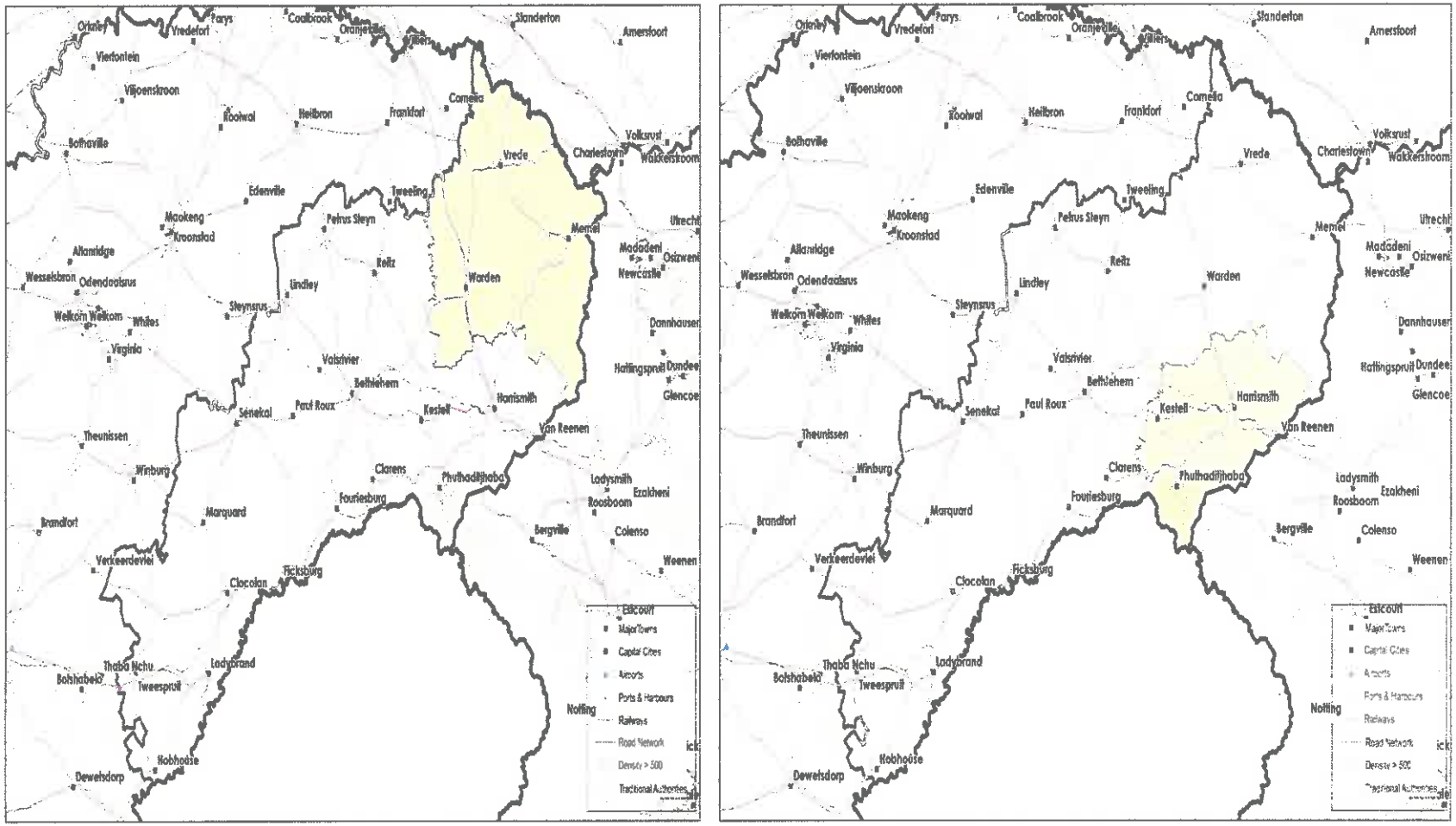

Figure 4.2-1: PLM & MAP

Phumelela Local Municipality Maluti-a-Phofung Local Municipality

Both local municipalities are situated within the jurisdiction of the Thabo Mofutsanyana District Municipality (TMDM).

4.2.1 Demographic and Household Data

Analysis of the demographic data focuses on population figures, gender breakdown and the age structure of the population; whilst analysis of HHs focuses on the total number and size of HHs, which is about the average number of people in a household. Information used is based on the 2016 Community Survey by Statistics South Africa.

Table 4.2-1: Demographic and Household Data

Key Indicator	Phumelela LM 8 209 km^2	Maluti-a-Phofung LM 4 338km^2
Demographics:		
(a) Population	50 054	353 452
(b) Female	51%	54%
(c) Male	49%	46%
Age Structure:		
(a) 0-14 years	29%	31%
(b) Youth 15-34 years	39%	40%
(c) Adult 35-64 years	24%	21%
(d) 65+	8%	8%
Total Households:	**14 586**	**110725**
(a) Formal Dwellings	10 157	84 978
(b) Informal Dwellings	2 707	15 058
(c) Traditional (Huts)	642	9 294
(d) Other	1 081	1 395
Household Size	3,4	3,2

Sources: Stats SA Community Survey 2016; 2018/2019 IDPs for PLM and MAP

In terms of geographical area, the PLM is the largest within the District Municipality; whilst the MAP has the highest population density within the District and the 3rd highest population density in the FS. Both municipalities have a youthful population and more females than males. The implication of both factors is that future planning and creation of economic opportunities by the respective role players should take this into consideration.

The PLM has no land area containing traditional authorities; whilst the MAP encompasses substantially the entire former homeland of Qwaqwa and has traditional systems of governance and applied within the municipal jurisdiction. 60% of HHs in the PLM are headed by males; whilst 50.4 % of HHs in the MAP are headed by females. In both municipalities, the average size of HHs is three people per household. The veracity of the HH size statistics as it applies to the MAP is questionable because this municipality is regarded as one of the very poorer municipalities in the FS with high levels of unemployment.

Only the MAP has provided statistics on tenure status, which is 4.8% of the households, live in rented dwellings; 83.6% of households own the dwellings, whilst 9.1% live rent-free.

4.2.2 Social Indicators

The focus here will be a brief analysis of poverty levels, education, and the existence of health facilities. It is very uncommon to get statistics on the Human Development Index and Gini Co-efficient at the municipal level; however, these figures have been indicated in the provincial section.

Table 4.2-2: Social Indicators

Key Indicator	PLM	MAP
Poverty:		
(a) Poverty Headcount	8,7%	8,1%
(b) Intensity of Poverty	44,5%	40,8%
Education: Persons 20 years and have completed Grade 12	8 231	76 033
Health Facilities:		
(a) Clinics	6	34
(b) District Hospital	1	2
(c) Regional Hospital	0	1
Access to Basic Services:		
(a) Water (Piped)	94%	89%
(b) Sanitation (Flush)	70.4%	36.6%
(c) Electricity/Solar	79.8%	93.1%
(d) Weekly Refuse Removal	65,1%	22,1%

Sources: Stats SA Community Survey 2016; FS Department of Health "TM District Health Plan 2018/19-2020/21; MAP IDP 2018/2019

For the PLM, both poverty statistics have increased from the 2011 figures, which were 8,5% and 41, 2% for poverty headcount and intensity of poverty, respectively. This therefore means that levels of poverty in the PLM have not improved. On the other hand, there has been a slight improvement in the MAP, where the 2011 figures were 7, 9% for poverty headcount: and 41,4% for intensity of poverty.

It must be noted that both education (provincial mandate) and health (district and provincial mandate) are not municipal mandates and the statistics just point to the level of achievement with regards education; and the number and variety of health delivery platforms available. In the case of the PLM, it has been highlighted in the IDP, that according to the 2016 education statistics, more males (7 702) attended school than females (7 187); and, that this was the case is well in 2011.

4.2.3 Economic and Labour Market Overview

In the PLM the main economic activity occurs in the sectors of agriculture, followed by private household employment (domestic work); then followed by wholesale; retail; community and social services (government). There are currently no major industrial developments taking place; and, the PLM has in its IDP identified tourism development opportunities, especially in the Seekoeivlei wetlands bird sanctuary.

Government and agriculture are the main economic sectors in the MAP; and the municipality has been identified as a Special Economic Zone (SEZ) with the objective of accelerating economic growth and development. Automotive; agro-processing; logistics; ICT; pharmaceuticals and general processing have been identified as the major industries.

The economically active population (EAP) is aged between 15 and 64 years and is defined as made up of people who are able and willing to work and who are actively looking for work. For the PLM the 2016 figure stands at 65.5% with a dependency ratio of 52.7% (up from 62.3% in 2011). The EAP for MAP was 64.5% in 2016 with a dependency ratio of 55.1%.

The latest available unemployment rate statistics for the TMDM is for 2012, which was 34.2% at the time and was above the Provincial rate of 30.5% in the same year.

The economy of both municipalities is not performing, and this mirrors the challenge faced by the FS and the country. This together with high unemployment rates in the two municipalities, especially the MAP has contributed to low levels and poor quality of service delivery to HHs. It is fundamental that whatever employment opportunities are created in the region, should have biasness towards the employment of more females and youth, as well as developing opportunities for skills development and training.

4.2.4 Land Use Patterns

Information on land use patterns for both municipalities is sourced from the 2018 Demarcation Board's Capacity Assessment Reports for both the PLM and the MAP. PLM has 7 206km^2 of the municipal area that is under a land claim process, with no land falling under traditional authority. Land cover of the PLM is categorised as 72.4% natural; 26.7% cultivated and 0.1% built up.

MAP has no land claims; and 88.6% of its wards have traditional authorities, whilst 11.3% of the municipal area is under traditional authorities. Its land cover is dominated by the following uses: Plantations 0.2%; water 2.3%; Degraded 1.3%; cultivated 22.3%; built-up 3.7%; and, natural 70.1%. In terms of natural heritage assets, the percentage of municipal land with such is 4.9% (national heritage park) and 4.3% (local reserves).

5 POTENTIAL SOCIO-ECONOMIC IMPACTS AND MITIGATION MEASURES

This section discusses the potential social and economic impacts, whether positive or negative that will occur as a result of change processes brought about as a result of implementation of the project. For a SEIA study, the main change processes are defined as follows:

- **Demographical Processes**: relate to the number of people and the composition of a community in terms of their race, gender, educational profile, and the composition of the households.
- **Socio-cultural Processes**: relates to the processes that affect the local culture of an area and how the local community lives.
- **Institutional Processes**: relates to the role, efficiency and effectiveness of government and related institutions' operations in terms delivering services.
- **Economic processes**: relate to the way in which people make a living in an area and what the economic activities are.

Implementation of the proposed project will definitively impact either positively or negatively on some of the identified processes; and the impacts are outlined below. The impacts are also identified in terms of their nature, scale, duration, intensity, probability and significance; and they are associated with the construction; operational; and decommissioning phases. For negative impacts, mitigation structures are also identified in order to alleviate the effect of their negativity.

The main activity that will be conducted during the pre-construction phase is the geohydrological assessment study, which might include a site visit to the project area as one of the methods used in the research study. As yet the following factors are unknown, namely, the size of the assessment team; the duration of the site visit if any will be done; and where the project team will be resident. Such specialist teams are usually made up of a handful of people, who operate during working hours; and therefore it is foreseen that the effect on demographical change processes will be negligible and will neither pose any risks on family structures nor result in any negative social impacts. Also, the project site is located some distance from where the tenants' households are currently located.

The geotechnical assessment study may run concurrently with the construction phase.

5.1 Construction Phase Impacts

In terms of the Eskom's Scope of Work documentation dated 2020, there are housekeeping roles and responsibilities, which the Contractor and by extension sub-contractors (sub-contractors will be sourced by the contractors) that they have to abide by. Compliance with these obligations will contribute to alleviating negative impacts that may arise during this phase. Some of those compliance issues, which are of a temporary nature, include the following:

- The contractor to establish a demarcated laydown or site camp area; and provide electricity; sanitation facilities; and portable water for domestic consumption.
- Records of employees of the contractor and sub-contractors to be kept; and, that all such employees will have undergo police clearance and certified to have no criminal records.
- Contractor to establish temporary health and safety facilities on site (i.e. medical and fire fighting facilities).
- Contractor to comply with some of the labour related legislation like the OHSA and the BCEA.
- Other health and safety related issues to be complied with refer to control and management of waste, pollution, dust, noise levels and emissions.
- Should the need arise; the Contractor is to liaise with local communities through accepted channels or forums.
- The contractor is required to exercise and enforce all necessary care and measure to preclude exposure of personnel, labour and nearby residents to potential health hazards and environmental pollutants.

Positive Socio-Economic Impacts and Mitigation Measures

The positive impacts during this phase relate to the following:

- Employment Creation.
- Skills Development; Capacity Building; and, on the Job Training.
- Economic Development.

5.1.1 Employment Creation

Discussion	Employment opportunities of a temporary nature will be created during the construction phase of the various infrastructures to be developed. A mixture of skilled, semi-skilled and unskilled labour force will be required; and it is highly likely that the Contractor and Sub-Contractors will bring their own skilled and to some extent some of their semi-skilled personnel. At this point the size of the construction team required is not known. Employment opportunities will arise for local people, most of which will be in the unskilled category (like office cleaning, excavation etc.) and some in the semi-skilled (painting, tiling etc.) category.
Impact/s	Employment provides many socio-economic benefits to employees and their dependents, including improved material well-being and standard of living, greater access to services, enhanced skills, good health, a sense of independence freedom and pride.
Risk/s	• Influx of people from surrounding municipalities and other areas, who will be competing for opportunities with locals. • Not offering equal employment opportunity for youth and females. • Payment of wages and salaries that do not conform to minimum industry norms.

	• Health risks related to Covid19. • Employment of children.
Mitigation Measures	• According to the 2019/2020 Ingula Annual Natural and Social Environmental Report provided by Eskom, employment of local community members by contractors have been addressed and a procedure developed. The procedure is that suitable candidates living in the area are identified in conjunction with the local community committees. In line with this procedure, it is hoped that first preference will be given to the economically active members of the six-dweller families, for unskilled and semi-skilled positions; then the local community people. The procedure should also specify quotas for employment of youth and females. • The Contractor and Sub-Contractors should arrange and pay for the police vetting process, which should be done prior to start of their employment. • Terms and conditions of the Labour Relations Act in terms of the appropriate age of employment should apply. Also, the terms and conditions of the BCEA and OSHA should be observed; as well as ensuring that proper personal protective equipment is supplied and that fair wages and salaries in line with industry norms are paid. • The rules to be established and enforced by the Contractor and Sub-contractors regarding the health and safety of employees should include plans of action regarding Covid 19 safeguards in line with the Construction Industry Guidelines.

	Pre-Mitigation	**Post-Mitigation**
Scale	Individual/Household	Local Municipality Level
Duration	Short-term	Short-term
Intensity	Low	Medium
Probability	Medium	High
Significance	Low	Medium

5.1.2 Skills Development, Capacity Building, and on the Job Training

Discussion	One of the benefits that flow from implementation of socio-economic development projects is capacity building element of beneficiary local communities. It is anticipated that during this phase, there will be on the job-training opportunities for the unskilled labour force, especially in trades like tiling, painting etc.; and issue a reference letter at the end of the work contract period, which acknowledges the training provided to workers. Also, part of that training will relate to relevant environmental laws and regulations as they apply to the INR.

Impact/s	The impact of these interventions is that they will improve the employability of the local people, some of whom will have been employed for the first time; expand their skills base; as well as enhance their capacity to secure better jobs in the future. Also, this can enable some of the locals to move out of the area in search of job opportunities in bigger towns.
Risk/s	• Contractors and sub-contractors will most likely not be informed about the high unemployment rate of the area; and, the fact that both local municipalities do not have facilities for skills development; and, therefore not be cognizant of the need to improve the skills and capacity of temporary workers.
Mitigation Measures	• The agreement between Eskom and the Contractor (whose requirement should be cascaded to the sub-contractors) should include a clause that there should be on the job training for temporary unskilled workers. • Reference letters acknowledging the training provided should be given to workers at the end of their contracts. • Eskom to enforce the implementation of the training requirement contained in the Scope of Word document that the Contractor should extend health, safety and environmental training to all workers during the construction phase. • Prior to start of the construction process, the local community forum or community representative • Should conduct a skills audit of the direct beneficiaries of the project and also the local people resident in or near the INR.

	Pre-Mitigation	**Post-Mitigation**
Scale	Individual	Local
Duration	Short-term	Long-term
Intensity	Low	Medium
Probability	Low	Medium
Significance	Low	Medium

5.1.3 Economic Development

Discussion	The economic processes relate to the way in which people make a living and the economic activities within the area/society. Employment opportunities that will be created will be a source of income for individuals and households; and this is expected to lead to increase in local spending power. It is also standard practice that contractors and sub-contractors

	procure a quota of goods and services, as well as building material from local businesses.	
Impact/s	Individuals and HHs will have income to spend in local retail shops, pay for municipal services etc. This together with buying from local businesses by the contractor (and sub-contractors) will benefit the local economy, with spin-offs positively impacting the economy of the region (Free State)	
Risk/s	• Employment practices that do not give preference to the direct beneficiaries of the project, as well as local people. • Not allowing locals to set up food stalls in a dedicated area within the construction site. • Contractors not buying construction materials from local businesses.	
Mitigation Measures	• A locals first employment procedure mentioned above should be implemented. • Set aside a safe space at the construction site to allow an agreed upon small number (2-3) of locals to operate food stalls, within agreed upon working hours. • In line with Eskom's policy on BBBEE, the contractors and sub-contractors should be required to purchase an agreed to quota of materials, goods and services from local businesses. • A local person should run the kiosk (mentioned in the Scope of Work document) within the laydown or campsite.	
	Pre-Mitigation	**Post-Mitigation**
Scale	HH/Local /District	Local/District/Region
Duration	Short-term	Short-term
Intensity	Low	Medium
Probability	Medium	High
Significance	Medium	High

Negative Socio-Economic Impacts and Mitigation Measure

The following negative impacts during the construction phase have been identified:

- Health and safety hazards.
- Demographical/Population Change processes.
- Socio-Cultural Change Processes.

5.1.4 Healthy and Safety Hazards

Discussion	Construction operations can pose health and safety hazards to people working at the construction site or people living around or near the site. Construction camps can also give rise to health risks associated with poor waste disposal and sanitation practices. Construction could also pose an adverse effect on the environment.
Impact/s	All these could negatively impact the health of project workers and people residing near the vicinity of the project site. Although, operations will be of a short-term nature, their impact can have long-term effects on those affected.
Risk/s	• Risks related to physical health and Covid19. • Generation of dust. • Noise as a result of construction vehicles or sand blasting. • Solid waste generated (bottles, food, wrappers etc.) • Veld Fires. • Exhaust fumes from construction vehicles.
Mitigation Measures	• Cordon-off construction site and strictly control entry to authorised personnel only and they should be required to wear protective gear. • According to the Scope of Work document, the Contractor is required to set up medical facilities and fire fighting facilities on site. • Set-up dedicated smoking areas for employees and control employee movements after work hours. • The Scope of Work document also puts the responsibility on the Contractor to develop a Method Statement, which will contain details of environmental protection measures, which include a waste disposal management plan; pollution prevention measures; an Environmental Incident Management Plan; Refuse and Waste Control etc. Also, it will address dust and vehicle emission control actions as well as noise pollution. For instance, the Contractor is required to restrict working hours during the week to between 06.00 to 18.00; and this is designed to deal with noise pollution • Also, the Contractor is required to liaise with local Communities through the accepted channels or forums on matters concerning the impact of the Contractor's operations on local communities and other matters. • Contractor is required to comply with requirements of the OHSA or any other act or Government regulation dealing with health and safety and environmental health; as well as establish and enforce rules to ensure the health and safety of his/her employees and those of sub-

	contractors. • Contractor is also required to develop a Safety, Health and Environmental Plan according to Eskom's specifications. • A Covid19 response plan should also form part of the requirements.	
	Pre-Mitigation	**Post-Mitigation**
Scale	Individual/HH/Local	Local/District
Duration	Short-term	Medium-term
Intensity	Medium	Low
Probability	High	Low
Significance	Low to High	Low to Medium

5.1.5 Demographical/Population Changes

Discussion	Due to high unemployment levels in the local and district municipalities and the province as a whole, the employment and economic opportunities presented by the proposed project during the construction phase will lead to an influx of job seekers. Some skills will have to be sourced from outside the project area, thus leading to a temporary change in the number and composition of the within the affected local area.
Impact/s	Currently, within the INR only the six-dweller families are residing there; and, with the campsite to be established for the construction team, this will lead to a population increase resident within the INR. A change in the number and composition of the local area can have negative impacts related to increased demand for commodities like water; and lead to a number of undesirable pressures and consequences like disruption to local cultures; increase in incidents of crime; sexually transmitted diseases etc.
Risk/s	• Increased incidents of crime, sexually transmitted diseases (STDs) etc. • Disruption to local cultures. • Increased demand for commodities like water; and increased levels of generated waste.
Mitigation Measures	Measures to be put in place through a combination of community consultations, rules and policies include the following: • Hiring policy that gives priority to local residents especially for unskilled labour. • The contractor to ensure that all employees have undergone the police screening process mentioned in the Scope of Work. • Allowing non-locals to go home during weekends. • A code of conduct for project workers that establishes rules between the project, its workers and the local community.

	• According to the scope of work document, the Contractor is liable for providing services for the construction site and the campsite. These will, including water, electricity, sanitation and waste removal.	
	Pre-Mitigation	**Post-Mitigation**
Scale	Local	Local
Duration	Short-term	Short-term
Intensity	Medium	Low
Probability	Medium	Low
Significance	Medium	Low

5.1.6 Socio-Cultural Changes

Discussion	Socio-cultural change processes relate to the processes that affect the local culture of an area and how the local community lives. If construction workers are from a different culture than the local resident's conflict could arise as a result of different cultural backgrounds. As yet, the significance of this impact is difficult to determine and foretell, as the demographic profile of the construction workers remains an unknown. From the material provided by Eskom, it is evident that the direct beneficiaries of the proposed project, the six-dweller families, who are residing within the INR are people who are fond and proud of their culture and heritage, thus they opted to remain within the INR. A campsite will be built for the construction workers.
Impact/s	If social practices of workers are dissimilar from the local residents' this could lead to conflicts arising especially if the construction site and campsite are located close to the local residents. Changes in movement patterns of the local residents might have to occur because of the physical space being taken up by construction activities at the project site. However, if these impacts occur, they will be of a short-term nature; and, it is also not expected that the dissimilarity in social practices would manifest itself to the degree that it can affect a larger segment of the local population.
Risk/s	• Construction site and campsite located close to the area where the six-dweller families are located currently. • Construction site not cordoned off and entry to both the construction site and campsite should be controlled. • Notice boards indicating danger and hazards related to construction sites not placed. • Lack of proper communication with the directly affected parties and local communities; as well as not properly informing construction

	workers about the local cultures and practices.	
Mitigation Measures	• Raise awareness amongst workers about local traditions, practices, norms and values; and, if possible, a code of conduct should be developed for the construction workers, which will state the types of behaviors and conduct that is allowed. • Ensure that the local community, through appropriate relevant structures communicate their expectations of construction workers' behavior with them. • During construction, provide a safe passageway for community members. • Movement of construction workers should be monitored.	
	Pre-Mitigation	**Post-Mitigation**
Scale	Local	Site
Duration	Short-term	Short-term
Intensity	Medium	Low
Probability	Low	Very Low
Significance	Low	Very Low

5.2 Operational Phase Impacts

This phase focuses on the impacts that the move into the village will have on the six-dweller families; and the positive impacts that will relate to the following aspects:

- Improvement in livelihoods and quality of lives.
- Economic Development.
- Institutional Change Processes.

Only the positive impacts are of significance during this phase. What could be limitations on the move to the village relate to some of the site rules that the families have agreed to, which are:

- Families are restricted to modify or develop their houses in the future.
- The dweller families are restricted on the number of livestock that they are allowed to graze in the designated areas (20 cattle: 20 goats and 5 horses).

To alleviate the impact of these restrictions, measures have been agreed to with the families. On the first limitation, families can get written approval from the Plant Manager to either modify or develop their houses in the future. Also, if they want to graze more livestock than is allowed, this must be negotiated and whatever decision taken will be based on environmental considerations and cost. They would have to pay a monthly fee of R30 livestock unit per month.

Positive Impacts

5.2.1 Improvement in Livelihoods and Quality of Lives

Discussion	Currently, the living patterns of the six-dweller families are not environmentally safe, in that they are scattered around the INR and located in highly sensitive environmental areas. Their current abodes made up of mud and are prone to damage or hazardous weather conditions because the material used to build them is non-weather resistant. Their current farming activities are mainly characterised by subsistence farming. With the move to the village, they will be settled in a common low impact area; with land properly identified and allocated for farming purposes. Most importantly, the area they are currently located in is prone to fires and because they are scattered, and the roads are not proper it becomes difficult to dispatch fire-fighting facilities timeously. Also, as part of the agreements with Eskom, the families will be allowed access to the graves of their departed family members, this will be in keeping with their cultural value systems.
Impact/s	The dweller's quality of lives will be improved, in that the houses being built for them are designed to address the hazardous conditions mentioned above; and are built with brick and mortar and cater for extended family needs. They have amenities, which they did not previously have like ablution facilities. They will also be provided with the proper basic services (water; electricity/solar; sanitation; internal access roads and waste disposal), which they did not have before. They will be located in an area where they will be exposed to reduced environmental impacts. Their livelihoods will also be improved. For instance, in the village they will have proper land allocated for farming purposes and water available, they will be able to move from subsistence farming to sustainable farming, which will ensure food security.
Risk/s	• Dwellers disregarding environmental management standard procedures. • Dwellers not becoming responsible for the upkeep and maintenance of their households as agreed with them. • Dwellers not containing their livestock to graze in a common allocated area and disregarding to follow proper farming activities in line with the Ingula Management Plan-IMP (2017-2021).
Mitigation Measures	• Some of Eskom's programmes include training of the six-dweller homilies in the importance of conservation and environmental education. • Initiatives are undertaken to develop training material on sustainable

	farming practices, rather than the current subsistence farming practices they follow. • Tying social development to sound conservation objectives will contribute to the development of sustainable agriculture, villages and healthy communities. • The design of the houses takes due cognisance of allowing for ease of maintainability by each individual dweller.	
	Pre-Mitigation	**Post-Mitigation**
Scale	Household	Local
Duration	Short-term	Long-term
Intensity	Low	High
Probability	Low	High
Significance	Medium	High

5.2.2 Economic Development

Discussion	The Ingula Annual Natural and Social Environmental Report 2019/202, states as one of the visions of the INR, that the nature reserve will be the vehicle to drive the creation of nature-based job opportunities for local communities. The INR will be promoted as a conservation area to encouraging visitors. By so doing, opportunities could be created for the development of walking, hiking, cycle and river trails; bird watching etc., and this could create economic opportunities for locals to become guides. Eskom is also committed to employing the dweller families in the conservation management related work.	
Impact/s	Economic and social upliftment of the six-dweller families.	
Risk/s	• Dweller families not showing an interest in opportunities. • Dweller families not attending necessary training. • Dweller families not forming family trusts or cooperatives, which could be used as the vehicle to access funding.	
Mitigation Measures	• Community members continue being considered for all employment activities on site and are used for fencing, security patrols and alien eradication (Source: Final Stage of the Dweller Relocation Programme, July 2019). • Eskom supporting the formation of cooperatives by local communities; and, facilitating access to funding opportunities like Eskom Foundation. • Economic opportunities that can arise from the Conservation programme	
	Pre-Mitigation	**Post-Mitigation**

Scale	Household	Local/District/Region
Duration	Short-term	Long-term
Intensity	Low	High
Probability	Low	High
Significance	Low	High

5.2.3 Institutional Changes (Access to Basic Services)

Discussion	This relates to the role and operational efficiency of service delivery arrangements by government agencies like Eskom. The focus will be on how the development of the village, with the infrastructure for basic services as part of the development will positively impact on the families' quality of life. Currently, where the six-dweller families stay, they have no basic services delivered to them either by the local municipalities (PLM and MAP) or Eskom.	
Impact/s	Access to basic services will improve the quality of lives of the six-dweller families; bring decency to their standards of living; as well as improve their environmental health standards.	
Risk/s	• Dweller families not using the services efficiently or overloading the system. • Poor communication to dweller families of how the use of some of the basic services will be measured and managed, and the regularity of the collection of waste. • Eskom not living up to the agreement to deliver these basic services.	
Mitigation Measures	Six-dweller families to receive training in the efficient use and saving techniques of some of the services like electricity.	
	Pre-Mitigation	**Post-Mitigation**
Scale	Household	Household
Duration	Short-term	Long-term
Intensity	Low	High
Probability	Low	High
Significance	Medium	High

5.3 Decommissioning Phase

During this phase, the only positive impact that will arise from this process is employment creation opportunities, which can benefit the economically active members of six-dweller families amongst others and local community members.

5.3.1 Employment Creation

Discussion	The Scope of Work document maps out the work that would be performed during this phase as follows: • Demolition and Removal of existing homesteads and infrastructure. • Fencing and preservation of gravesites. • Grassing and rehabilitation. • Planting. The same Contractor will conduct the work and will also be responsible for engaging sub-contractors. There will be opportunities for unskilled and semi-skilled labourers, and the six-dweller families and local community members can be afforded employment opportunities. It is anticipated that by then, members of the six dweller families and local communities, will have received training in conservation and environmental management. As yet the exact number of workers that will be used during this phase is not known but the likelihood, is that, it will be few people than were originally employed during the construction phase; as a result the impact will be low.	
Impact/s	Improved material well-being and standards of living. Access to an expanded type of services, like affording to pay for doctor's consultation fees. Enhanced skills, good health, and a sense of independence, financial freedom and pride.	
Risk/s	The six dweller families and local community members not having received the necessary conservation and environmental management training by the time this phase begins.	
Mitigation Measures	The procedure used in the construction phase to secure employment of unskilled workers should be used and giving priority to the members of the six-dweller families first, then the other local community members.	
	Pre-Mitigation	**Post-Mitigation**
Scale	Household	Local
Duration	Short-term	Short-term
Intensity	Low	Low
Probability	Low	Medium
Significance	Low	Medium

6 RELOCATION ACTION PLAN

This RAP is not the normal fully developed document due to the fact that some of the processes of the proposed project were started some time ago and the project team was not privy to those processes; and, therefore does not have all the necessary information. It must be treated as a framework to guide amongst other things on the following:

- Clarifying what resources are needed to reach the goal.
- Formulate a timeframe for when specific tasks need to be completed.
- Determine what resources are required.

The RAP must also be read or used in conjunction with the Eskom "Procedure for Management of Involuntary Resettlement and Relocation of Legal Occupiers on affected Eskom Land" dated September 2015.As a minimum requirement, the RAP must ensure that the livelihoods of people affected by the project are restored to levels prevailing before the inception of the project. The process of developing the RAP should be led by the Eskom Resettlement Advisor.

The contents of the RAP are discussed under the following sub-headings; and, where information is not available this will be highlighted.

- Identification of project impacts and affected people.
- Legal framework for land acquisition and compensation.
- Compensation Framework.
- Description of resettlement assistance and restoration activities.
- Detailed budget (not done)
- An implementation schedule.
- Description of organisational responsibilities.
- Framework for public consultation and participation.
- Grievance procedure.
- Framework for monitoring, evaluation and reporting.

6.1 Identification of Project Impact and Affected People

Section 5 of the report provides a detailed analysis of the project impacts, risks and mitigation measures. This table below captures the project impacts, both positive and negative throughout the phases.

Table 6.1-1: Project Impacts

Project Phases	Positive Impacts	Negative Impacts
Construction	• Employment creation. • Skills Development, Capacity Building; and, on the Job Training. • Economic Development	• Health and Safety Hazards. • Demographical Changes. • Socio-Cultural Changes.
Operational	• Improvement in livelihoods and quality of lives. • Economic Development. • Access to Basic Services.	• Limitations on livestock numbers families can graze. • Restrictions on families to modify/develop their houses in the future.
Decommissioning	• Employment creation.	

Six-dweller families are directly affected by the project; and they will be compensated as follows:

Name	Housing Units	Rondawel	Ablution Block	Kraal
P. Shabalala	5	1	1	1
E. Shabalala	5	1	1	1
B. Shabalala	6	1	1	1
J. Dlamini	4	1	1	1
P. Mkhwanazi	5	1	1	1
C. Shabalala	2	1	1	1

Source: Eskom Scope of Work Document 2020

It must be noted that one of the Shabalala households is woman headed and therefore should be regarded as falling under the vulnerable category; and additional effort to assist this family has to be provided. In addition, there will be the following infrastructure provided: internal access roads; storm water management; sewer and water reticulation; potable water reticulation; boreholes; electrical reticulation/solar power; fencing and sewer treatment works. Also, the project entails fencing and preservation of graves.

The socio-economic information of the affected six-dweller family's needs to be updated as the one in the possession of the team is dated (done in 2006); and this should extend to the livestock details of each household.

6.2 Legal Framework for Land Acquisition and Compensation

Section 3 above discusses in detail the relevant sections of crucial legislation. Below are the crucial ones applicable to resettlements and relocations

- The Constitution of the Republic of South Africa
- National Environmental Management Act
- Promotion of Administrative Justice Act
- Extension of Security of Tenure Act.
- The Local Government Municipal Systems Act (No. 32 of 2000) encourages the development of a culture of community participation and consultation.

Guidelines on resettlements and relocation as provided by institutions like the World Bank, International Finance Corporation and the African Development Bank are also crucial. Thus, the process should be guided by the following standards:

- Involuntary Resettlement should be avoided.
- Where involuntary settlement is unavoidable, all people affected by it should be compensated fully and fairly for lost assets.
- Involuntary resettlement should be conceived as an opportunity for improving the livelihoods of the affected people and undertaken accordingly.

- All people affected by involuntary resettlement should be consulted and involved in the resettlement planning to ensure that the mitigation of adverse effects as well as the benefits of resettlement are appropriate and sustainable.

Compensation elements for each dweller family are highlighted above.

Eskom should ensure that it is in possession of all the contracts signed by the six-dweller families.

6.3 Compensation Framework

Indications are that the framework has been established and agreed upon by the parties, thus the implementation of the proposed project. This is some of the information the project team is not privy to. However, if it is not in place, the following can guide the process:

- Eskom should develop a methodology (if there is no national one developed by the National Government) to value losses.
- The proposed types and levels of compensation to be paid.
- Compensation and assistance eligibility criteria.
- How and when compensation will be paid.

6.4 Description of Resettlement Assistance and Restoration Activities

The parties have already agreed to the issue of resettlement and site allocation etc.; and the proposed project is implemented as a result of such agreement. The focus should now be on the restoration programme that will include the following:

- Training and skills development; support with establishment of cooperatives or family trusts; support with accessing funding opportunities from Eskom Foundation; training is sustainable farming techniques etc.
- The affected people should be given priority status in terms of appropriate employment opportunities that arise within the INR.
- Assistance to be provided to the dweller families when relocating, with more focus put on the female-headed households.

6.5 Implementation Schedule

The IFC Handbook on Preparing a Resettlement Action Plan, 2002 provides the following cautionary points to note about implementation schedules.

- RAP budget should be linked with a detailed implementation schedule.
- Implementation schedule should be synchronised with the project's schedule of civil works construction.
- Planners should be attentive to the agricultural cycles of affected people.
- Another cautionary note by the IFC, is that, the timing of RAP field activities (consultations, census, surveys etc.) is crucial because if they commence too soon before the start of the project, this might raise local expectations and attract new comers.

- Also, commencement of activities too late after the project starts may interfere with the implementation of the project.
- Tasks will vary according to the project and its dynamics.

6.6 Description of Organisational Responsibilities

- The overall responsibility of managing the implementation of the RAP lies with Eskom.
- It is advisable that a Relocation Advisory Group should be established and must be made-up of relevant stakeholders, like the affected community representative; an official representing the Department of Rural Development and Land Reform etc. For the make-up of the team, refer to the Eskom Procedure for Management of Involuntary Resettlement and Relocation of legal Occupation on Affected Eskom Land.
- Detailed roles and responsibilities should be developed, and the capacity of stakeholder organisations should be assessed.

6.7 Framework for Public Consultation and Participation

- Public consultation and participation are a legislatively regulated process as shown above; and it is therefore crucial that the process is open (transparent), inclusive and effective.
- Information exchange and promotion of participation should be the main objectives.

6.8 Grievance Procedure

The main objective of the process should be to provide the project affected people and other affected community members, a mechanism for raising grievances related to the project. It is advisable that the complaints or grievances are submitted in writing. The procedure should contain the following:

- Institutional arrangements
- Procedure for recording and processing grievances.
- Mechanisms for adjudicating grievances and appeals process.
- A schedule with deadlines for all the steps in the grievance process.

6.9 Framework for Monitoring, Evaluation and Reporting

- Timeframes on when to conduct the M&E should be agreed upon and reports compiled after each M&E process, culminating in a Project Completion Report.
- Two M&E mechanisms should be used, namely, the internal monitoring and the external monitoring; and each focussing at two levels, namely: Relocation compensation payment period; and Post-relocation compensation payment period.

According to the African Development Bank the external evaluation should focus on

Thematic issues and the type of indicators to use can include any of the following:

- Process indicators (measuring RAP implementation process).
- Compliance Indicators (legislative compliance).
- Adequacy indicators (staff numbers/skills/knowledge levels).

- Effectiveness indicators (resource utilisation against outputs of the RAP implementation).
- Coordination Indicators (adequacy and promptness of collaboration of RAP implementing agencies)
- Outcome indicators (pre-and post-compensation analysis),
- Livelihood and property changes among project affected peoples' households, including accessibility of basic services).

7 CONCLUSION AND RECOMMENDATIONS

The report concludes that the implementation of the proposed project will create employment opportunities; develop and enhance skills; improve the livelihood and quality of lives of the directly affected people and local community in the project area. Additionally, the project will boost economic development locally, which can extend to both the district and provincial areas. Some of these changes might bring a short-term impact in people's lives; but others like skills development might have a long-term impact and change their lives forever. The timing of the project as well is welcome; as it comes at a time when the country, the FS and the local area need infrastructure projects that can boost the economies of these areas; and, expose locals to opportunities.

The relocation process could not be avoided because of the high environmental sensitivity of the area where the six-dweller families are currently located; as well as safety risks related to veld fires and bad climatic conditions against which their current houses are not proofed. The process to choose the appropriate location within the nature reserve was based on studies conducted; and, even the final option between the two alternative options on the table (1 or 2) will be based on the outcome of a geohydrological study, which will assess the availability of water. Consultations with the six-dweller families were conducted when the site was chosen, and they approved of the site.

The implementation of the proposed project, if implemented according to design will over exceed the expectation of the principles regarding involuntary resettlements of the Development Finance Institutions like the IFC, World Bank etc. For the first time, the six-dweller families will be exposed to basic services and decent housing; and this will change their quality of lives forever. Also, the project will ensure that the families have food security through training them in sustainable farming techniques thus improving their livelihoods, rather than the current subsistence farming practices they use. The implementation of the proposed project will also contribute to ensuring that government's developmental commitments are gradually being fulfilled, that is in terms of the National Development Plan; as well as commitments made toward achieving targets for the UN SDGs.

The positive impacts of the project throughout its various phases far outweigh the negative impacts and more so, if the mitigation measures are implemented timeously. As could be expected, the construction phase is characterised by a number of negative social impacts, which is mainly due to the nature of the activities that take place during this phase. From a socio-economic perspective the planned project is socially and economically sound and has far reaching and significant positive impacts for the affected families. The proposed project is recommended for implementation.

The report recommends the following:

- The update of the socio-economic data on the six-dweller families and the livestock they own.
- That meaningful consultation with the affected stakeholders is held, which will result in an agreed agenda for activities that can be implemented as part of the restoration of livelihood programme.
- A Skills Audit of the members of the directly affected families and affected local community should be conducted to establish the available local skills base, facilitate recruitment during the implementation phases of the project and establish training requirements.

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Required Operational Capability Report for Relocation of Dwellers at Eskom-2019.

Scope of Work: Ingula Homesteads and Infrastructure for the Relocation of Dwellers- June 2020.

Government Documents:

Title Deed issued by Maluti-a-Phofung Local Municipality-2004: Portion 1, 2, 3 of Farm Wilge Rivier 319.

Other Documents:

Free State Provincial Treasury-2020:Free State Estimates of Provincial Revenue and Expenditure 2019/2020.

International Finance Corporation-Environment and Social Development Department – 2002: Handbook for Preparing a Resettlement Action Plan.

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Municipal Demarcation Board-2018:*Phumelela Municipal Capacity Assessment Report.*

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SEIA Guidelines:

Barbour T. – 2007: Western Cape: Department of Environmental Affairs and Development Planning: *Guidelines for involving Social Specialists in EIA Processes.*

Department of Environmental Affairs and Tourism-2005 (National): *Socio-Economic Impact Assessment-Series 22.*

Statistics South Africa Documents:

Community Survey 2016.

Quarterly Labour Force Survey Quarter 1: 2020.

Annexures

Annexure 1: Full Declaration of Independence

Annexure 1: Full Declaration of Independence

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

SEIA REPORT FOR THE RELOCATION OF DWELLERS AT IPPE

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	FEZUBEX (PTY) LTD			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	
Specialist name:	NEBOM GUNASHE MFARAPAM			
Specialist Qualifications:	B.A (HONS) & MASTERS IN LABOUR STUDIES			
Professional affiliation/registration:				
Physical address:	56 DENNIS ROAD			
Postal address:	ATHOLHURST, JOHANNESBURG			
Postal code:	2196	Cell:	079 538 3555	
Telephone:		Fax:		
E-mail:	nebom@mweb.co.za			

2. DECLARATION BY THE SPECIALIST

I, NEBOM GUNASHE MFARAPAM, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

FEZUBEX (PTY) LTD

Name of Company:

18 September 2020

Date

3. **UNDERTAKING UNDER OATH/ AFFIRMATION**

I, Nobani Gcinashe Mngenani swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

FERUBEX (PTY) LTD

Name of Company

20/9/2020

Date

Signature of the Commissioner of Oaths

2020/09/20

Date

SOUTH AFRICAN POLICE SERVICE
BRAMLEY
CRIME OFFICE
2020 -09- 20
MISDAAD KANTOOR
BRAMLEY
SUID-AFRIKAANSE POLISIEDIENS

Appendix D3: Archaeological and Palaeontological Impact Assessment Reports

The Proposed Relocation of Dwellers at Ingula Pumped Storage Scheme

Phumelela and Maluti A - Phofung Local Municipalities, Thabo Mofutsanyana District Municipality, Free State Province

Farm: Wilge Rivier 319

Palaeontological Impact Assessment: Phase 1: Field Study

Tsimba Archaeological Footprints

24 Lawson Mansions, 74 Loveday Street,

Johannesburg, 2000

Tel: 061 912 5118

2020/11/30

Ref: Pending

Regisaurus (ESI) (H. Fourie)

B. Executive summary

Outline of the development project: Tsimba Archaeological Footprints (Pty) Ltd has been appointed by Myezo Environmental Management Services to undertake a Palaeontological Impact Assessment (PIA), Desktop Study

of the suitability of The Proposed Relocation of Dwellers at Ingula Pumped Storage Scheme, Phumelela and Maluti A - Phofung Local Municipalities, Thabo Mofutsanyana District Municipality, Free State Province on the Farm: Wilge Rivier 319.

The applicant, Eskom Holdings SOC Limited (Eskom) intends to embark on a relocation programme for six families at Ingula Pumped Storage Scheme, within the Ingula Nature Reserve. It was decided to relocate the remaining six families to the Farm Wilge Rivier 319.

The Project includes one locality Option (see map):
Option 1: An area outlined in red located about 23 km north east of Van Reenen, approximately 10 km north of the Ingula Pumped Storage Scheme, and about 42 km north-east-east of Harrismith. The approximate size of the site is X hectares.

The **National Heritage Resources Act (Act No. 25 of 1999) (NHRA)** requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA. South Africa's unique and non-renewable palaeontological heritage is protected in terms of the National Heritage Resources Act. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. The PIA therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

"palaeontological" means 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 traces.

For this study, resources such as geological maps, scientific literature, institutional fossil collections, satellite images, aerial maps and topographical maps were used. It provides an assessment of the observed or inferred palaeontological heritage within the study area, with recommendations (if any) for further specialist palaeontological input where this is considered necessary.

A Palaeontological Impact Assessment is generally warranted where rock units of **LOW** to **VERY HIGH** palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate; large scale projects with high potential heritage impact are planned; and where the distribution and nature of fossil remains in the proposed area is unknown. The specialist will inform whether further monitoring and mitigation are necessary.

Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (Act No.25 of 1999):
(i) (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.
This report adheres to the guidelines of Section 38 (1) of the National Heritage Resources Act (Act No. 25 of 1999).

Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; (b) the construction of a bridge or similar structure exceeding 50 m in length; (c) any development or other activity which will change the character of a site (see Section 38); (d) the re-zoning of a site exceeding 10 000 m² (1 ha) in extent; (e) or any other category of development provided for in regulations by SAHRA or a PHRA authority.

This report (**1c**) aims to provide comment and recommendations on the potential impacts that the proposed development could have on the fossil heritage of the area and to state if any mitigation or conservation measures are necessary.

Outline of the geology and the palaeontology:

The geology was obtained from map 1:100 000, Geology of the Republic of South Africa (Visser 1984) and 2828 Harrismith, 1:250 000 geological map (Verster 1989).

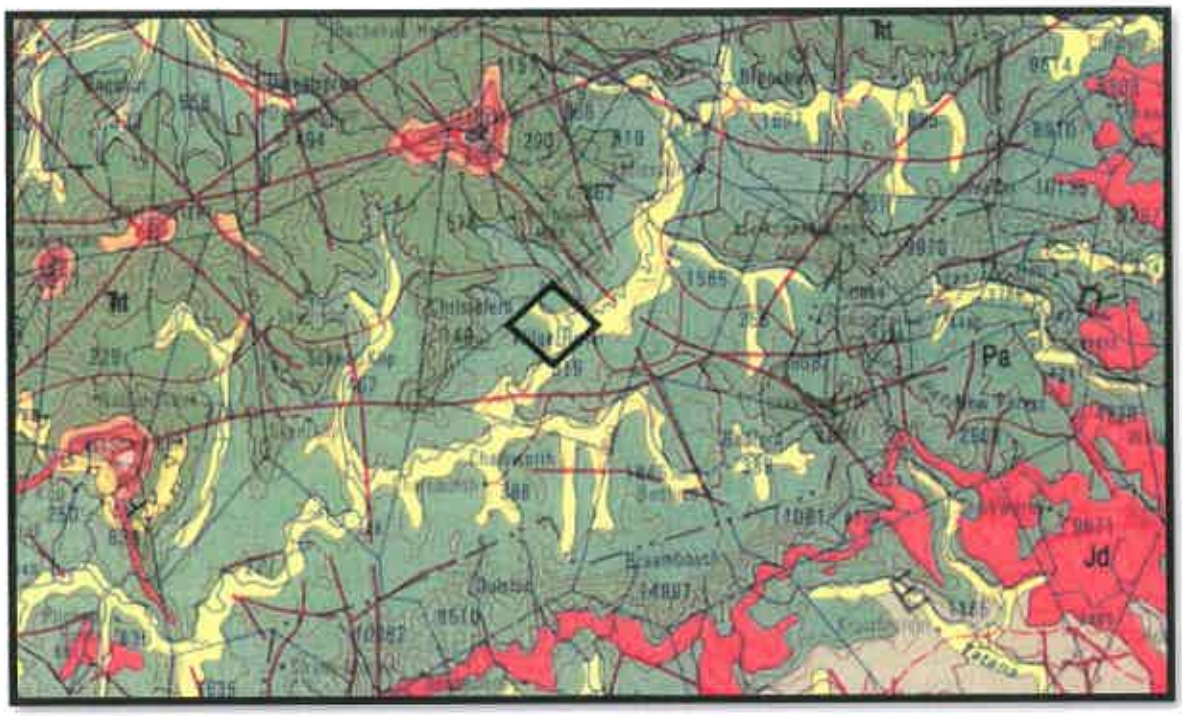

Figure 3: The geology of the development area.

Legend to Map and short explanation.

M – Alluvium (yellow). Quaternary.

Jd – Karoo Dolerite suite (pink). Jurassic.

TRt – Fine- to medium-grained sandstone; red, green and blue mudstone (dark green) – Tarkastad Subgroup, Beaufort Group, Karoo Supergroup. Permian.

Pa – Grey mudstone; dark-grey shale (carbonaceous in places); siltstone; sandstone (green). Adelaide Subgroup, Beaufort Group, Karoo Supergroup. Permian.

..... – (black) Lineament (Possible dyke).

--f— Fault.

⊥15° - Strike and dip.

□ - Proposed development (in black on Figure).

The Adelaide Subgroup consists of up to three formations (Koonap, Middleton, Balfour in the east). Mudrock predominates with subordinate sandstone and is Upper Permian in age. It overlies the Ecca Group conformably

and is overlain by the Katberg Formation of the Tarkastad Subgroup. Siltstone beds are common (Cole *et al.* 2004). The Koonap Formation reaches a thickness of 1 300 m. (Kent 1980). The Balfour Formation is distinguished from the Middleton Formation by the lack of 'red' mudstone and is ±2 150 m. thick, whereas the Middleton Formation is ±1 600 m. thick (sheet info, Kent 1980). The Abrahamskraal and Teekloof Formations also form part of the Adelaide Subgroup in the west (Snyman 1996). Chert is present in the Abrahamskraal Formation. The Adelaide Subgroup has a maximum thickness of 1750 m. in the south (Visser 1989).

Palaeontology – Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity can generally be **LOW** to **VERY HIGH**, and here locally **VERY HIGH** for the Adelaide Subgroup (SG 2.2 SAHRA APMHOB, 2012).

The rocks of the Karoo Supergroup are internationally acclaimed for their richness and diversity of fossils. The rocks of the Beaufort Group of South Africa cover approximately one-third of the land surface and have yielded an abundance of well-preserved therapsids and other tetrapods which have been used to subdivide this Group into eight faunal Assemblage Zones.

Further to the lithostratigraphy, the Beaufort Group is divided into biostratigraphic units. Zones present in the study area are the *Daptocephalus* Assemblage Zone and the *Lystrosaurus* Assemblage Zone including the Teekloof Formation and the Balfour Formation, and is characterised by the abundance of *Dicynodon* in association with *Emydops, Pristerodon* and *Dinanomodon; Palemydops Aulacephalodon* and *Oudenodon; Diictodon,* and several Therocephalia such as *Theriognathus* and the Cynodont *Cynosaurus* amongst others (Rubidge 1995). Plant fossils such as *Glossopteris* and silicified wood are also present. In this area the biozone boundaries are uncertain. The *Daptocephalus* Assemblage Zone overlies the *Cistecephalus* Assemblage zone.

Summary of findings (1d): The Phase 1: Field Study was undertaken in November 2020 in the summer in dry and hot conditions during the official Level 1 Covid-19 lockdown, and the following is reported, as this is a desktop study the season has no influence:

The Project includes one locality Option (see map) with a **VERY HIGH** sensitivity:
Option 1: An area outlined in red located about 23 km north east of Van Reenen, approximately 10 km north of the Ingula Pumped Storage Scheme, and about 42 km north-east-east of Harrismith. The approximate size of the site is X hectares.

Other locality options will not be feasible as all of the options will be situated on the Beaufort Group sediments.

Field Observation - Fieldwork was done by Elize Butler. Sandstone outcrops are present with lush grass. No fossils were found.

Recommendation:
The potential impact of the development on fossil heritage is **VERY HIGH** and therefore a Phase 1: Field Survey was necessary for this development (according to SAHRA protocol), if a chance fossil is found during construction a Phase 2 Palaeontological Impact Assessment and Mitigation or conservation will be necessary.

Concerns/threats **(1g)** to be added to EMPr:

1. Threats to the National Heritage are earth moving equipment/machinery (for example haul trucks, front end loaders, excavators, graders, dozers) during construction, the sealing-in, disturbance, damage or destruction of the fossils by development, vehicle traffic, clearing, and human disturbance.
2. Special care must be taken during the clearing, digging, drilling, blasting and excavating of foundations, trenches, channels and footings and removal of overburden not to intrude fossiliferous layers.

The recommendations are (**1ni,1niA,1nii**):

1. Mitigation may be needed if fossils are found during construction. Overburden and interburden must be surveyed for fossils.
2. No consultation with parties was necessary. The Environmental Control Officer must familiarise him- or herself with the formation present and its fossils.
3. The development may go ahead with caution. The ECO must survey for fossils before and or after clearing, blasting or excavating and keep a photographic record.
4. The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities. For a chance find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation. It is recommended that the EMPr be updated to include the involvement of a palaeontologist for pre-construction training of the ECO.

Stakeholders: Developer – Eskom Holdings SOC Limited (Eskom).
Environmental – Myezo Environmental Management Services
Landowner – Community.

C. Table of Contents

D. Background information on the project

Report

This report is part of the environmental impact assessment process under the National Environmental Management Act, as amended (Act No. 107 of 1998) (NEMA) and includes Appendix 6 (May 2019) of the Environmental Impact Assessment Regulations (see Appendix 2). It also is in compliance with The Minimum Standards for Palaeontological Components of Heritage Impact Assessment Reports, SAHRA, APMHOB, Guidelines 2012, Pp 1-15 (**2**).

Outline of development (1f)

This report discusses and aims to provide the developer with information regarding the location of palaeontological material that will be impacted by the development. In the pre-construction phase it is necessary for the developer to apply for the relevant permit from the South African Heritage Resources Agency (SAHRA / PHRA).

Eskom Holdings SOC Limited (Eskom) intends to embark on a relocation programme for six families at Ingula Pumped Storage Scheme, within the Ingula Nature Reserve. It was decided to relocate the remaining six families to the Farm Wilger. The families will be provided with land for crop production and grazing as well as housing. All homesteads can be placed within a centralized location with shared grazing land, or each homestead gets a plot of land with a crop garden and grazing land.

Related Infrastructure:

1. Upgrading of existing access road infrastructure,
2. Civil and structural design including foundations,
3. Borehole and water supply,
4. Wastewater and sewage disposal with reticulation to septic tank,
5. Power supply and reticulation – solar power.

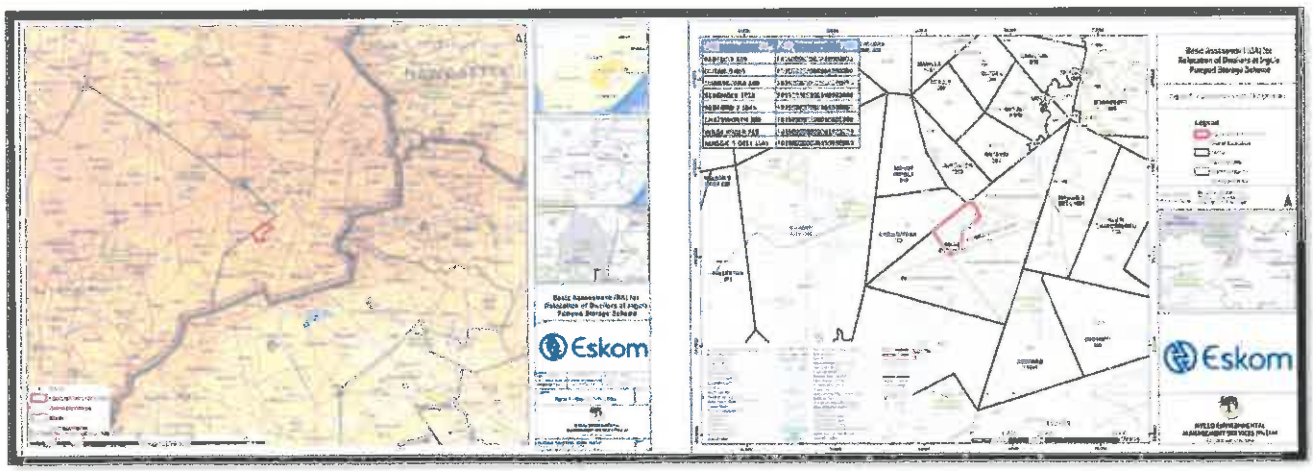

Figure 1: Figure showing location (Myezo)

The Project includes one locality Option (see map):
Option 1: An area outlined in red located about 23 km north east of Van Reenen, approximately 10 km north of the Ingula Pumped Storage Scheme, and about 42 km north-east-east of Harrismith. The approximate size of the site is X hectares.

Rezoning/ and or subdivision of land: No.
Name of Developer and Consultant: Eskom Holdings SOC Limited (Eskom) and Myezo Environmental Management Services
Terms of reference: Dr H. Fourie is a palaeontologist commissioned to do a palaeontological impact assessment: field study to ascertain if any palaeontological sensitive material is present in the development area. This study will advise on the impact on fossil heritage mitigation or conservation necessary, if any.
Short *Curriculum vitae:(**1ai, 1aii**)* Dr Fourie obtained a Ph.D from the Bernard Price Institute for Palaeontological Research (now ESI), University of the Witwatersrand. Her undergraduate degree is in Geology and Zoology. She

specialises in vertebrate morphology and function concentrating on the Therapsid Therocephalia. At present she is curator of a large fossil invertebrate, Therapsid, dinosaur, amphibia, fish, reptile, and plant collections at Ditsong: National Museum of Natural History. For the past 14 years she carried out field work in the North West, Western Cape, Northern Cape, Eastern Cape, Limpopo, Mpumalanga, Gauteng and Free State Provinces and has done more than 200 PIA's since 2012. Dr Fourie has been employed at the Ditsong: National Museum of Natural History in Pretoria (formerly Transvaal Museum) for 26 years.
Legislative requirements: South African Heritage Resources Agency (SAHRA) for issue of permits if necessary. National Heritage Resources Act (Act No. 25 of 1999). An electronic copy of this report must be supplied to SAHRA (2).

E. Description of property or affected environment
Location and depth:
The Proposed Relocation of Dwellers at Ingula Pumped Storage Scheme, Phumelela and Maluti A - Phofung Local Municipalities, Thabo Mofutsanyana District Municipality, Free State Province will be situated on the Farm: Wilge Rivier 319.

Depth is determined by the infrastructure to be developed and the thickness of the formation in the development area, in this instance the related infrastructure. Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to determine due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot. Geological maps do not provide depth or superficial cover, it only provides mappable surface outcrops. The Katberg Formation reaches a depth of 600 m. (Figure 2).

The Project includes one locality Option (see map):
Option 1: An area outlined in red located about 23 km north east of Van Reenen, approximately 10 km north of the Ingula Pumped Storage Scheme, and about 42 km north-east-east of Harrismith. The approximate size of the site is X hectares.

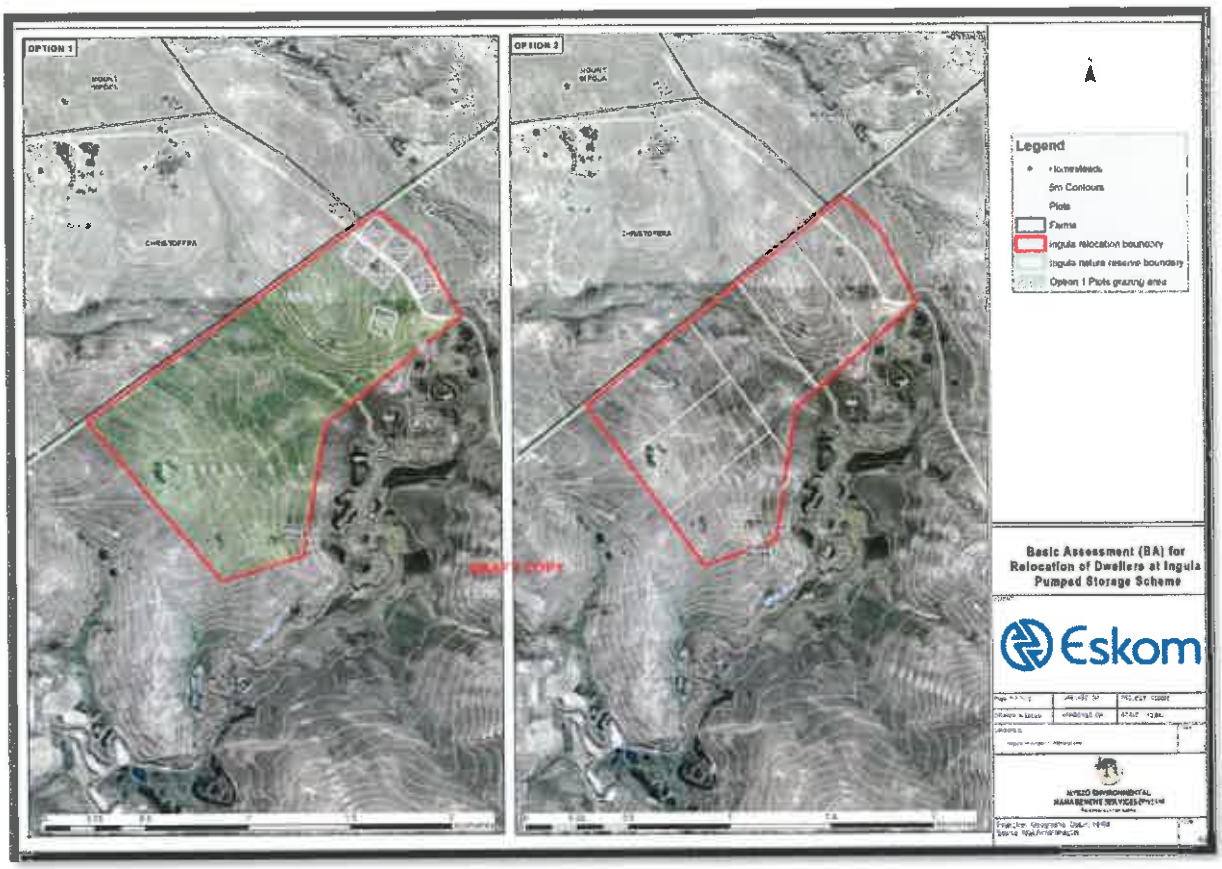

Figure 2: Google.earth image showing location (Myezo).

The bulk of the site is underlain by the Karoo Supergroup Formations covered by vegetation, grass, rocky outcrops, and a road.

F. Description of the Geological Setting

Description of the rock units:

Large areas of the southern African continent are covered by the Karoo Supergroup (Figure 3). It covers older geological formations with an almost horizontal blanket. Several basins are present with the main basin in the central part of south Africa and several smaller basins towards Lebombo, Springbok Flats and Soutpansberg. An estimated age is 150 – 180 Ma. And a maximum thickness of 7000 m is reached in the south. Three formations overlie the Beaufort Group, they are the Molteno, Elliot and Clarens Formations. The Elliot Formation is also known as the Red Beds and the old Cave Sandstone is known as the Clarens Formation. At the top is the Drakensberg Basalt Formation with its pillow lavas, pyroclasts, etc. (Kent 1980, Snyman 1996).

The rocks of the Beaufort Group were deposited by large, northward-flowing, meandering rivers in which sand accumulated, flanked by extensive floodplains where periodic floods deposited mud. Following the end-Permian mass extinction, the meandering rivers were replaced by multi-channelled, braided river systems that deposited sand rather than the silts and muds of the earlier meandering rivers. The sandstone-dominated strata deposited by these braided rivers, known as the Katberg Formation, can be as much as 1000 m. thick. As time passed, the high-energy, braided rivers of the Katberg Formation reverted to a meandering form, possibly reflecting recovery of the vegetation. These sedimentary deposits are the Burgersdorp Formation (McCarthy and Rubidge 2005).

The Tarkastad Subgroup of the Beaufort Group consists of a lower predominantly arenaceous Katberg Sandstone Formation and a predominantly upper argillaceous Burgersdorp Formation (Cole *et al.* 2004, Kent

1980). It is Early Triassic in age. This Subgroup is absent in the west of the basin. A maximum thickness of 900 m can be measured for the Katberg sandstone Formation. This formation consists of buff-weathered, greenish-grey and light-grey tabular and minor ribbon-shaped sandstone bodies, interbedded with units of red, greyish-red and, less commonly, greenish-grey and dark greenish-grey mudstone (Cole *et al.* 2004). Red, bluish and green mudstone, siltstone and fine- to medium-grained sandstone lenses are characteristic of the Burgersdorp Formation. This Subgroup marks the boundary of the Palaeozoic and the Mesozoic (Snyman 1996, Visser 1998). Fossil mammal-like reptiles are present (Norman and Whitfield 2006).

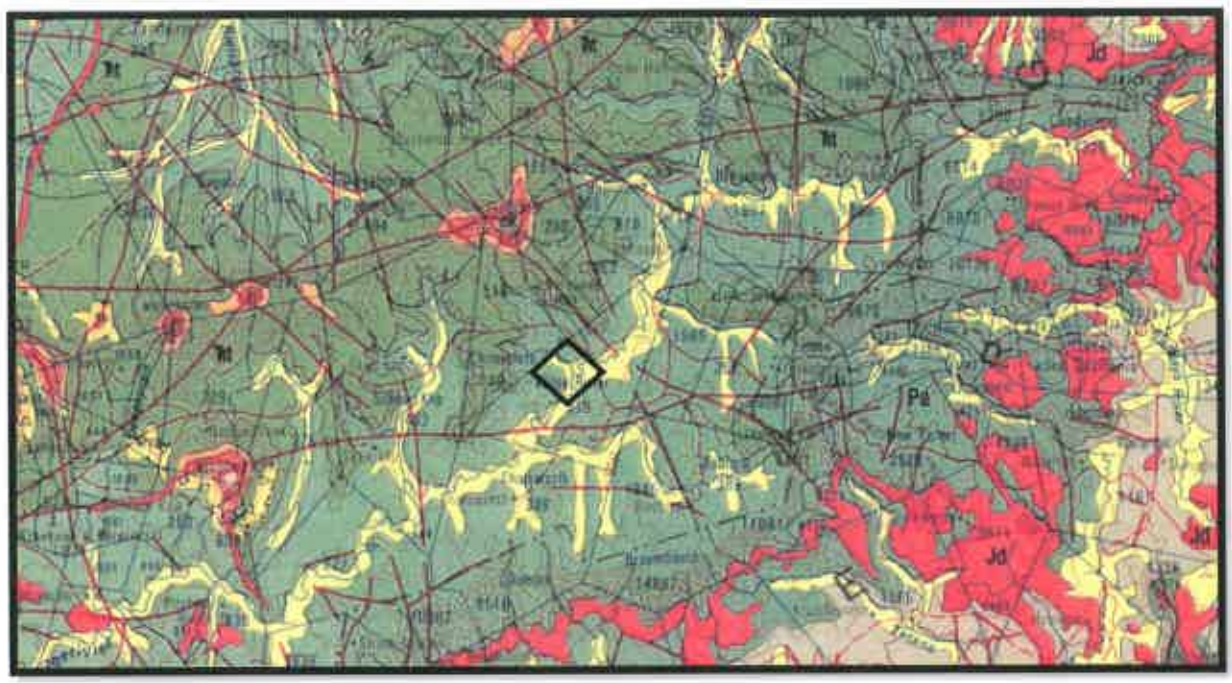

Figure 3: Geology of the development area (Verster 1998) (**1h**).
Legend to Map and short explanation.
M – Alluvium (yellow). Quaternary.
Jd – Karoo Dolerite suite (pink). Jurassic.
TRt – Fine- to medium-grained sandstone; red, green and blue mudstone (dark green) – Tarkastad Subgroup, Beaufort Group, Karoo Supergroup. Permian.
Pa – Grey mudstone; dark-grey shale (carbonaceous in places); siltstone; sandstone (green). Adelaide Subgroup, Beaufort Group, Karoo Supergroup. Permian.
..... – (black) Lineament (Possible dyke).
--f-- Fault.
⊥15° - Strike and dip.
□ – Approximate position of farm (blocked in white).

Mining Activities on Figure above:
None.
Several faults are present near the development area.

The Adelaide Subgroup consists of up to three formations (Koonap, Middleton, Balfour in the east). Mudrock predominates with subordinate sandstone and is Upper Permian in age. It overlies the Ecca Group conformably and is overlain by the Katberg Formation of the Tarkastad Subgroup. Siltstone beds are common (Cole *et al.* 2004). The Koonap Formation reaches a thickness of 1 300 m. (Kent 1980). The Balfour Formation is distinguished from the Middleton Formation by the lack of 'red' mudstone and is ±2 150 m. thick, whereas the

Middleton Formation is ±1 600 m. thick (sheet info, Kent 1980). The Abrahamskraal and Teekloof Formations also form part of the Adelaide Subgroup in the west (Snyman 1996). Chert is present in the Abrahamskraal Formation. The Adelaide Subgroup has a maximum thickness of 1750 m. in the south (Visser 1989).

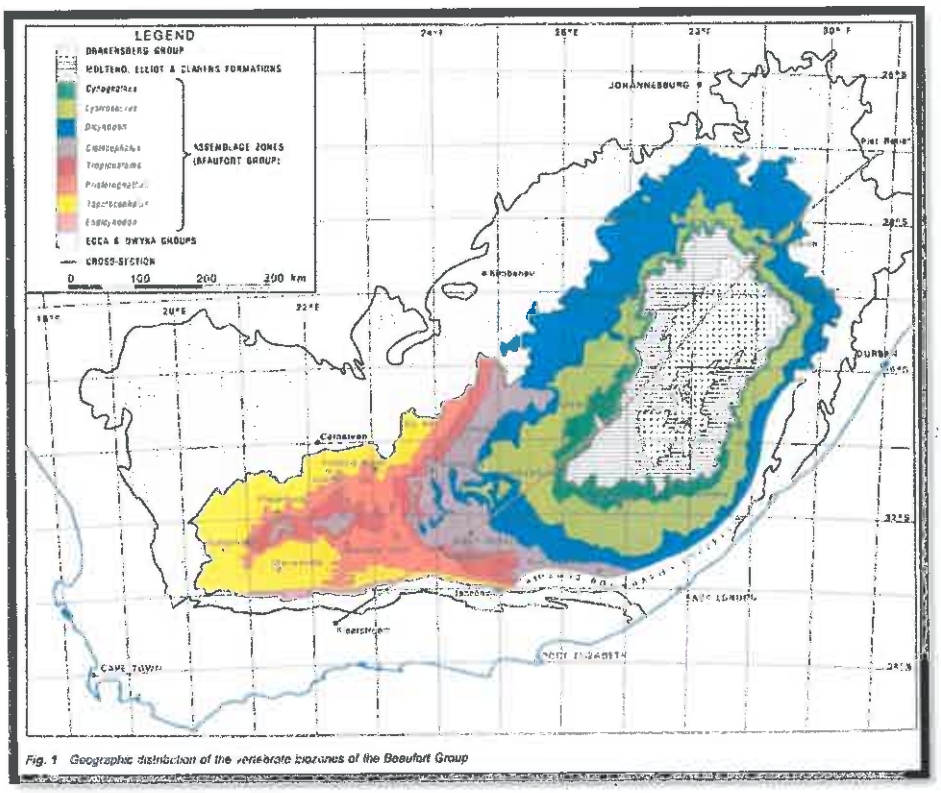

Fig. 1 Geographic distribution of the vertebrate biozones of the Beaufort Group

Figure 4: Geographic distribution of the vertebrate biozones of the Beaufort Group (Rubidge 1995).

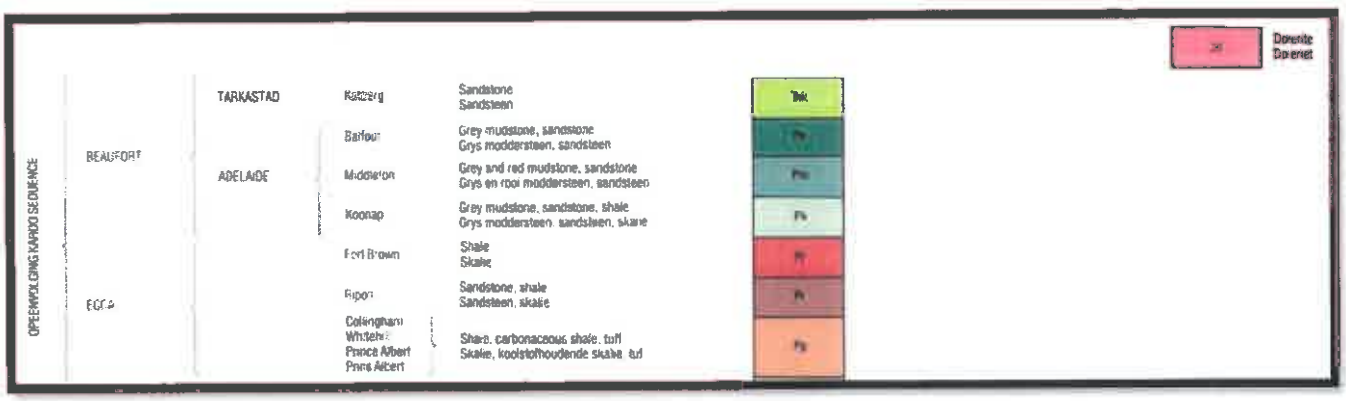

Figure 5: Lithostratigraphic column of the Karoo Supergroup (Johnson 1976)

Dolerite dykes (Jd) occur throughout the Karoo Supergroup. Structural geological features such as dykes and faults can have a measurable influence on ground water flow and mass transport. Permian sediments are extensively intruded and thermally metamorphosed (baked) by subhorizontal sills and steeply inclined dykes of the Karoo Dolerite Suite (Jd). These early Jurassic (183 Ma) basic intrusions baked the adjacent mudrocks and sandstones to form splintery hornfels and quartzites respectively. Thermal metamorphism by dolerite intrusions tends to reduce the palaeontological heritage potential of the adjacent sediments.

Field Observation - Fieldwork was done by Elize Butler. Sandstone outcrops are present with lush grass. No fossils were found.

Figure 6: Road present on site.

Figure 7: Superficial sediments showing overburden.

Figure 8: Grass areas.

Figure 9: Sandstone outcrop.

Figure 10: Sandstone outcrop.

Figure 11: Farmhouse present on site.

G. Background to Palaeontology of the area

Summary: When rock units of moderate to very high palaeontological sensitivity are present within the development footprint, a desk top and or field scoping (survey) study by a professional palaeontologist is usually warranted. The main purpose of a field scoping (survey) study would be to identify any areas within the development footprint where specialist palaeontological mitigation during the construction phase may be required (SG 2.2 SAHRA AMPHOB, 2012).

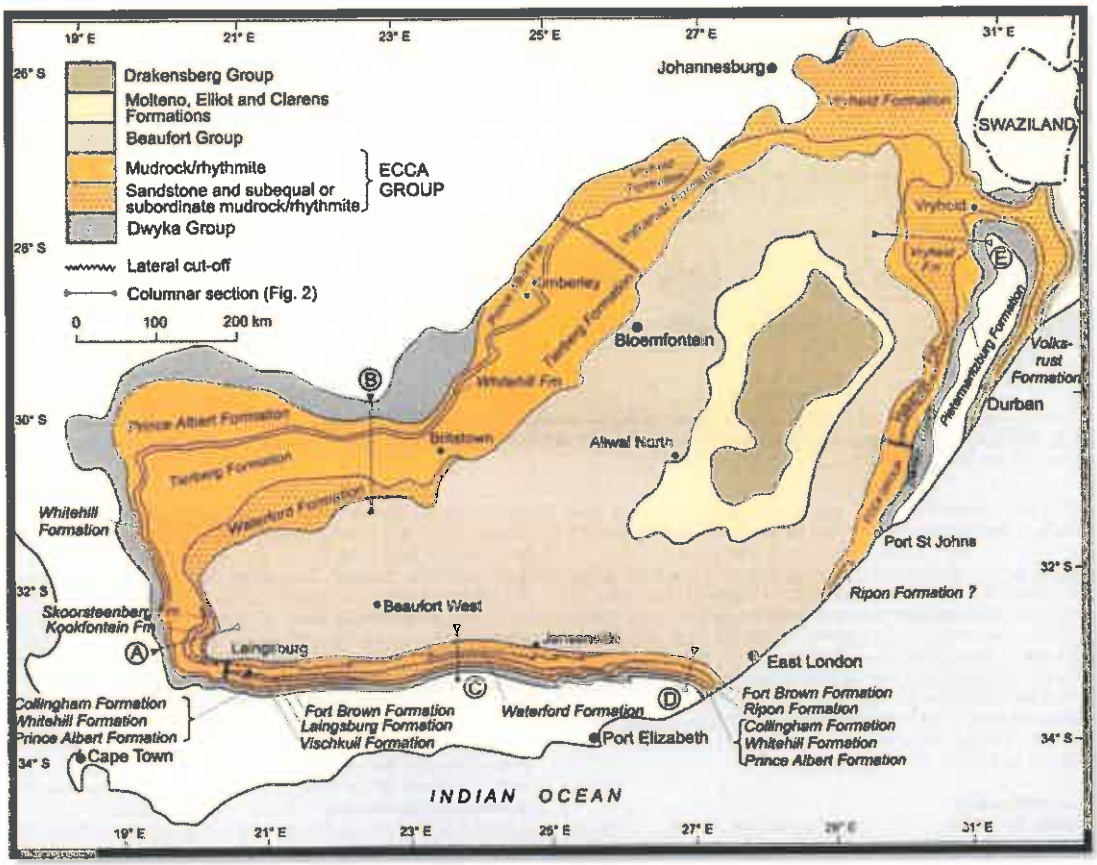

Figure 12: Extent of the Karoo Supergroup (Johnson 2009).

The rocks of the Karoo Supergroup are internationally acclaimed for their richness and diversity of fossils. The rocks of the Beaufort Group of South Africa cover approximately one-third of the land surface and have yielded an abundance of well-preserved therapsids and other tetrapods which have been used to subdivide this Group into eight faunal Assemblage Zones.

Fossils occurring may be from the *Lystrosaurus* Assemblage Zone such as the dicynodont therapsid *Lystrosaurus*, the small cynodont genera *Thrinaxodon* and *Galesaurus*, the crocodile-like *Proterosuchus*, and the anapsid *Procolophon*. Amphibian fauna are represented by *Lydekkerina, Rhitidosteus* and *Micropholis*. Plant fossils are scarce. East of 25°E, the correlation of the *Daptocephalus* Assemblage Zone with the lithostratigraphic units of the underlying *Cistecephalus* Assemblage Zone is less certain (Cole *et al.* 2004, Rubidge 1995).

Zones present in the study area are the *Daptocephalus* Assemblage Zone and the *Lystrosaurus* Assemblage Zone including the Teekloof Formation and the Balfour Formation, and is characterised by the abundance of *Dicynodon* in association with *Emydops, Pristerodon* and *Dinanomodon; Palemydops Aulacephalodon* and *Oudenodon; Diictodon,* and several Therocephalia such as *Theriognathus* and the Cynodont *Cynosaurus* amongst others (Rubidge 1995). Plant fossils such as *Glossopteris* and silicified wood are also present. In this area the biozone boundaries are uncertain. The *Daptocephalus* Assemblage Zone overlies the *Cistecephalus* Assemblage zone.

Well preserved fossils of therapsids occur in mudrock horizons, and are usually found as dispersed, isolated specimens associated with an abundance of calcareous nodules. An abundant and varied therapsid fauna as well as amphibian and fish fossils have been recovered from the lower half of the stratigraphic levels assigned to

the *Daptocephalus* Assemblage Zone in the main Karoo basin. However, in the upper levels the fauna shows a marked decrease in diversity (Rubidge 1995).

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, if there is the presence of Karoo Supergroup strata the palaeontological sensitivity is generally **LOW** to **VERY HIGH**, but here locally **VERY HIGH** for the Adelaide Subgroup.

Table 1: Taken from Palaeotechnical Report (Almond, *et al.* 2009) (**1cA**).

8. BEAUFORT GROUP	**8b. Tarkastad Subgroup: Katberg, Burgersdorp Fms (TRt)** **8a. Adelaide Subgroup: Koonap, Middleton, Balfour Fms** **(Pa)**	continental (fluvial, lacustrine) siliciclastic sediments, pedocretes (calcretes) Late Permian – Early Triassic *c.* 266 – 250 Ma	diverse terrestrial and freshwater tetrapods of *Tapinocephalus* to *Cynognathus* Biozones (amphibians, true reptiles, synapsids – especially therapsids), palaeoniscoid fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse vascular plants (*Glossopteris* Flora including petrified wood)	Biozonation of Beaufort Group in some areas of E. Cape still requires resolution richest Permotriassic tetrapod fauna from Pangaea / Gondwana key evidence for evolution of mammalian characters among therapsids continental record of Late Permian Mass Extinction Events

Table 2: Criteria used (Fossil Heritage Layer Browser/SAHRA) (**1cB**):

Rock Unit	Significance/vulnerability	Recommended Action
Jurassic Dolerite	Very Low	No action required
Katberg Subgroup	Very High	Field assessment and protocol for finds is required
Adelaide Subgroup	Very High	Field assessment and protocol for finds is required

Databases and collections: Ditsong: National Museum of Natural History. Evolutionary Studies Institute, University of the Witwatersrand (ESI).
Impact: **VERY HIGH** for the Adelaide Subgroup, Beaufort Group, Karoo Supergroup. There are significant fossil resources that may be impacted by the development (mudstone, shale) and if destroyed are no longer available for scientific research or other public good (Almond, *et al.* 2009).

The Project includes one locality Option (see map) with a **VERY HIGH** sensitivity (**1j**):
Option 1: An area outlined in red located about 23 km north east of Van Reenen, approximately 10 km north of the Ingula Pumped Storage Scheme, and about 42 km north-east-east of Harrismith. The approximate size of the site is X hectares.

H. Description of the Methodology (1e)
The palaeontological impact assessment field study was undertaken in November 2020 during the official Level 1 of the Covid-19 lockdown. A Phase 1: Field Study includes a survey of the affected portion with photographs taken (in 7.1 mega pixels) of the site with a digital camera (Canon PowerShot A470). Additionally, a Global Positioning System (GPS) (Garmin eTrex 10) is used to record fossiliferous finds and outcrops (bedrock) when the area is not covered with topsoil, subsoil, overburden, vegetation, grassland, trees or waste. The survey did identify the Karoo Supergroup. A literature survey is included and the study relied heavily on geological maps.

SAHRA document 7/6/9/2/1 requires track records/logs from archaeologists not palaeontologists as palaeontologists concentrate on outcrops which may be recorded with a GPS. Isolated occurrences of rocks usually do not constitute an outcrop. Fossils can occur in dongas, as nodules, in fresh rock exposures, and in riverbeds. Finding fossils require the experience and technical knowledge of the professional palaeontologist, but

that does not mean that an amateur can't find fossils. The geology of the region is used to predict what type of fossil and zone will be found in any particular region. Archaeozoologists concentrate on more recent fossils in the quaternary and tertiary deposits.

Assumptions and Limitations (**1i**):-
The accuracy and reliability of the report **may be** limited by the following constraints:

1. Most development areas have never been surveyed by a palaeontologist or geophysicist.
2. Variable accuracy of geological maps and associated information.
3. Poor locality information on sheet explanations for geological maps.
4. Lack of published data.
5. Lack of rocky outcrops.
6. Inaccessibility of site.
7. Insufficient data from developer and exact lay-out plan for all structures.

A Phase 2 Palaeontological Impact Assessment: Mitigation will include:

1. Recommendations for the future of the site.
2. Description of work done (including number of people and their responsibilities.
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.
4. Conclusion reached regarding the fossil material.
5. A detailed site plan.
6. Possible declaration as a heritage site or Site Management Plan.

The National Heritage Resources Act No. 25 of 1999 further prescribes.

Act No. 25 of 1999. National Heritage Resources Act, 1999.
National Estate: 3 (2) (f) archaeological and palaeontological sites,
(i)(1) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens,
Heritage assessment criteria and grading: (a) Grade 1: Heritage resources with qualities so exceptional that they are of special national significance;
(b) Grade 2: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and (c) Grade 3: Other heritage resources worthy of conservation.
SAHRA is responsible for the identification and management of Grade 1 heritage resources.
Provincial Heritage Resources Authority (PHRA) identifies and manages Grade 2 heritage resources.
Local authorities identify and manage Grade 3 heritage resources.

No person may damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of a provincially protected place or object without a permit issued by a heritage resources authority or local authority responsible for the provincial protection.
Archaeology, palaeontology and meteorites: Section 35.
(2) Subject to the provisions of subsection (8) (a), all archaeological objects, palaeontological material and meteorites are the property of the State.
(3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.

Mitigation involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or excavation, recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before a Phase 2 may be implemented.

The Mitigation is done in order to rescue representative fossil material from the study area to allow and record the nature of each locality and establish its age before it is destroyed and to make samples accessible for future research. It also interprets the evidence recovered to allow for education of the public and promotion of palaeontological heritage.

Should further fossil material be discovered during the course of the development (*e. g.* during bedrock excavations), this must be safeguarded, where feasible *in situ,* and reported to a palaeontologist or to the Heritage Resources authority. In situations where the area is considered palaeontologically sensitive (*e. g.* Karoo Supergroup Formations, ancient marine deposits in the interior or along the coast) the palaeontologist might need to monitor all newly excavated bedrock. The developer needs to give the palaeontologist sufficient time to assess and document the finds and, if necessary, to rescue a representative sample.

When a Phase 2 palaeontological impact study is recommended, permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that (a) the palaeontological resources under threat have been adequately recorded and sampled, and (b) adequate development on fossil heritage, including, where necessary, *in situ* conservation of heritage of high significance. Careful planning, including early consultation with a palaeontologist and heritage management authorities, can minimise the impact of palaeontological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

Three types of permits are available; Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

I. Description of significant fossil occurrences

All Karoo Supergroup geological formations are ranked as **LOW** to **VERY HIGH**, and here the impact is potentially **VERY HIGH** for the Tarkastad Subgroup.

Well preserved fossils of therapsids occur in mudrock horizons, and are usually found as dispersed, isolated specimens associated with an abundance of calcareous nodules. An abundant and varied therapsid fauna as well as amphibian and fish fossils have been recovered (Rubidge 1995).

Further to the lithostratigraphy, the Beaufort Group is divided into biostratigraphic units. Zones present in the study area are the *Daptocephalus* Assemblage Zone and the *Lystrosaurus* Assemblage Zone including the Teekloof Formation and the Balfour Formation, and is characterised by the abundance of *Dicynodon* in association with *Emydops, Pristerodon* and *Dinanomodon; Palemydops Aulacephalodon* and *Oudenodon; Diictodon,* and several Therocephalia such as *Theriognathus* and the Cynodont *Cynosaurus* amongst others (Rubidge 1995). Plant fossils such as *Glossopteris* and silicified wood are also present. In this area the biozone boundaries are uncertain. The *Daptocephalus* Assemblage Zone overlies the *Cistecephalus* Assemblage zone.

The Jurassic Dolerite does not contain fossils.

Details of the location and distribution of all significant fossil sites or key fossiliferous rock units are often difficult to be determined due to thick topsoil, subsoil, overburden and alluvium. Depth of the overburden may vary a lot.

The threats are:-

- Earth moving equipment/machinery (front end loaders, excavators, graders, dozers) during construction,
- The sealing-in or destruction of fossils by development, vehicle traffic, and human disturbance. See Description of the Geological Setting (F) above.

J. Recommendation (1o,1p,1q)

a. There is no objection (see Recommendation B) to the development, it was necessary to request a Phase 1 Palaeontological Impact Assessment: Field Study to determine whether the development will affect fossiliferous outcrops, if chance fossils are found during construction a Phase 1 Palaeontological Field Study is required and a Phase 2 Palaeontological Assessment: Mitigation. Protocol is attached (Appendix 2).
b. This project may benefit the economy, the life expectancy of the community, the growth of the community and social development in general.
c. Preferred choice: Only one locality Option is presented. The palaeontological sensitivity is **VERY HIGH**.
d. The following should be conserved: if any palaeontological material is exposed during clearing, digging, excavating, drilling or blasting SAHRA must be notified. All construction activities must be stopped, a 30 m no-go barrier constructed and a palaeontologist should be called in to determine proper mitigation measures.
e. No consultation with parties was necessary.

Sampling and collecting **(6m,6k)**:
Wherefore a permit is needed from the South African Heritage Resources Agency (SAHRA / PHRA).

a. Objections: Cautious. See heritage value and recommendation.
b. Conditions of development: See Recommendation.
c. Areas that may need a permit: Yes, if a fossil is found.
d. Permits for mitigation: **Needed from SAHRA/PHRA prior to Mitigation**.

K. Conclusions

a. All the land involved in the development was assessed and none of the property is unsuitable for development (see Recommendation B).
b. All information needed for the Palaeontological Impact Assessment was provided by the Consultant. All technical information was provided by Myezo Environmental Management Services
c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed.
d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting, SAHRA must be notified. All development activities must be stopped and a palaeontologist should be called in to determine proper mitigation measures. Especially shallow caves.
e. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment and adjacent areas as well as for safety and security reasons.

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Declaration (1b)

I, Heidi Fourie, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project for which I was appointed to do a palaeontological assessment. There are no circumstances that compromise the objectivity of me performing such work.

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

It may be possible that the Palaeontological Impact Assessment may have missed palaeontological resources in the project area as outcrops are not always present or visible while others may lie below the overburden of earth and may only be present once development commences.

This report may not be altered in any way and any parts drawn from this report must make reference to this report.

Heidi Fourie
2020/11/30

Appendix 1: **Protocol for Chance Finds and Management Plan (also include Section B) (1k,1l,1m)**
This section covers the recommended protocol for a Phase 2 Mitigation process as well as for reports where the Palaeontological Sensitivity is **LOW**; this process guides the palaeontologist / palaeobotanist on site and should not be attempted by the layman / developer. As part of the Environmental Authorisation conditions, an Environmental Control Officer (ECO) will be appointed to oversee the construction activities in line with the legally binding Environmental Management Programme (EMPr). The EMPr already covers the conservation of heritage and palaeontological material that may be exposed during construction activities:

- For a chance find, the protocol is to immediately cease all construction activities, construct a 30 m no-go barrier, and contact SAHRA for further investigation.
- Construction workers must be informed that this is a no-go area. Any fossil find must be placed in a safe area.
- It is recommended that the EMPr be updated to include the involvement of a palaeontologist for pre-construction training of the ECO and during the digging and excavation phase of the development.
- The ECO must visit the site after clearing, excavations, blasting or drilling and keep a photographic record.
- The developer may have to survey the areas affected by the development and indicate on plan where the construction / development may take place. Trenches have to be dug to ascertain how deep the sediments are above the bedrock (can be a few hundred metres). This will give an indication of the depth of the topsoil, subsoil, and overburden, if need be trenches should be dug deeper to expose the interburden.

Mitigation will involve recording, rescue and judicious sampling of the fossil material present in the layers sandwiched between the geological / coal layers. It must include information on number of taxa, fossil abundance, preservational style, and taphonomy. This can only be done during mining or excavations. In order for this to happen, in case of coal mining operations, the process will have to be closely scrutinised by a professional palaeontologist / palaeobotanist to ensure that only the coal layers are mined and the interlayers (siltstone and mudstone) are surveyed for fossils or representative sampling of fossils are taking place.

The palaeontological impact assessment process presents an opportunity for identification, access and possibly salvage of fossils and add to the few good plant localities. Mitigation can provide valuable onsite research that can benefit both the community and the palaeontological fraternity.

A Phase 2 study is very often the last opportunity we will ever have to record the fossil heritage within the development area. Fossils excavated will be stored at a National Repository.

A Phase 2 Palaeontological Impact Assessment: Mitigation will include (SAHRA) -

1. Recommendations for the future of the site.
2. Description and purpose of work done (including number of people and their responsibilities).
3. A written assessment of the work done, fossils excavated, not removed or collected and observed.

4. Conclusion reached regarding the fossil material.
5. A detailed site plan and map.
6. Possible declaration as a heritage site or Site Management Plan.
7. Stakeholders.
8. Detailed report including the Desktop and Phase 1 study information.
9. Annual interim or progress Phase 2 permit reports as well as the final report.
10. Methodology used.

Mitigation involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or excavation, recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before a Phase 2 may be implemented.

The Mitigation is done in order to rescue representative fossil material from the study area to allow and record the nature of each locality and establish its age before it is destroyed and to make samples accessible for future research. It also interprets the evidence recovered to allow for education of the public and promotion of palaeontological heritage.

Should further fossil material be discovered during the course of the development (*e. g.* during bedrock excavations), this must be safeguarded, where feasible *in situ,* and reported to a palaeontologist or to the Heritage Resources authority. In situations where the area is considered palaeontologically sensitive (*e. g.* Karoo Supergroup Formations, ancient marine deposits in the interior or along the coast) the palaeontologist might need to monitor all newly excavated bedrock. The developer needs to give the palaeontologist sufficient time to assess and document the finds and, if necessary, to rescue a representative sample.

When a Phase 2 palaeontological impact study is recommended, permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that (a) the palaeontological resources under threat have been adequately recorded and sampled, and (b) adequate development on fossil heritage, including, where necessary, *in situ* conservation of heritage of high significance. Careful planning, including early consultation with a palaeontologist and heritage management authorities, can minimise the impact of palaeontological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

Three types of permits are available; Mitigation, Destruction and Interpretation. The specialist will apply for the permit at the beginning of the process (SAHRA 2012).

The Palaeontological Society of South Africa (PSSA) does not have guidelines on excavating or collecting, but the following is suggested:

1. The developer needs to clearly stake or peg-out (survey) the areas affected by the mining/ construction/ development operations and dig representative trenches and if possible supply geological borehole data. When the route is better defined, it is recommended that a specialist undertake a 'walk through' of the entire road as well as construction areas, including camps and access roads, prior to the start of any construction activities, this may be done in sections.
2. When clearing vegetation, topsoil, subsoil or overburden, hard rock (outcrop) is found, the contractor needs to stop all work.
3. A Palaeobotanist / palaeontologist (contact SAHRIS for list) must then inspect the affected areas and trenches for fossiliferous outcrops / layers. The contractor / developer may be asked to move structures, and put the development on hold.

4. If the palaeontologist / palaeobotanist is satisfied that no fossils will be destroyed or have removed the fossils, development and removing of the topsoil can continue.
5. After this process the same palaeontologist / palaeobotanist will have to inspect and offer advice through the Phase 2 Mitigation Process. Bedrock excavations for footings may expose, damage or destroy previously buried fossil material and must be inspected.
6. When permission for the development is granted, the next layer can be removed, if this is part of a fossiliferous layer, then with the removal of each layer of sediment, the palaeontologist / palaeobotanist must do an investigation (a minimum of once every week).
7. At this stage the palaeontologist / palaeobotanist in consultation with the developer / mining company must ensure that a further working protocol and schedule is in place. Onsite training should take place, followed by an annual visit by the palaeontologist / palaeobotanist.

Fossil excavation if necessary during Phase 2:

1. Photography of fossil / fossil layer and surrounding strata.
2. Once a fossil has been identified as such, the task of extraction begins.
3. It usually entails the taking of a GPS reading and recording lithostratigraphic, biostratigraphic, date, collector and locality information.
4. Using Paraloid (B-72) as an adhesive and protective glue, parts of the fossil can be kept together (not necessarily applicable to plant fossils).
5. Slowly chipping away of matrix surrounding the fossil using a geological pick, brushes and chisels.
6. Once the full extent of the fossil / fossils are visible, it can be covered with a plaster jacket (not necessarily applicable to plant fossils).
7. Chipping away sides to loosen underside.
8. Splitting of the rock containing palaeobotanical material should reveal any fossils sandwiched between the layers.

The South African Heritage Resources Agency has the following documents in place:
Guidelines to Palaeontological Permitting policy.
Minimum Standards: Palaeontological Component of Heritage Impact Assessment reports.
Guidelines for Field Reports.
Palaeotechnical Reports (Eastern Cape, North West, Northern Cape, Mpumalanga, Gauteng, Western Cape, Free State, Kwazulu Natal, and Limpopo)

Appendix 2:

Table 2: Listing points in Appendix 6 of the Act and position in Report (bold in text).

Section in Report	Point in Act	Requirement
B	1(c)	Scope and purpose of report
B	1(d)	Duration, date and season
B	1(g)	Areas to be avoided
D	1(ai)	Specialist who prepared report
D	1(aii)	Expertise of the specialist
F Figure 3	1(h)	Map
F	1(ni)	Authorisation
F	1(nii)	Avoidance, management, mitigation and closure plan
G Table 1	1(cA)	Quality and age of base data
G Table 2	1(cB)	Existing and cumulative impacts
G	1(f)	Details or activities of assessment
G	1(j)	Description of findings

H	1(e)	Description of methodology
H	1(i)	Assumptions
J	1(o)	Consultation
J	1(p)	Copies of comments during consultation
J	1(q)	Information requested by authority
Declaration	1(b)	Independent declaration
Appendix 2	1(k)	Mitigation included in EMPr
Appendix 2	1(l)	Conditions included in EMPr
Appendix 2	1(m)	Monitoring included in EMPr
D	2	Protocol or minimum standard

ARCHAEOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED RELOCATION OF DWELLERS AT INGULA PUMPED STORAGE SCHEME

DEVELOPED FOR

MYEZO ENVIRONMENTAL MANAGEMENT SERVICES
Environmental Stewardship
Cnr Highwood & Hazyview Road, Pretoria East.
Tel: 012 9087642 Fax: 086 543 1698
Email: babalwa@myezo.co.za
Web: www.myezo.co.za

DECEMBER | 2020

Prepared by: Roy Muroyi | ASAPA | APHP | IAIAsa | SBA.
Tsimba Archaeological Footprints (Pty) Ltd
24 Lawson Mansions
74Loveday Street, Johannesburg,CBD
Gauteng, 2000
E-mail: info@tsimba-arch.co.za Cell: (+27) 813 717 993

AUTHOR'S CREDENTIALS

The report was authored by Mr. Roy Muroyi (Archaeologist) Mr. Muroyi is a holder of an Masters CDS (with specialisation in Archaeology) from the University of Witwatersrand. A holder of an Honors Degree, Archaeology, Cultural Heritage and Museum Studies (Midlands State University), he attended further training as a Laboratory Specialist for Human anatomy and human skeletal analysis through the University of Cape-Town human biology department in-conjunction with Cape Archaeological Surveys. Mr Muroyi has over six years industry experience , after leaving the Department of National Museums and Monuments of Botswana, where he worked as an Archaeological Impact Assessments adjudicating officer Mr . Muroyi then moved to South Africa where has been involved in a range of Cultural Resources Management (CRM) companies before starting Tsimba Archaeological Footprints. He has so far exhumed over 500 historical burials as a professional archaeologist and carried out close to a 100 Heritage Impact Assessments.

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Name	Qualification	Professional Registration
Jean Beater **Reviewer**	MA (Heritage Studies) MSc (Environmental Management)	Member of Association of South African Professional Archaeologists (No. 349) Member of IAIAsa (No. 1538)
Roy Muroyi **Author**	MA CDS with specialization in Archaeology. Hon (Archaeology Cultural Heritage and Museum Studies)	Member of Association of South African Professional Archaeologists (No. 453) Association of Professional Heritage Practitioners (No. C 0115)

DOCUMENT INFORMATION

DOCUMENT INFORMATION ITEM	DESCRIPTION
Proposed development and location	The proposed project is located under the jurisdiction of Phumelela and Maluti A Phofung Local Municipalities, within the Thabo Mofutsanya District Municipality.
Purpose of the study	To carry out an Archaeological Impact Assessment to determine the presence/absence of archaeological assess their archaeological significance in terms of the NHRA of 1999 and SHARA guidelines.
Topography	The site sits on rolling terrain
Coordinates	*26°16'58.83"S 28°23'57.08"E*
Municipalities	Phumelela and Maluti A Phofung Local Municipalities, within the Thabo Mofutsanya District Municipality
Predominant land use of surrounding area	Nature Reserve / Conservation area
Applicant	Eskom Holdings SOC Limited (Esckom)
Client Details	Myezo Environmental Management services (Pty) Ltd Postnet Suite B 165, Private Bag X18, Lynnwood Ridge, 0040, Pretoria
Heritage Consultant	Tsimba Archaeological Footprints (Pty) Ltd 24 Lawson Mansions 74Loveday Street, Johannesburg, CBD Gauteng, 2000 E-mail:info@tsimba-arch.co.za / rmuroyi23@gmail.com Phone : (+27) 813 717 993 / (+27) 619 12 5118
Author (s)	Mr. Roy Muroyi (Archaeology and Heritage Specialist)

EXECUTIVE SUMMARY

The Applicant Eskom Holdings SOC Limited (Eskom) proposes to embark on a relocation programme for six families at Ingula Pumped Storage Scheme, within the Ingula Nature Reserve. The Ingula Pumped Storage scheme is located in the Free State Province in the Thabo Mofutsanyana District and Phumelela Local Municipality (FS195). The site is located approximately 10 kilometres north of the Ingula Pumped Storage Scheme, about 42 kilometres north-east-east of Harrismith, 26 kilometres north-east of Van Reenen and 4.5 kilometres from the Little Drakensberg escarpment. This forms the border between the Free State and Kwa Zulu-Natal Provinces and on the north-western boundary of the Ingula Nature Reserve, in the Free State Province.

The review of a range of cultural heritage information was undertaken. This included national heritage databases, lists and registers, other documented information (including heritage impact assessment reports and a range of ethno-historic and archaeological sources at both local and regional levels) were also consulted for information regarding other heritage resources within the vicinity of Ingula Nature Reserve

From this it is clear that the Ingula Nature reserve area contains a rich and varied cultural landscape that is of particular significance to the local communities these include mainly archaeological sites and ancestral burial grounds and san rock art shelters and paintings. The cultural signature of this landscape has expression in two separate but intrinsically linked spheres: that relating to traditional and spiritual association; and that resulting from the everyday use and occupation of that landscape. The field survey noted the existence of marked and a possibility of unmarked graves within the proposed development area. These graves fall within the eastern side and the western boundary of the proposed development footprint.

The scope of work for this Archaeological Impact Assessment was to assess the footprint of the proposed development footprint as well as asses the site for cultural heritage significance and architectural significance. The proposed development area exceeds 5000m^2 therefore it triggers section *38(1) (a) of the the National Heritage Resources Act (NHRA- Act No. 25 of 1999) (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—any development or other activity which will change the character of a site—(i) exceeding 5 000 m2 in extent.*

The objective of the report is to fulfil the requirements of SAHRA who requested that an Archaeological Impact assessment be carried out before the commencement of the proposed project as outlined in the in terms of Section38(1) (Explained above) and Section 34 (4) of the NHRA (National Heritage Resources Act) No. 25 of 1999 --*No person may, without a permit issued by the responsible heritage resources authority— (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite.*

Conclusions

- *This report is an independent view and makes recommendations to the SAHRA based on its findings. The authority will consider the recommendations and make a decision based on conservation principles.*

It is the reasoned opinion of the author of this report that SAHRA should exercise its discretion and offer the proposed development a conditional approval. This is based on the fact that no other heritage resources were noted in the proposed development footprint apart from the graves falling within the proposed development. Below are the recommendations that the developer would have to stick to when developing;

Recommendations

1. No significant Stone Age material or ceramics occurs in the study area. There is, however, a stone wall structure that is attributed to the Iron Age, which is recorded within the study area. No further mitigation is recommended in terms of the archaeological component for Section 35 for the proposed development to proceed.
    - Regular Archaeological Watching Briefs are recommended during the construction phase of the proposed development
    - Due to the subsurface nature of archaeological remains in the Nature reserve and the fact that graves can occur anywhere on the landscape, it is recommended that a chance find procedure is implemented for the project as part of the EMPr as detailed below (see Appendix E).
2. In terms of the built environment of the area (Section 34), no standing structures older than 60 years occur within the study area.
3. In terms of Section 36 of the National Heritage Resources Act, the eastern side of the site contains a significant number of burial sites while two more sites occur on the western boundary of the site. Ideally the graves should be preserved in-situ or alternatively relocated according to existing legislation.
    a. If the developer chooses to preserve them in future;
        - If the developer chooses to preserve the graves, they should be fenced off and a small access gate put in order to allow relatives of the deceased access to the graves.
        - The development should observe a 50 metre buffer around the graves in order to avoid disturbing them
    b. If the developer chooses to relocate the graves, the following should be observed;
        - A qualified archaeologist should be contracted to apply for a human burial exhumation permit from SAHRA.
        - The relocation procedure will then be guided by the conditions of the SAHRA permit.

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ABBREVIATIONS

Acronyms	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GIS	Geographic Information System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LSA	Late Stone Age
LIA	Late Iron Age
MIA	Middle Iron Age
MSA	Middle Stone Age
SAHRA	South African Heritage Resources Agency

1.0 INTRODUCTION

1.1 Project Background

Tsimba Archaeological Footprints (Pty) Ltd was requested by Myezo Environmental Services (Pty) Ltd to conduct an Archaeological impact assessment (AIA) for the area proposed for relocation for six families at Ingula Pumped Storage Scheme, within the Ingula Nature Reserve. The Ingula Pumped Storage Scheme is located in the Free State Province, in the Thabo Mofutsanyana District and Phumelela Local Municipality (FS195). An AIA is required where potential impacts to archaeological resources are identified in the overview study. The impact assessment is designed to gain the fullest possible understanding of archaeological resources which would be affected by the project.

The Terms of Reference for this AIA study are:

- Review existing theories and models of archaeological interpretation and how to develop effective methods of archaeological interpretation for future generations to assist and assist South African heritage Resources Agency (SAHRA) in their deliberations.
- Clarify the extent and ways in which current site context archaeological findings may affect the interpretation of cultural sites for present and future generations;
- Shed light on the potential challenges and opportunities brought about by the existence of archaeological sites and other conflicting views of the values of a site;
- Set out the ethical considerations on the interpretation and preservation of archaeological findings given the varied range of approaches available;
- Explain that the issue of archaeological preservation and conservation as relevant not only National Heritage or Provincial Heritage properties, but also for any significant cultural site;
- Focus on best practice of interpretation and preservation of archaeological findings.

The aim: - There are two interlinked aims for this AIA. The first is to identify and document archaeological sites, cultural resources, sites associated with oral histories (intangible heritage), graves, cultural landscapes, and any structures of historical significance (tangible heritage) that may be affected within the development footprint. The second aim of this AIA is to assess the archaeological significance of the findings and make recommendations based on the best archaeological practice of interpretation and preservation of archaeological findings

The findings: - The findings of this report have been informed by desktop data review, field survey and impact assessment reporting which include recommendations to guide heritage authorities in making decisions with regards to the proposed project. This study was conducted before any activities took place on the proposed development area. The impact assessment study also includes detailed recommendations on how to mitigate and manage negative impacts while enhancing positive effects on the project area.

1.3 Need and Desirability of the Project

Eskom holdings purchased over 8000 hectares of land around the Ingula Pumped Storage Scheme, which was commissioned in 2016. As part of compensating for residual impacts on wetlands, ecosystems, which were lost during the construction of the Pumped storage scheme and as a condition of the Environmental Authorisation, Eskom was required to purchase farms comprising of key wetlands and grasslands and then ensure that these farms are proclaimed as a nature reserve to provide long term protection to these ecosystems, which provide habitat to species of global importance.

Some of the above purchased land falls outside the footprint of the power station and could be considered for the resettlement purposes. Most of the previous land owners choose not to redeploy their farm workers elsewhere. After the development progressed and Ingula area was ultimately proclaimed as a nature reserve, Eskom engaged all the landowners whose land was within the sensitive wetland ecosystems, which are characteristic of the Ingula Nature Reserve and ultimately purchased these farms. Negotiations with the last six households have been concluded and they opted to stay on the property, on a less sensitive area on the Wilger farm during the latter half of 2016, Wilger farm was identified as an idea area to relocate the remaining dwellers.

1.4 Scope of works

The Proposed project scope of the activities is given below;

The current dwellings are homesteads that consist of mud structures. The villagers practice subsistence stock farming and have garden for crop production. The new homesteads will be made of cement brick structures with adequate sanitation, utilizing conservancy tanks, solar energy, and borehole water supply. The families will be provided with land crop production and grazing through various options which entail:

- ***Option 1:*** Placing all homesteads within a centralised location and providing a shared grazing land.
- ***Option 2:*** Providing each homestead with a plot that would accommodate the homestead crop garden and grazing land.

2.0 DESCRIPTION OF THE RECEIVING ENVIRONMENT

2.1 Location

The project is located in the Free State Province in the Thabo Mofutsanyana District and Phumelela Local Municipality (FS195). The site is located approximately 10 kilometres north of the Ingula Pumped Storage Scheme, about 42 kilometres north-east-east of Harrismith, 26 kilometres north-east of Van Reenen and 4.5 kilometres from the Little Drakensberg escarpment. This forms the border between the Free State and Kwa Zulu-Natal Provinces and on the north-western boundary of the Ingula Nature Reserve, in the Free State Province.

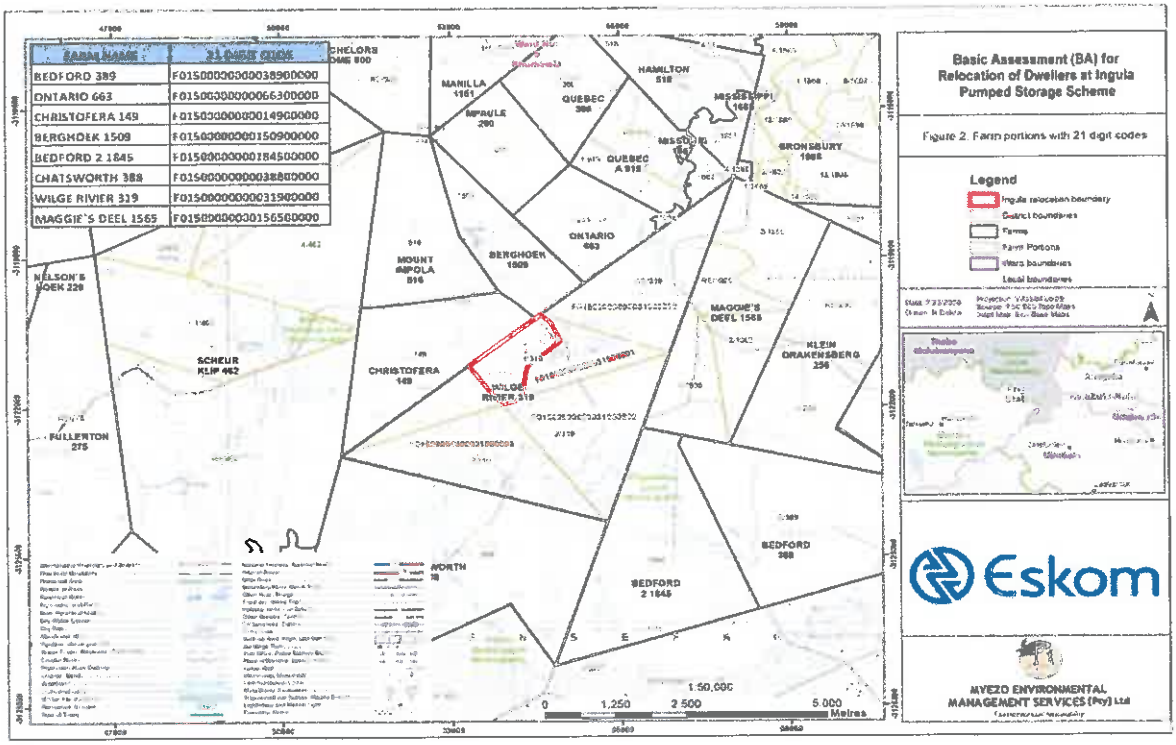

Figure 1: Regional context locality map (developed by Myezo)

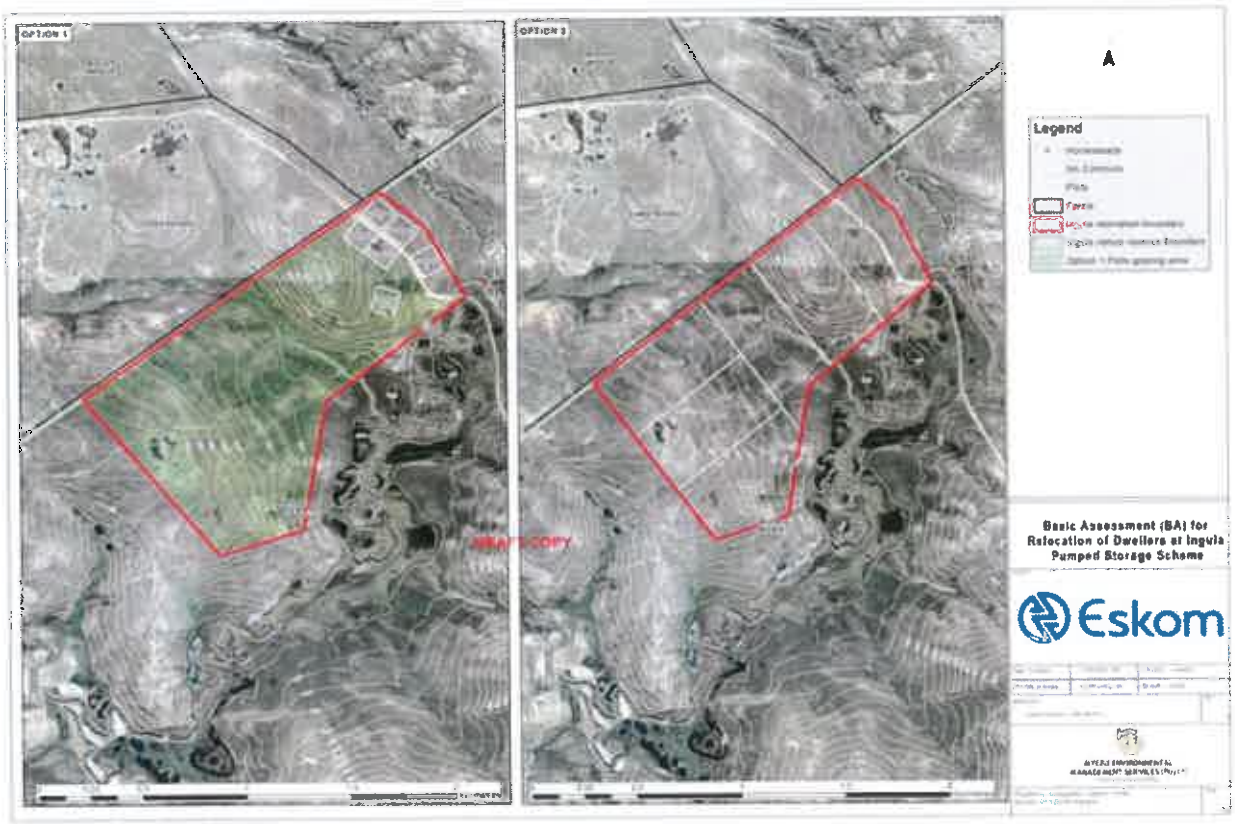

Figure 2: Map showing the development options (Developed by Myezo)

2.2 Environmental Context

This area, located in the Free State is of significant value as a source of water for the Highveld and serves as a habitat for a variety of plants, birds and animals. In addition to the wetlands, there are a variety of habitats on the property, including grassland slopes and mountain forests, with large numbers of plant species.

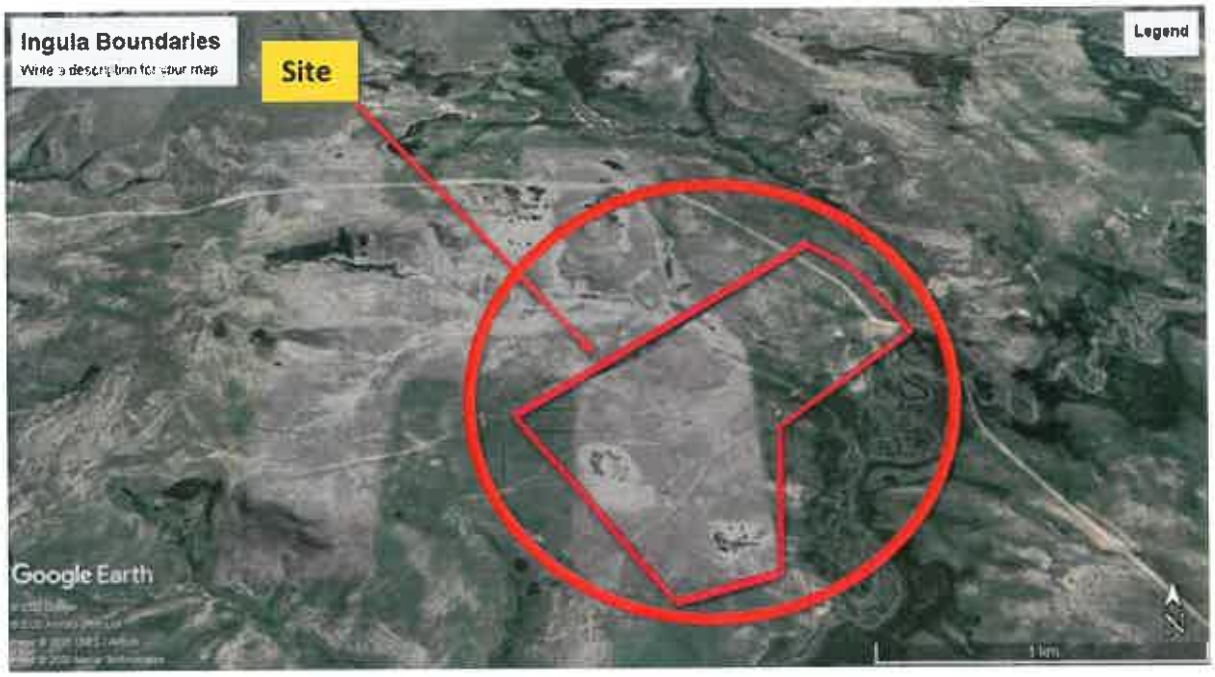

Figure 3: Google image showing the immediate context of the proposed development site

3.0 METHODOLOGY

3.1 Literature review

The methodology used in this AIA is based on a comprehensive understanding of the current or baseline situation; the type, distribution and significance of heritage resources as revealed through desk-based study and additional data acquisition, such as archaeological investigations, built heritage surveys, and recording of crafts, skills and intangible heritage. This is systematically integrated by the use of matrices with information on the nature and extent of the proposed engineering and other works to identify potential. The following tasks were also undertaken in relation to the cultural heritage and are described in this report:

The background information search of the proposed development area was conducted following the site maps from the client. Sources used in this study included:

- Published academic papers and AIA and PIA studies conducted in and around the region where the proposed infrastructure development will take place;
- Available archaeological literature on the Ingula Nature reserve was consulted;

- The SAHRIS website and the National Data Base were consulted to obtain background information on previous heritage surveys and assessments in the area; and other planning documents.
- Map Archives - Historical maps of the proposed area of development and its surrounds were assessed to aid information gathering of the proposed area of development and its surrounds.

3.2 Field Survey / Ground Truthing

Tsimba Archaeological Footprints heritage specialists attended to the site on the 27th of November 2020 as agreed to by the client. The survey was conducted on foot and driving a systemic survey of the area as indicated by Burke and Smith (2004) resulted in the maximum coverage of the site.
The survey investigated the cultural resources onsite using the best possible technologies for archaeological field surveys. A Samsung GPS Logger (2018) was used to find co-ordinates and a Nikon W300 Camera (with built in GPS) was used to document the resources as well as the receiving environment.

3.3 Public Participation Process

Article 12 of the Burra Charter states the conservation, interpretation and management of a heritage resource should provide for the participation of people for whom the place has significant associations and meanings, or who have social, spiritual or other cultural responsibilities for the place.

A comprehensive public participation process (PPP) was carried out by Myezo Environmental Management Services in terms of the EIA Regulations (2014) and has ensured that the public participation principles are upheld. A successful PPPP is one that is inclusive, actively engages the public and provides ample opportunity for the public to participate in the process.

The purpose of the PPP is to ensure that the issues, inputs and concerns of Interested and Affected Parties (I&APs) are taken into account during the decision-making process. This requires the identification of I&APs (including authorities, technical specialists and the public), communication of the process and findings to these I&APs and the facilitation of their input and comment on the process and environmental impacts, including issues and alternatives that are to be investigated.

4.0 LEGISLATIVE FRAMEWORK

This HIA is informed and conducted to fulfil the requirements of the National Heritage Resources Act (No 25 of 1999) *38(1) (a) of the National Heritage Resources Act (NHRA- Act No. 25 of 1999) Section 38(1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as— any development or other activity which will change the character of a site—(i) exceeding 5 000 m2 in extent; and 34 (4) No person may, without a permit issued by the responsible heritage resources authority— (a) destroy,*

damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite.

4.1 Legislative Frame works used

- The Australia ICOMOS charter for places of cultural significance (the Burra Charter).
- The Principles for the analysis, conservation and structural restoration of architectural heritage (2003)
- The National Heritage and Resources Act of South Africa No.25 of 1999
- The Athens Charter, the Restoration of Historic Monuments (1931)
  The International Council on Monuments and Sites (1965)
- The World Heritage Convention(1972)
- The Washington Charter (1987)
- The International Charter for the Conservation and Restoration of Monuments and sites (the Venice charter 2006).
- The Organisation of World Heritage Cities (1993).

4.2 Scope of the Phase 1 AIA

A Phase 1 AIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management of these impacts.

4.3 Archaeological Resources Management Policy Objectives

a. To preserve representative samples of the National archaeological resources for the scientific and educational benefit of present and future generations;
b. To ensure that development proponents consider archaeological resource values and concerns in the course of project planning; and
c. To ensure where decisions are made to develop land, the proponents adopt one of the following actions:
   - avoid archaeological sites wherever possible;
   - implement measures which will mitigate project impacts on archaeological sites; or
   - compensate the local communities for unavoidable losses of significant archaeological value

5.0 ARCHEOLOGICAL BACKGROUND

According to historical records and few available archival documents, the area now known as Ingula Nature reserve was 'Braamhoek'. This name was to be officially changed to 'Ingula' in March 2007. The name 'Ingula' alludes to the creamy contents at the top of a milk calabash. Its strong association with the local people is therefore paramount to this archaeological assessment. The use of the name Ingula was as a result to find an appropriate name for Ingula Power Station was inspired by the mountains and foamy river-waters, and the rich cultural symbols and traditions of the indigenous people on both sides of the border[1].

Deacon and Deacon (1999) observed that the Stone Age prehistory of South Africa is important to humanity as a whole, since South African sites record the broad sweep of human evolution, from the appearance of the australopithecines before three million years ago to the origins of fully modern humans within the last 250 000 years. From 1924 until 1959, the australopithecines were known only from South Africa, and even now, the australopithecine sample from Taung, Makapansgat, and the famous Krugersdorp caves outnumbers the better publicised sample from sites associated with the East African Rift Valley. The South African sample also underscores the growing realisation that the australopithecines-some of which survived to between two million and 1.5 million years ago-were essentially bipedal apes, who barely used technology and who depended heavily on trees for refuge or feeding (Deacon and Deacon, 1999 p. 149)

South Africa by 115 000 years ago, and their emergence may coincide with the transition from the Acheulean (Early Stone Age) to the Middle Stone Age (MSA) roughly 250 000 years ago. MSA sites differ from Acheulean ones most obviously in the absence of hand-axes and other large bifacial stone tools, but together MSA and Acheulean sites differ from LSA ones in the rarity or absence of formal bone artefacts and art objects, and MSA faunal remains suggest that compared to LSA people, MSA hunter-gatherers obtained fish and dangerous terrestrial game like buffaloes much more rarely and that MSA human populations were much less dense. Based on similarities in MSA and LSA site locations, in the structure and positioning of fire places. Archaeologists believe that MSA and LSA people were fundamentally similar in behaviour (Deacon and Deacon, 1999 p. 150). The archaeological excavation report by Anderson and Anderson (2006) conducted for Ingula showed that the Ingula nature reserve area has a very high frequency of stone instruments in all the units, especially formal tools. These tools were also found around a few shelters in the Thukela River Valley and Mhlatuzana Shelter (approximately 40 km inland from Durban): these are not all of the area's excavated sites, but the most prominent and documented ones.

The report further noted that for Rose Cottage Cave, the stone tool assemblages have not yet been published. With the exception of Mhlatuzana Shelter, the stone tool frequency of stone tools around the Ingula Nature

[1] Eskom (2016) Ingula Pumped Storage Scheme: Accessed November 27, 2020 https://www.eskom.co.za/Whatweredoing/NewBuild/IngulaPumpedStorage/Pages/Ingula_Pumped_Storage_Scheme.aspx

reserve is unlike that of the other sites in terms of deposit depth. There is a far higher frequency of stone instruments in the Mhlatuzana Shelter, but a much lower percentage of formal instruments. In addition, all of the squares down to 2.5m are in Mhlatuzana Shelter, whereas Ingula Nature reserve has only 4 squares at a similar depth.

A more thorough analysis of raw materials and formal tool types and other categories of tools is needed. There are equal numbers of stone instruments at KwaThwaleyakhe Shelter (although a higher density of artefacts) The proportion of formal instruments for Ingula Nature reserve is three to four times higher than that of the other locations. This is important as the Pleistocene and early Holocene layers are rare in the area, and tend not to have high percentages of formal tools (see Wadley 2000). It also provides data about scraper types. At BS2, several scraper types have been noted, and these will be contrasted with other sites. The standard, or the more frequently occurring scraper type, is end scrapers. The tiny, medium and large scrapers have a temporal connotation: over time, scrapers get smaller (see Mazel 1989; Anderson 1996).

The area around Ingula is also famous for San rock paintings as it falls under the Drakensburg escarpment. Frans Prins (2009: 192) notes that the persistence of indigenous beliefs relating to the rock art came as a surprise to Patricia Vinnicombe who has done a lot of work on the Drakensburg escarpment rock art. Her own research on the southern Drakensberg rock art had been heavily influenced by the premise of an extinct Drakensberg San. The perceived absence of a vibrant Drakensberg San ethnography necessitated her to engage with the ethnographies of San groups (such as the /Xam and !Kung) removed in space and time from the prehistoric rock artists of the Drakensberg. In this approach she was not alone, as the skilful and selective use of diverse San ethnographies has become the dominant trend in southern African rock art research (p.192)

6.0 DISCUSSION OF THE FINDINGS

This field visit, completed by a qualified archaeologist, assessed the entire area that could be impacted during construction. The assessment included visual inspection to identify features with predictable archaeological potential, surface inspection of areas with exposed sediments for cultural materials, subsurface testing of terrain features exhibiting archaeological potential, and ground conditions .After the field study has been completed, a report including associated findings was prepared based on the results of the field survey.

Figure 4: Vegetation cover within the proposed development footprint

Figure 5: View of some of the excavated areas that were inspected for possible archaeological artefacts

Figure 6: Vie of some of the access roads within the site

Figure 7: View of some cow dung within the proposed site

6.1 Archaeological and Paleontological resources

- *Section 35 (4) of the National heritage resources act states that no person may, without a permit issued by the responsible heritage resources authority issued by SAHRA or a provincial Heritage Resources authority.*

During the survey, no Stone Age sites were recorded, this however does not rule out the possibility of any Stone Age findings during the construction phase. The dense vegetation cover made it almost impossible for smaller Stone Age artefacts and fragments to be discovered. However, a possible Later Iron Age Cattle Kraal was recorded during the field survey. No middens or any other associated Iron Age findings were made in association

with this kraal making its context very difficult to be known and its existence to be interpreted. This cattle kraal is given a **LOW** Significance rating.

Figure 8: View of the Later Iron age cattle kraal [GPS -28.200308, 29.554998]

6.2 Burial Grounds and Graves

- *Section 36(3) of the National Heritage Resources Act states that no person may, without a permit issued by SAHRA or a provincial Heritage Resources authority.*

The field survey noted the existence of marked and unmarked recent graves. Some of the graves are isolated and some are at clustered in one place.

Burial Site No1	
Coordinates : -28.198024 29.552555	
Number of Burials : 1	
Description: Marked grave The grave is a stand-alone grave on the western boundary of the proposed development site. The grave is marked by stones.	
Significance :High	

Burial Site No2	
Coordinates : -28.199188, 29.555609	
Number of Burials : About 8	
Description: Marked grave This is a possible family burial ground with burials marked with stones. The graves are about 8 in number. Close to the homesteads on the proposed grazing lands for Option 1	
Significance : High	

Burial Site No3	
Coordinates : -28.199184, 29.555546	
Number of Burials : 1	
Description: Marked grave This is a stand – alone marked grave	
Significance: High	

Burial Site No4	
Coordinates : -28.200506, 29.555350	
Number of Burials: Number not clearly determined as markings are not clear, possibly 3 graves	
Description: Marked grave The grave markings are scattered everywhere therefore making it difficult to determine the number of graves present.	
Significance : High	

Burial Site No5	
Coordinates : -28.207381, 29.549929	
Number of Burials : Number not determined	
Description: Marked grave The grave markings are scattered everywhere therefore making it difficult to determine the number of graves present.	
Significance: High	

Burial Site No6	
Coordinates : -28.206528, 29.547589	
Number of Burials : Possible Burial (1)	
Description: Half marked possible grave This possible burial though it has no clear markings it has a head stone with some numbers scribed on it.	
Significance : High (if it is indeed a burial)	

7.0 HERITAGE ASSESSMENT OF SIGNIFICANCE

Site significance classification standards prescribed by SAHRA (2006), and acknowledged by ASAPA for the SADC region, were used for the purposes of this report.

- The main aim in assessing significance is to produce a succinct statement of significance, which summarises an item's heritage values. The statement is the basis for policies and management structures that will affect the item's future.

SAHRA's Site significance classification minimum standards			
Filed Rating	**Grade**	**Classification**	**Recommendation**
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

Site significance is calculated by combining the following concepts in a given formula.

S= (E+D+M) P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

The significance weightings for each potential impact are as follows:		
Aspect	**Description**	**Weight**
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8

Impact Significance		
It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. (S) is formulated by adding the sum of numbers assigned to Extent (E), Duration (D), and Intensity (I) and multiplying the sum by the Probability. S= (E+D+M) P		
<30	Low	Mitigation of impacts is easily achieved where this impact would not have a direct influence on the decision to develop in the area.
30-60	Medium	Mitigation of impact is both feasible and fairly easy. The impact could influence the decision to develop in the area unless it is effectively mitigated.
>60	High	Significant impacts where there is difficult. The impact must have an influence on the decision process to develop in the area.
Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects.		
	Without Mitigation	With Mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low(2)
Probability	Not Probable (2)	Not probable (2)
Significance	Low (16)	Low (16)
Status	Negative	Negative
Reversibility	Not irreversible	Not irreversible
Irreversible loss of resources	No resources were recorded	No resources were recorded
Can impacts be mitigated?	Yes, a chance find procedure should be implemented.	Yes
Mitigation: Impacts are rated as 30- 60 (Medium). Mitigation of impact is both feasible and fairly easy.		

7.1 Conclusions

- *This report is an independent view and makes recommendations to SAHRA based on its findings. The authority will consider the recommendations and make a decision based on conservation principles.*

It is the reasoned opinion of the author of this report that SAHRA should exercise its discretion and offer the proposed development a conditional approval. This is based on the fact that no other significant heritage resources were noted in the proposed development footprint apart from the graves of the proposed development. Below are the recommendations that the developer would have to adhere to when developing;

7.2 Recommendations

1. No significant Stone Age material or ceramics occurs in the study area. There is however a stone wall structure attributed to the Iron Age recorded within the study area. No further mitigation is recommended in terms of the archaeological component for Section 35 for the proposed development to proceed.
    - Regular Archaeological Watching Briefs are recommended during the construction phase of the proposed development
    - Due to the subsurface nature of archaeological remains in the Nature reserve and the fact that graves can occur anywhere on the landscape, it is recommended that a chance find procedure is implemented for the project as part of the EMPr as detailed below (see Appendix E).
2. In terms of the built environment of the area (Section 34), no standing structures older than 60 years occur within the study area.
3. In terms of Section 36 of the National Heritage Resources Act, the eastern side of the site contains a significant number of burial sites while two more sites occur on the western boundary of the site. Ideally the graves should be preserved in-situ or alternatively relocated according to existing legislation.
    c. If the developer chooses to preserve them in future;
        - If the developer chooses to preserve the graves, they should be fenced off and a small access gate the put in order to allow relatives of the deceased access to the graves.
        - The development should observe a 50 metre buffer around the graves in order to avoid disturbing them
    d. If the developer chooses to relocate the graves, the following should be observed;
        - A qualified archaeologist should be contracted to apply for a human burial exhumation permit from SAHRA.
        - The relocation procedure will then be guided by the conditions of the SAHRA permit.

8.0 REFERENCES

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APPENDIX A: DEFINITION OF TERMS ADOPTED IN THIS HIA

- **The terminology adopted in this document is mainly influenced by the NHRA of South Africa (1999) and the Burra Charter (1979).**

Adaptation: Changes made to a place so that it can have different but reconcilable uses.

Artefact: Cultural object (made by humans).

Buffer Zone: Means an area surrounding a cultural heritage which has restrictions placed on its use or where collaborative projects and programs are undertaken to afford additional protection to the site.

Co-management: Managing in such a way as to take into account the needs and desires of stakeholders, neighbours and partners, and incorporating these into decision making through, amongst others, the promulgation of a local board.

Conservation: In relation to heritage resources, includes protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance as defined. These processes include, but are not necessarily restricted to preservation, restoration, reconstruction and adaptation.

Contextual Paradigm: A scientific approach which places importance on the total context as catalyst for cultural change and which specifically studies the symbolic role of the individual and immediate historical context.

Cultural Resource: Any place or object of cultural significance

Cultural Significance: Means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance of a place or object for past, present and future generations.

Feature: A coincidental find of movable cultural objects.

Grading: The South African heritage resource management system is based on a grading system, which provides for assigning the appropriate level of management responsibility to a heritage resource.

Heritage Resources Management: The utilization of management techniques to protect and develop cultural resources so that these become long term cultural heritage which are of value to the general public.

Heritage Resources Management Paradigm:A scientific approach based on the Contextual paradigm, but placing the emphasis on the cultural importance of archaeological (and historical) sites for the community.

Heritage Site Management: The control of the elements that make up the physical and social environment of a site, its physical condition, land use, human visitors, interpretation etc. Management may be aimed at preservation or, if necessary at minimizing damage or destruction or at presentation of the site to the public.

Historic: Means significant in history, belonging to the past; of what is important or famous in the past.

Historical: Means belonging to the past, or relating to the study of history.

Maintenance: Means the continuous protective care of the fabric, contents and setting of a place. It does not involve physical alteration.

Object: Artefact (cultural object)

Paradigm: Theories, laws, models, analogies, metaphors and the epistimatological and methodological values used by researchers to solve a scientific problem.

Preservation: Refers to protecting and maintaining the fabric of a place in its existing state and retarding deterioration or change, and may include stabilization where necessary. Preservation is appropriate where the existing state of the fabric itself constitutes evidence of specific cultural significance, or where insufficient evidence is available to allow other conservation processes to be carried out.

Protection: With reference to cultural heritage resources this includes the conservation, maintenance, preservation and sustainable utilization of places or objects in order to maintain the cultural significance thereof.

Place : Means a geographically defined area. It may include elements, objects, spaces and views. Place may have tangible and intangible dimensions.

Reconstruction: To bring a place or object as close as possible to a specific known state by using old and new materials.

Rehabilitation: The repairing and/ or changing of a structure without necessarily taking the historical correctness thereof into account.

Restoration: To bring a place or object back as close as possible to a known state, without using any new materials.

Site: A large place with extensive structures and related cultural objects. It can also be a large assemblage of cultural artefacts, found on a single location.

Sustainable: Means the use of such resource in a way and at a rate that would not lead to its long-term decline, would not decrease its historical integrity or cultural significance and would ensure its continued use to meet the needs and aspirations of present and future generations of people.

APPENDIX B: ENVIRONMENTAL CONTEXT FOR HERITAGE SPECIALIST STUDIES IN SOUTHERN AFRICA

This is a categorized by a temporal layering including a substantial pre-colonial, early contact and early colonial history as distinct from other regions. The following table can be regarded as a useful categorization of these formative layers.

Indigenous:

Palaeontological and geological:

- Precambian (1.2 bya to late Pleistocene 20 000 ya)

Archaeological:

- Earlier Stone Age (3 mya to 300 00ya) (ESA)
- Middle Stone Age (c300 000 to 30 000 ya) (MSA)
- Later Stone Age (c 30 000 to 2000 ya) (LSA)
- Late Stone Age Herder period (after 2000 ya) (LSA - Herder period)
- Early contact (c 1500 - 1652)

Colonial:

- Dutch East India Company (1652 - 1795)
- Transition British and Dutch occupation (1796-1814)
- British colony (1814 -1910)
- Union of South Africa (1911-1961)
- Republic of South Africa (1962 – 1996)

APPENDIX C: DEFINITION OF VALUES

Value	Definition
Historic Value	Important in the community or pattern of history or has an association with the life or work of a person, group or organization of importance in history.
Scientific Value	Potential to yield information that will contribute to an understanding of natural or cultural history or is important in demonstrating a high degree of creative or technical achievement of a particular period
Aesthetic Value	Important in exhibiting particular aesthetic characteristics valued by a community or cultural group.
Social Value	Have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
Rarity	Does it possess uncommon, rare or endangered aspects of natural or cultural heritage
Representivity	Important in demonstrating the principal characteristics of a particular class of natural or cultural places or object or a range of landscapes or environments characteristic of its class or of human activities (including way of life, philosophy, custom, process, land-use function, design or technique) in the environment of the nation, province region or locality.

APPENDIX D: RESOURCE LIKELY TO OCCUR WITHIN THESE CONTEXTS AND LIKELY SOURCES OF HERITAGE IMPACTS/ISSUES

HERITAGE CONTEXT	HERITAGE RESOURCES	SOURCES OF HERITAGE IMPACTS/ISSUES
A. PALAEONTOLOGICAL LANDSCAPE CONTEXT	Fossil remains. Such resources are typically found in specific geographical areas, e.g. the Karoo and are embedded in ancient rock and limestone/calcrete formations.	▯ Road cuttings ▯ Quarry excavation
B. ARCHAEOLOGICAL LANDSCAPE CONTEXT NOTE: Archaeology is the study of human material and remains (by definition) and is not restricted in any formal way as being below the ground surface.	Archaeological remains dating to the following periods: ▪ ESA ▪ MSA ▪ LSA ▪ LSA - Herder ▪ Historical ▪ Maritime history Types of sites that could occur include: ▪ Shell middens ▪ Historical dumps ▪ Structural remains	▪ Subsurface excavations including ground leveling, landscaping, foundation preparation. ▪ In the case of maritime resources, development including land reclamation, harbor/marina/water front developments, marine mining, engineering and salvaging.
C. HISTORICAL BUILT URBAN LANDSCAPE CONTEXT	▯ Historical townscapes/streetscapes. ▯ Historical structures; i.e. older than 60 years ▯ Formal public spaces. ▯ Formally declared urban conservation areas. ▯ Places associated with social identity/displacement.	A range of physical and land use changes within this context could result in the following heritage impacts/issues: ▯ Loss of historical fabric or layering related to demolition or alteration work. ▯ Loss of urban morphology related to changes in patterns of subdivision and incompatibility of the scale, massing and form of new development. ▯ Loss of social fabric related to processes of gentrification and urban renewal.

APPENDIX E: CHANCE FINDS PROCEDURE

What is a Chance Finds Procedure?

The purpose of Archaeological Chance Find Procedure (CFP) is to address the possibility of cultural heritage resources and archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required. A CFP is a tool for the protection of previously unidentified cultural heritage resources during construction period. The main purpose of a CFP is to raise awareness of all workers on site regarding the potential for accidental discovery of cultural heritage resources and establish a procedure for the protection of these resources.

Chance finds are defined as potential cultural heritage (or paleontological) objects, features, or sites that are identified outside of or after Heritage Impact studies, normally as a result of construction monitoring. Archaeological sites are protected by The National Heritage Resources Act of 1999. They are non-renewable, very susceptible to disturbance and are finite in number. Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public, local communities.

What are the objectives of the CFP?

The objectives of this "Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling It is recommended that due to thearchaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

Where is a CFP applicable?

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits. Chance finds may be made by any member of the project team who may not necessarily be an archaeologist or even visitors. Appropriate application of a CFP on development projects has led to discovery of cultural heritage resources that were not identified during archaeological and heritage impact assessments. As such, it is considered to be a valuable instrument when properly implemented. For the CFP to be effective, the mine manager must ensure that all personnel on the proposed mine site understand the CFP and the importance of adhering to it if cultural heritage resources are encountered. In addition, training or induction on cultural heritage resources that might potentially

be found on site should be provided. In short, the Chance Find Procedure details the necessary steps to be taken if any culturally significant artefacts are found during mining or construction.

What is the CF Procedure?

The following procedure is to be executed in the event that archaeological material is discovered:

- All construction activity in the vicinity of the accidental find/feature/site must cease immediately to avoid further damage to the site.
- Briefly note the type of archaeological materials you think you've encountered, its location, and if possible, the depth below surface of the find.
- Report your discovery to your supervisor or if they are unavailable, report to the project Environmental Control Officer (ECO) who will provide further instructions.
- If the supervisor is not available, notify the ECO immediately. The ECO will then report the find to the Manager who will promptly notify the project archaeologist and SAHRA.
- Delineate the discovered find/ feature/ site and provide a 25m buffer zone from all sides of the find.
- An archaeologist should immediately be called to attend to the site and give further recommendations