HERITAGE SCREENING ASSESSMENT REPORT FOR THE PROPOSED CASCADE IRON ORE MINE LOCATED IN MKHONDO LOCAL MUNICIPALITY, WITHIN GERT SIBANDE DISTRICT, MPUMALANGA PROVINCE, REPUBLIC OF SOUTH AFRICA

17 October 2014
ACKNOWLEDGEMENT OF RECEIPT

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DECLARATION OF INDEPENDENCE

This heritage screening assessment report has been compiled by Nkosinathi Tomose, Principal Archaeologist and Heritage Consultant for NGT Project and Heritage Consultants. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the project.

HERITAGE CONSULTANT: NGT Projects & Heritage Consultants

CONTACT PERSON: Nkosinathi Tomose

Declaration:
I, Nkosinathi Tomose, declare that:

- I act as an independent specialist;
- I have performed the work relating to this assessment in an objective manner;
- I declare that there are no circumstances that compromised my objectivity in carrying out this assessment;
- I have expertise in conducting the specialist report, including knowledge of the regulations and any guidelines that have relevance to the proposed activity;
- I have no conflicting interests in the undertaking of the activity;
- I have no interest in the project other than fair remuneration for work carried out;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has the potential of influencing any decision to be taken with respect to the proposed project by the competent authority;
- All the particulars furnished by me are correct.

SIGNATURE:
EXECUTIVE SUMMARY

NGT Projects and Heritage Consultants (Division: NGT Heritage Solutions), was contracted by Ethical Exchange to conduct a Heritage Specialist Scoping Assessment for the mining rights application on farms Remaining Extent (R/E) of Farm Cascade 442 IT, Portion 1 – 9 and R/E of Farm Ishelo 441 IT, Portion 4 and R/E of Farm Haarlem 443 IT as part of specialist input into the environmental impact assessment required to fulfil the mining rights application and the environmental management process which forms part of the rights application process. The mining right application is for a mine known as the Cascades Iron Ore Mine. The mining rights application is in terms of Section 22 of the Mining and Petroleum Resources Development Act, Act 28 of 2002. The heritage specialist scoping assessment is in terms of Section 38 (1) of the National Heritage Resources Act, No. 25 of 1999.

Nkosinathi Tomose, principal archaeologist and heritage consultant from NGT Projects & Heritage Consultants, conducted the screening study. This study assesses a range of all manmade or human influenced/altered resources within farms Remaining Extent (R/E) of Farm Cascade 442 IT, Portion 1 – 9 and R/E of Farm Ishelo 441 IT, Portion 4 and R/E of Farm Haarlem 443 IT. There was no physical survey of the proposed project area (footprint) at this stage – the study is still at desktop/scoping level. It identified communities and archaeological sites in and around the proposed development areas. Among the identified communities are 5 communities located within the proposed 3 mining blocks. South of the 3 mining blocks, 1 community is found and 4 more communities along the pipeline, stockpiles and plants as well as in the area north of the railway siding.

Conclusions:

- It is concluded that the study is only a desktop scoping study and it did not include the physical survey of the proposed development area.
- The proposed development area has a potential to yield archaeological and rock art sites dating from Stone Age, Iron Age to Historic period.
- It is also conclude that some 5 communities will be directly affected and this may include an impact on the burial ground and graves.

Recommendations
• It is recommended that a detailed heritage impact assessment (HIA) be conducted once this report has been reviewed by the SAHRA and MPHRA.
• The HIA should include an onsite verification of heritage resources.
• Recording and documenting of identified resources must be undertaken using the necessary tools and equipment and impact evaluation and assessment process.
• The HIA should make recommendations for mitigating / managing impacts on affected resources, individuals and communities.
• Once the HIA has been completed, details of compensation to be resolved between Mkhombi Mining and affected parties.
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<tr>
<td>AIA</td>
<td>Archaeological Impact Assessment</td>
</tr>
<tr>
<td>ASAPA</td>
<td>Association of South African Professional Archaeologists</td>
</tr>
<tr>
<td>ARCH</td>
<td>Archaeological</td>
</tr>
<tr>
<td>BA</td>
<td>Basic Assessment</td>
</tr>
<tr>
<td>BID</td>
<td>Background Information Document</td>
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<tr>
<td>BEL</td>
<td>Built Environment and Landscape</td>
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<tr>
<td>BGG</td>
<td>Burial Grounds and Graves</td>
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<tr>
<td>BGG</td>
<td>Proven not to be Burial Ground and Grave</td>
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<tr>
<td>CBD</td>
<td>Central Business District</td>
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<tr>
<td>CRM</td>
<td>Cultural Resource Management</td>
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<tr>
<td>DEA</td>
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<td>Environmental Assessment Practitioner</td>
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<td>EIR</td>
<td>Environmental Impact Report</td>
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<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ESA</td>
<td>Early Stone Age</td>
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<tr>
<td>I&amp;AP</td>
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<td>K.y.a</td>
<td>Thousand years ago</td>
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<td>LSA</td>
<td>Late Stone Age</td>
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<td>LIA</td>
<td>Late Iron Age</td>
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<tr>
<td>MIA</td>
<td>Middle Iron Age</td>
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<tr>
<td>NHRA</td>
<td>National Heritage Resources Act</td>
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<tr>
<td>NEMA</td>
<td>National Environmental Management Act</td>
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<td>NWA</td>
<td>National Water Act</td>
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<td>PHRA</td>
<td>Provincial Heritage Resources Authority</td>
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TERMS AND DEFINITIONS

Archaeological resources

This includes:

- material remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- Features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

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

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

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

**Heritage resources**

This means any place or object of cultural significance
1. INTRODUCTION

1.1. Project Background
Mkhombi Mining (Pty) Ltd has applied for mining rights, in terms of Mineral and Petroleum Resources Act (MPRDA, 2002), to mine iron ore, manganese, limestone, marble and nickel on the following farms: the Remaining Extent (R/E) of Farm The Cascade 442 IT; Portion 1–9 and R/E of Farm Ishlelo 441 IT; and on Portion 4 and R/E of Farm Haarlem 443 I on farm The Cascade 442 IT (Ethical Exchange BID, 2014). The majoring of the proposed mining activities will take place on farm The Cascade 442 IT (ibid).

1.1.1. Project Location
The proposed The Cascade Iron Ore Project is situated ~350 km south-east of Johannesburg, between the towns of Amsterdam and Piet Retief along the R33 provincial road. The area is located in the Mkhondo Local Municipality, Gert Sibande District Municipality, and Mpumalanga Province, and is just west of the Swaziland border (Figure 1 & 2).

1.1.2. Details of the Project
The mining right application covers an area of approximately 8,000 ha in extent on the farms: Remaining Extent (R/E) of Farm Cascade 442 IT, Portion 1 – 9 and R/E of Farm Ishelo 441 IT, Portion 4 and R/E of Farm Haarlem 443 IT. The proposed iron ore mine is planned as an opencast mining operation. Based on the results of a conceptual mine planning study that was completed in 2012, Mkhombi Mining is proposing to develop an opencast mine with an iron ore concentrate output of 2 Million tonnes per annum (Mtpa). The reason for the 2 Mtpa concentrate output is due to the fact that it has become apparent that there is potential for 2 Mtpa rail capacity to be available on the coal line to Richards Bay and furthermore, there is potential access to facilities at the port of Richards Bay to export iron ore pellets.

The conceptual mine planning study stated that the mineral resource on the farm The Cascade is sufficient to support a mining project with a 2 Mtpa concentrate output for more than 20 years. 6 Million tonnes of runoff ore will be mined per annum in order to produce 2 Mtpa of pelletized iron ore concentrate. Thus, for a 20 year life of mine, 120.5 million tonnes of ore will be mined from the open pits. With a waste to ore strip ratio of 1.61:1, some 194 million tonnes of waste will have to be mined to access all the ore.
Mining Method

On the farm The Cascade, the iron ore bearing magnetite has been identified in three distinct minable blocks that outcrop on surface. The mineable blocks are separated from each other by a series of horst and or graben structures. The deposits are generally tabular in nature with gentle dips that vary between 7-15 degrees. Anomalous deposit dips of up to 25 degrees are present sporadically across the property. For this type of ore body outcropping to surface, the conventional drill, blast, load and haul open cast mining would be adopted. There is no free dig material so all material will be drilled and blasted from the start of mining.

Overview of the Mining and Operational Process

The envisaged overall process from pit to port involves the following:

- Mining of iron ore resource on the farm The Cascade.
- Processing of mine ore to produce a fine concentrate on the mining area.
- Slurry transport, via pipeline, of the concentrate fines from the mining area to the existing Wildrand rail siding.
- Dewatering of the concentrate at the rail siding.
- Pelletising of the concentrate at the rail siding.
- Storage and loading of the pellets onto rail trucks and transport to Richards Bay Port.
- Storage and handling of the pellets onto vessels for export.

Concentrator Plant

Processing of mine ore to a concentrate will consist of the following:

- Primary milling and magnetic separation.
- Ball milling and secondary magnetic separation.
- Fine milling and third stage magnetic separation.
• Cleaning of the concentrate through flotation.

Tailings Storage Facility

The mine will produce 4,250,000 tonnes of tailings per annum over the 20 year life of mine. The total volume of tailings to be deposited 53,125,000 m³ over the mine life. The tailings storage facility will be approximately 180 hectares, or an area of 1298 x 1388 metres, which includes the tailings dam, the external paddocks, solution trench, road around the tailings dam and the return water dam. It will have a final height of 34 to 40 m, and overall slope of 1:3.

The dam will be constructed with a clay underliner to prevent seepage of water associated with the tailings into the groundwater. Return water from the tailings dam will be decanted via a penstock system to the return water dams prior to being returned to the plant for reuse. It is likely that a cyclone deposition system will be employed, to allow the coarse size fraction in the tailings to be used for wall construction.

Slurry Pipeline and Pelletising Plant

The finely milled concentrate will be slurry pumped to the pelletising plant at the Wildrand rail siding where it will be pelletised to make it suitable for the steel plant processes and it also makes the product easier for rail transport. The direct distance from plant to rail siding is approximately 11 km.

The pelletising process consists of a balling section, a sintering section and a product screening and dispatch section. The concentrate is mixed with a binder and formed into balls in a rotating drum or disc. The balls are normally sized between 10 mm and 16 mm with a nominal size of 12 mm. They are transported via conveyors to the sintering furnace. Once fed through the furnace, the cooled pellets are screened. The pellets produced will then be stockpiled, loaded and railed (see rail siding description below).
**Water Supply**

The mine and plant will be designed to reclaim as much water as possible from each process stage. The plan is that the concentrate will be pumped to a pelletizing plant as a slurry, and water filtrate will be returned back to the mine for re-use in the process.

The expected make-up water requirement for the plant to produce 2 Mtpa of concentrate, is about 2,000,000 m³/annum, and mining operations will require a further 300,000 m³/annum, bringing the total to 2,300,000 m³/annum.

For the water supply to the project, exploratory discussions with the Department of Water and Sanitation (DWS) indicated that there are no significant supplies of water available from the existing storage sources in the area such as the Jerico and Morgenstond dams, or a weir in the Hlelo River. Therefore, different options for building new storage dams in one of the local catchment areas are being considered. Options for water supply to the mine will be further investigated during the feasibility study and in consultation with DWA, relevant catchment management agencies and stakeholders dealing with water-related matters.

**Power Supply**

Total power requirements for the mine and associated plant to produce 2 Mtpa of pelletised concentrate is estimated at 35 megavolt ampere (MVA). Initial discussions with Eskom representatives have indicated that the local area distribution network would not be able to supply this requirement. Different power supply options are being investigated, such as supply from the nearby the 400 kV transmission line to Mozambique, supply from the Camden Power Station some 80 km away, or locally generated power. Options for power supply to the mine will be further investigated during the feasibility study and in consultation with relevant stakeholders. It is assumed that there will be an overhead power line, 11 kV or 33 kV, to both the concentrator plant and the pelletising plant and that the line will run adjacent to the R33 between the plants.

**Surface Infrastructure**

Associated surface infrastructure for the project will include:

- Offices
• Stores
• Security
• Road construction
• Potable Water Supply and Management
• Sewerage Management
• Storm Water Management
• Dirty Water Management
• Electrical Infrastructure, Power Lines and Substations
• Fire Prevention
• Change houses
• Refuelling Bays
• Service Vehicles
• Bioremediation Facility
• Waste Disposal
• Salvage Yard
• Plant workshop

**Rail Siding and Transport of Product**

Different options are being considered for the position of the pelletising plant and the associated stockpile requirements. The sites are all located in close proximity to the Wildrand Siding, assuming that the pellets will not be transported on public roads. The pellets produced at the pelletising plant will be stockpiled adjacent to the Wildrand rail siding prior to loading on trains destined for Richards Bay Port. The pellets will be transported on the coal line via Piet Retief to Richards Bay Port.
1.2. Legislation Triggered and Terms of Reference for the Appointment of Archaeologist and Heritage Specialist

The nature and size of the proposed development, proposed mining activities involving open cast mining and associated surface mine infrastructure requires an environmental authorisation. As a result, the environmental application process developed in terms of the old environmental legislation, the National Environmental Act (NEMA), No. 107 of 1998 as amended and read together with the 2010 Environmental Impact Assessment (EIA) Regulations. There are also other various triggers to this project because of its nature, mining activities. The following legislation becomes relevant – the Mineral and Petroleum Resources Development Act (MPRDA), No. of 2012. Associated mining activities and associated activities such as water management (and NWAA, 2014), waste management (NEMWA, 2008), the management of the natural (NEMA, 1998 and NEMLAA (National Environmental Management Laws Amendment Act), 2014) and the management of cultural environment triggers NEMA, No. 107 of 1998 and the National Heritage Resources Act (NHRA), No. 25 of 1999.

The environmental management process for the proposed Cascades Iron Ore Mine involves the identification and assessment of environmental impacts through specialist studies. Ethical Exchange was appointed by Mkhombi Mining (Pty) Ltd as a lead Environmental Assessment Practitioner (EAP) to manage the Environmental Scoping and the EIA process under the MPRDA. Ethical Exchange appointed NGT Projects & Heritage Consultants (Division: NGT Heritage Solutions) as an independent Cultural Resources Management (CRM) firm to conduct a heritage specialist scoping assessment (exclusive of Palaeontological Desktop study) for the proposed mining activities as part of the specialist assessments for the project. Nkosinathi Tomose (Principal archaeologist & heritage consultant) from NGT Projects & Heritage Consultants conducted the study for the proposed Cascades Iron Ore Mine (Figure 1 & 2).

The appointment of NGT Projects & Heritage Consultants, as an independent CRM firm, is in terms of Section 38 of the NHRA, No. 25 of 1999, the NEMA, No.107 of 1998, as well as other applicable legislations.
Figure 1- Topographic Map showing mining rights and prospecting areas for the proposed Cascades Iron Ore Mine, Mining Rights Application Area, MLM, Mpumalanga.
Figure 2-Map showing the extent of Mkhondo Local Municipality on the western boarder of Swaziland and the eastern border of the Republic of South Africa @ Maluleke 2012.
2. BACKGROUND OF THE STUDY AREA

South Africa is rich in diverse forms and types of heritage resources, ranging from natural to cultural heritage. The natural heritage includes among other things: Geological, Palaeontological, and the various plant and animal species that define the country. The cultural heritage, which dates as far back as 2.5 million years ago (m.y.a), includes - the different periods of Stone Age Archaeology, the Iron Age Archaeology, Historical and Industrial Archaeology, as well as the “Political/Historic” geographies of South Africa (reference - Tomose, 2013 a, b, c, d).
This Heritage Scoping Study (HSS) assesses the range of all the manmade or human influenced resources within Cascades Iron Ore Mine mining area, and immediate outside but within the proposed ESP area as marked in Figure 1.

2.1. Background Information Study: A Stone Age, Iron Age and Historical Archaeology (incl. some Anthropological aspects) of Mpumalanga

Early Stone Age:

There is paucity of Early Stone Age archaeological data and publications about the Mpumalanga Province. This is partly due to the fact that there are few if not limited ESA sites found in this region. ESA resources found in this province have mostly been identified along dongas and eroded areas and not in their primary context. Few such sites have been found in Maleoskop near Groblersdal (Pistorius, 2012). According to Pistorius this presents one of the few places in Mpumalanga where ESA Olduwan and Acheulian artefacts have been recorded to date (ibid).

Middle Stone Age:

Like with the ESA, there is limited data and research on the MSA archaeology of Mpumalanga. One of the most referred to MSA site example’s in Mpumalanga is the excavation of Bushman Rock Shelter near Ohrigstad (e.g. Maggs, 2007; Pistorius, 2012; Celliers, 2010). From evidence yielded by the excavations at this shelter, it has been concluded that the shelter was repeatedly visited over prolonged periods of times. The stratigraphic layering and associated resources provides clues to the different episodes of occupation at this shelter. The oldest layers of this cave dates to 40 k.y.a and the youngest layer (late MSA) dates to 27 k.y.a (Pistorius, 2012).

Late Stone Age:

The LSA is a Stone Age period that spans a period from the last 30 k.y.a to the historical time i.e. the last 500 years to 100 years ago (Mitchell, 2002; Maggs, 2007). The LSA period in southern African archaeology is predominantly associated with the San hunter-gather communities (e.g. Pistorius, 2012; Mitchell, 2002; Wadley, 1989; Mason, 1957; Deacon 1972, 1974; Binneman, 1984). During LSA we start seeing diverse forms of material culture in archaeological records. These forms of material culture include various forms stone artefacts, ostrich eggshell beads, digging sticks, remains of hide or skin used to make bow quivers and
The various forms of material culture referred to are often found in isolation or associated with animal remains in ‘closed sites’ such as caves or rock shelters. Stone Age archaeologists like Lyn Wadley have been able to deduce aggregation and dispersal patterns from material culture found in particular sites (e.g. Wadley, 1989).

Rock art is another unique form of LSA material culture and the Mpumalanga province is known contain some rock art sites in form of paintings and engravings. The Bushman Rock Shelter provides one good example of LSA sites, containing the various forms of LSA material culture and remains, in the Mpumalanga province. In this shelter, the LSA dates from 12 k.y.a to 9 k.y.a. Other sites which have yielded evidence of LSA resources or material culture include the site of Hôningnestkrans – an LSA sites located near Badfontein. This site has been dated between 4,870 y.a and 200 y.a (Pistorius, 2012).

The second group of people which are often associated with the LSA period is a group of pastoralist herders dubbed the Khoekhoe herders (e.g. Smith & Ouzman, 2004; Ouzman, 2005; Sadr, 1999; Hall & Smith, 2000). However, there is not much material culture associated with this group of people in the archaeological records with exception to ceramic vessels, often associated with animal remains which are most predominantly sheep and other small stock in the interior regions and muscle, fish and seal/sea lion remains in the coastal regions (e.g. Binneman, 2011; Sadr, 1999). Other than ceramic vessels (and animal remains) mentioned above - rock art provides another form of material culture associated with the Khoekhoe herders (e.g. Ouzman, 2005; Ouzman & Smith, 2004; Hall & Smith, 2000). Based on their records in the landscape, in the time capsule between the LSA and the EIA - the Khoekhoe herders can therefore be seen as intermediate group between the LSA and EIA. However, this does not have to be taken to imply that the San hunter-gathers seized to exist, but to simple mean that a separate and independent group of people emerged in the landscape just before the arrival of the EIA people/communities in southern Africa. This was the interface between the LSA and ESA. Hall and Smith (2000), for example make a good argument about the relations and/or potential relations that could have developed in the landscape with the emergence of the Khoekhoe herder in the landscape which was previously dominated by the San hunter-gathers and later emergence of the Iron Age communities. Among the relations that could have developed, based on material culture evidence in caves such as the Saltpan Cave and Little Muck in the Limpopo Province, it is evident that the relation could have been both amicable and contestable at times. Contestation of sites and dominance of one group over the other as portrayed in rock art (e.g. Hall & Smith, 2000). In his 2005 publication, Ouzman refers to the Khoekhoe rock art of the interior regions of which Mpumalanga forms
part – an indication of the existence of Khoekhoe rock art in the province. Presence of Khoekhoe rock art in the province are further attested to by Smith & Ouzman (2004), Pistorius (2012) and Maggs (2007) also makes reference to rock art of Mpumalanga.

In his 2012 HIA study of Mafube Coal Mining open cast mining of the Nooltgedacht and Wildfontein reserves between Middelburg and Belfast, an area located just before Machadodorp - Pistorius estimates approximately 400 rock art sites that are distributed throughout the Mpumalanga province. According to Pistorius these sites are mostly distributed in the northern and eastern regions of Mpumalanga - in “…places such as Emalahleni (Witbank) (4), Lydenburg (2), Ermelo (8) White River and the southern Kruger National Park (76), Nelspruit and the Nsikazi District (250)” (Pistorius, 2012: 24). For the purpose of this study these numbers are taken to present estimates of sites which have been recorded – to arrive at exact number of sites one would have to quantify Pistorius database with that of research institutions such as the Ditsong Cultural History Museum and the Rock Art Research Institute located at the Origins Centre, Wits University. These institutions have large record of rock art database for most parts of the former Transvaal. Such quantification could potential increase the number of known rock art sites located within this province.

The LSA period rock art of Mpumalanga Province can, therefore, be attributed to two culture groups. Rock art authored by the San hunter-gathers and rock art authored by the Khoekhoe herders. The tradition of making rock art, however, does not sized in the LSA - it continues up to the Iron Age period. Therefore, we also get the Iron Age community rock art – the Late White (e.g. Pistorius, 2012).

The distribution patterns of rock art sites in this province are varied between the three groups dubbed as authors of the art. For example, the fine polychrome and monochrome and engravings of the San are known to be widely spread throughout the province and the country. On the other hand the herder or Khoekhoe rock art form a thin scattering from the Limpopo Valley through the Lydenburg district into the Nelspruit area (Pistorius, 2012; see also Ouzman & Smith 2004, Ouzman, 2005). The Bantu speakers or Iron Age communities rock art “late white farmer paintings” are mostly localised (Pistorius, 2012; Maggs, 2007).

Other than rock art and other forms of material culture associated with the LSA such as ceramic vessels as well as food remains – burials pits and graves become dominant in the landscape. In the coastal regions of South Africa for example, LSA burials are often found buried underneath middens (dumpsites) (e.g. Deacon & Deacon 1999; Binneman, 2011).
While in the interior regions they are sporadic and can occur across various features in the landscape (Deacon & Deacon, 1999).

**2.2.2. Iron Age Archaeology:**

The Iron Age archaeology of South Africa is divided into two categories, namely the EIA (Early Iron Age) and the LIA (Late Iron Age). Unlike Stone Age archaeology, there is no clear disenable Middle Iron Age in archaeological records or publications. It is associated with the first agro-pastoralists or farming communities who lived in semi-permanent villages and who practiced metal working during the last two millennia.

The EIA communities first appear in southern African archaeological records in the 1st Millennium AD. The eastern regions of the country have been argues to have been were their preferred regions because of their rainfall patterns – summer rainfall climates conducive for ploughing and growing crops like sorghum and millet (e.g. Huffman, 2007). In the interior region the former Transvaal’s (Transvaal & Eastern Transvaal – now Limpopo, Gauteng andMpumalanga Province) were preferred. In the landscape this group of people is mostly characterised by stone walls.

Stonewalls are a major characteristic of the Iron Age communities. They are, however, not the only characteristic or features that define the presence and material culture of the Iron Age people. Huffman (1982), for example, described cattle dug (both vitrified and unverified), hut foundations, grain-bins, dagah floors, iron smelting sites, beads, grinding stones, remains of sorghum and millet in archaeological records etc as some of the Iron Age traits. He also included burial pits and graves, with some located inside the cattle kraals (ibid). For theMpumalanga region various Iron Age traits have been identified and studies. However, not much detailed research has been afforded to this regions as correctly asserted by Maggs (2007). In this area some of the Iron Age traits include stone walling and terracing (e.g. Figure 10) and rock art (Figure 11) (e.g. Huffman, 2007; Maggs, 2007; Pistorius, 2012).

The rock art includes among other forms of art – rock engravings depicting settlement patterns (Figure 11 - after Maggs, 2007). North of the Mpumalanga Province, in the Limpopo Province, Iron Age communities’ rock art depicts distinct and different scenes - especially in the last part of the Iron Age (the LSA). In this province (Limpopo) the “Late White rock art” is characterised by scenes of different encounters between the LSA communities and the colonial
settlers. In the Makgabeng Plateau, for example, rock art depicts conflict scenes associated with the Malebogo Wars – war between Chief Malebogo of the Hananwa people and President Kruger of the ZAR (Zuid Afrikaansche Republiek). Unlike the Limpopo Province where most of the rock art is associated with the Sotho-Tswana language speakers - in Mpumalanga province the Iron Age communities’ rock art can be divided into Sotho-Tswana finger paintings and Nguni engravings (Maggs, 2007). Approximately 20 engravings have been indentified in Boomplaats, north-west of Lydenburg to date (Pistorius, 2012; Maggs, 2007). In terms of distribution patterns, the Iron Age rock art is more localised than that of the San hunter-gathers and Khoekhoe herders.

In the study area and the surrounding Iron Age rock art could potential be ascribed to 3 culture and language groups - the Ndebele, Swazi and Koni people (Sotho-Tswana for Nguni) (e.g. Huffman, 2007; Maggs, 2007; Pistorius 2012).

Beside rock art and stone walling which mostly characterises the Iron Age archaeology of this region - there are other forms of Iron Age material culture that the Mpumalanga province is well known for. For example, the distinct Sotho-Tswana associated ceramic tradition which Maggs refers to, Moloko tradition (2007). The famous Lydenburg terracotta heads site form a good example of other forms of Iron Age material culture found in this province (Figure 12). This site has been dated to AD600 and from AD900 to AD1100 – this tells us about the different periods of its occupation (Pistorius, 2012).

Near Lydenburg in Sterkspruit there are known EIA sites and they have been dated to AD720 (Pistorius, 2012). According to Pistorius this includes sites in Nelspruit where provincial governmental offices were constructed (ibid). The site of Doornkop which is located south of Lydenburg provides another example of EIA sites and it has been dated between AD740 and AD810 (Maggs, 2007).

The Late Iron Age of Mpumalanga province is well represented and it stretches from AD1500 up to the 19th Century and historic period (e.g. Maggs, 2007). Based on existing ethnographic data and oral traditions accounts several spheres of influence of this later period are known (e.g. Huffman, 2007). One of the most referred to events that would have influenced the occupation of the area between Piet Retief and Amsterdam to regions further north during the LIA (that’s among other influences) would have been the expansion or spread of the Nguni language speakers from the regions of KwaZulu-Natal to the northern interior regions of the country such as the Waterberg Mountains, the interior plateau and the escarpment (see
Huffman, 2007). These Nguni speakers have been dubbed the BaKone or the Koni people as mostly referred to in most archaeological publications. Koni sites have been documented north of the current study area between Lydenburg and Machadodorp (Schoeman from Wits is working on such sites). Pistorius (2012) also include the Eastern Sotho clans such as the Pai, Pulana and Kutswe who established themselves in the eastern parts of the province as part of the LIA settlers on the area between Lydenburg and Nelspruit (see also Celliers, 2010). The southern Ndebele form another culture or language group found in the escarpment regions north of the current study area and the existence is known to extend to the boarder of Mpumalanga and KwaZulu Natal.

According to Huffman (2007:448), “generally, those [Nguni speakers] who live north of the Springbok Flats are known collectively as the Northern (Transvaal) Ndebele and those below as Southern (Transvaal) Ndebele”. He further argues that, “generally again, many northern groups claim Langa as a legendary leader and many of those to the south claim Musi. If they retain the Nguni language, they are called the Ndebele, while those who adopt the Sotho-Tswana are Koni (Sotho-Tswana for Nguni)” (idem). The Central Cattle Pattern (C.C.P) forms one of the Nguni defining characteristics in this region.

Maggs (2007) conforms to the idea that in the Machadodorp and Badfontein area the stone walling site fits within the C.C.P, an Iron Age Nguni settlement arrangement pattern (e.g. Huffman, 2007). In this area, Huffman argues that - as mostly organisation emphasis the centre/side axis of the CCP expressed through concentric circles. The way the C.C.P is arranged in this regions it means that, the inner circle encompasses cattle, the next marks the men’s court, and the outer ring the zone of houses (see also Maggs, 2007). Rock engravings in the same area depict this settlement pattern (e.g. Maggs 1995). According to Huffman associated engravings, terrace walls, cattle lanes and circular settlements which form part of the C.C.P extend over an enormous area along the escarpment south of the Lydenburg (2007). Based on oral traditions these settlement organisational patterns can be attributed to the Koni people. Huffman (2007) citing Hunt (1931) argues that, oral traditions places the Koni’s in the escarpment before the Pedi people. He places some walls before AD 1650, as early as AD 1600 – a period associated with the second dispersal of the Nguni people in the KwaZulu-Natal region (Huffman, 2007). However, in the later stages these people would have become associated with the Sotho-Tswana. Huffman argues that the ceramic show that they later became allied to the Pedi (2007) and Maggs (2007) argue for Sotho-Tswana ceramic presence in the eastern Mpumalanga area - Moloko ceramic, which attest to the presence of other groups of people other than the Koni in the region. One of the proposed lines of arguments for
the Badfontein Koni settlement and those in the escarpment is that they probably chose the escarpment because it is part of the mist belt that would have offered some relief to dry conditions during the Little Ice Age (e.g. Huffman, 2007).

Figure 4 - Example of stone walling, settlement pattern and terracing ©Maggs, 2007.
Figure 5 - Type of engravings found in the Escarpment and north of the development area. This one is from farm Boomplass near Lydenburg. © Maggs 2007.

Figure 6 - Picture showing the Lydenburg Heads @ ASAPA.ORG.ZA
2.2.3. The Historic period

The historic period of the Mpumalanga province or the former Eastern Transvaal (including other Transvaal) region(s) is directly linked to the arrival of the white settlers who moved into the area during the first half of the 19th century. There are a number of triggers for such a move into the central region of the country and one well known and most referred to in the Great Trek (see Cellier, 2010; Pistorius, 2012; Maggs, 2007).

The first white settlers of Mpumalanga can be traced back to a commission under the leadership of Hendrik Potgieter argued to have negotiated with the Portuguese Governor at Delagoa bay in 1844 for land acquisition in this region of the country (e.g. Cellier, 2010). It is, however, not clear whether the Portuguese had hold over land in this area at the time or whether it was under their administration thus the reason for such negotiations. But, since Mpumalanga province in close to the border between South Africa and Mozambique this is most likely to have been the case. Among the early white settler of Mpumalanga are the Dutch descendent who migrated into the interior regions of the country during the Great Trek. These pioneers are commonly referred to as the “Boer” or the farmers - the Afrikaans community. The first arrival of the Afrikaans communities in this province is dated to 1845. One of the forefathers of these communities in this region is Mr. Andries Ohrigstad who the town of Ohrigstad is named after him and this town is located some 100s of km north of the current proposed development area, but it is worth mentioning as an early date for settlement of the region by Trek Boers. This town is also the first town established in this region of the country in July 1845 after the Afrikaans communities/Boers successfully negotiated for land with the Pedi Chief Sekwati (Cellier, 2010).

The allocation of first farms to white settlers began during the late 1840s and they were given out as far west as the Oliphants River. During this time the western boundary is argued to have yet been officially defined, an issue resolved at the Volksraad meeting held in year 1849 - which decided that the Elands River would be the boundary between the districts of Potchefstroom and Lydenburg as this eastern portion of the Transvaal was known. The Elandspruit (River) is located some few 100kms north of our current study area. During the Volksraad meeting it was decided that the Elands River be part of the republic’s western boundary. However, this was countered by the ZAR claims of an eastern boundary that stretched to the Oliphants River. This thwarted the Eastern Transvaal autonomy and in 1860 it was decided to unite the Republic of Lydenburg with the ZAR as the District of Lydenburg and
seceded the land west of the Oliphants River as part of the unification agreement to the District of Pretoria (Celliers, 2010). This stretched the influence of Pretoria to the Eastern Transvaal.

Due to internal strife and differences between the various Boer groups who settled in the Transvaal regions, the settlers in the Ohrigstad who were now governed from the town of Lydenburg decided to secede from the Transvaal Republic in 1856. The Republic of Lydenburg laid claim to a large area that included not only the land originally obtained from the Pedi Chief in 1849 but also other areas of land negotiated for from the Swazis. The area in which the current study is based form part of the Swazis. These claims included areas such as the present day town of Witbank, located to the far west of the current study area, before Middelburg and Belfast. During this time the districts mentioned above were all self governed and independent. However, such autonomy or independence did not last longer into the 1900s as in 1858 the ZAR was officially established, and consisted of all the other territories settled by the Boers in the Transvaal region. This move fuelled tensions in the already fragile relations between the ZAR and the Republic of Lydenburg. The Republic of Lydenburg defended their claim by referring to be the main catalyst in the development of the Witbank Coal Field (Cellier 2010 citing Graham, 1931). For a detailed account of territorial claims and disputes refer to Cellier (2010) and see also Pistorius, 2012.

2.2. Description of the affected environment

Table 1 – Description of the affected environment of the proposed Cascades Iron Ore Mine Mining Rights Area (inclusive of prospecting north)

| Location                                      | • The project area is located in Mkhondo Local Municipality, Gert Sibande District Municipality, Mpumalanga Province, South Africa. It is located in the following farms: Haarlem 469 IT, Haarlem 441 IT, Ishlelo 441 IT and The Cascade 442IT (Figure 1).  
  • It covers more than 5000m² i.e. 8,000 hectares in extent.  
  • The site centre GPS Coordinates are: 26° 47' 37.48"S  28° 44' 40.47"E (Figure 1). |
| Surrounding Townships/Industrial Zones/ Villages | • Zoning Schemes  
  • The current zoning might include agricultural, housing and industrial (Figure 7). |
| Land Uses in and around the study area | The predominant land use in and around the proposed mining rights area is farming and a conservation area is found north towards the town of Amsterdam (Figure 7 – yellow arrow). |
| Land Owner(s) | The mining area – Cascades Iron Ore Mine  
Surrounding farms – private land owners, local communities which may be represented through local tribal authorities |
| Current Conditions (on site) | Most of the land where the proposed activities are to take place show elements of disturbance or human activities through farming, existing roads, housing and small industries (Refer to Figure 7) |
| Applicant | Mkhombi Mining (Pty) Ltd, with Ethical Exchange Sustainability Services as Lead Environmental Consultant |
| Proposed Development | Mining Right Application |
| Access | Existing national, provincial and local roads, routes and human foot paths.  
Provincial Roads:  
- From Amsterdam to Piet Retief the R33 traverse through the development area in the west (Figure 7 - green arrow).  
- In the south it links with the N2 which stretches west (Figure 7 - white arrow)  
- In the north and north of Amsterdam, the R33 links with the R65 (Figure 7 - red arrow).  
- On the eastern side of the development area and along the Sawzi boarder – the MR4 is found (Figure 7 - black arrow). |
The development area is easily accessible.

| Defining natural features | • The development footprint is defined by a gorge south the proposed 3 mining pits (*Figure 7- purple arrow*).
• Undulating mountains and valleys are north and north east of the development foot print (*Figure 7*).
• A number of dams which bland into the natural landscape can been seen west of the development footprint (*Figure 6- blue arrows*).
• North of the development footprint towards Amsterdam a natural forestry areas has been declared a heritage area – protected area (*Figure 7- yellow arrow*). |
| Proposed Zoning | • Mining and industrial
• Farming/Agricultural (existing)
• Residential (existing) |
Figure 7- Location of the study area (also the development footprint) in relation to the towns of Amsterdam and Piet Retief and some of the provincial and national roads in Mpumalanga Province.
2.3. Description of proposed activities: Proposed Infrastructure

Table 2 - List of Proposed Activities

| Activity 1 | Mining Rights Application |
| Activity 2 | Clearing of soil and construction of mining infrastructure and support infrastructure such as offices |
| Activity 3 | Establishing open cast mining blocks – 3 in total |

2.4. Needs and Desirability

Table 3 – List of activities in-line with the project scope

| Activity 1 | Desktop study of the heritage value and integrity of the area under consideration and its surrounding with a particular focus on resources within the proposed mining area as marked in Figure 1. |
| Activity 2 | The mapping, assessment and evaluation of the heritage value and integrity of the identified heritage resources and Go Area vs. No Go Area. |
| Activity 3 | Developing of plan of study for the EIA phase |
| | Making recommendations to SAHRA and provincial heritage resources authority (MPHRA) |

3. METHODOLOGY

This chapter outlines the methodologies used in conducting this heritage scoping study for the proposed Cascades Iron Ore Mine. The study area is located Mkhondo Local Municipality, Mpumalanga Province. This is done in accordance to the Terms of Reference provided by the client for the completion of this study. However, some areas of the report follow minimum standards for completion of professional HIAs (adopted for the scoping phase) as stipulated in SAHRA minimum standard (2012) such as detailed account to the archaeological and historical background of the study area or region affected.
3.1. Step I – Literature Review (Desktop Phase):

- Sources used in this study included, but not limited to, published academic papers, books and internet publications.
- The use of archival maps – three historical maps showing the proposed area of development and its surroundings were assessed to aid information about the proposed area of development and its surroundings.
- The above also included a review and assessment of relevant environmental and heritage legislations such as the NEMA (together with the 2010 EIA Regulations) and the NHRA.

3.2. Step II – Physical Survey:

The objectives of physical surveys for heritage studies seek to address the following areas of concern:

- To conduct an onsite verification survey for sites that have were spotted at the scoped through desktop search.
- To identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the proposed development footprint.

No physical survey took place as part of this study

- The study relied on published records and HIAs conducted in Mpumalanga province and for location of communities within the project footprint was based on Google Earth Spotting. Furthermore, the following technological tools and platforms were deemed important for documenting and recording located and/or identified sites:
  - DELL aided with Garmin Basecamp Software, Google Earth – to plot the propose development area.
  - Quantum GIS Wroclaw (1.7.4) was used to communities spotted in the proposed development area against the proposed mine development infrastructures.

3.3. Step III – Data Consolidation and Report Writing:

All the archaeological and heritage data as well as the data captured on the development area by means of Google Earth spotting is used as a baseline for this desktop heritage study. This
data is also used to develop assessment for current and future impacts within the development footprint:

- Assessment of the significance of the cultural resources in terms of their archaeological, built environment and landscape, historical, scientific, social, religious, aesthetic and tourism value
- Description of possible impact of the proposed development on these cultural environment and remains, according to a set of standard and conventions for the management of the cultural environment;
- Proposal of suitable mitigation measures to minimize possible negative impacts on the cultural environment and resources that may result from the proposed mining activities;
- Review of applicable legislative requirements – as discussed in section 1.1 above under Terms of Reference for the Appointment of Heritage Specialist.
- Highlighting of assumptions, exclusions and key uncertainties. Chapter 4 (below) of this report addresses this concern.
- The final step involved the consolidation of the data collected using the various sources as described above. This involved the manipulation of data through Quantum GIS 1.7.4 Wroclaw.
- Assessing the significance and potential impact of the identified sites (communities in the case).
- Discussing the findings and making recommendation on the management and mitigation measures of the identified cultural environmental features and the potential heritage resources that might encountered within and around these cultural environment areas such as local farmsteads and villages.
- The impacts of heritage resources such as burial ground and graves predicted to occur around farmsteads and local communities on the proposed mining activities for the proposed Cascades Iron Ore Mine.

3.4. Assessment of Site Significance in Terms of Heritage Resources Management Methodologies

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

- Site integrity (i.e. primary vs. secondary context)
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures)
  - Density of scatter (dispersed scatter)
• Low - <10/50m²
• Medium - 10-50/50m²
• High - >50/50m²

- Uniqueness and
- Potential to answer present research questions.

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

• A - No further action necessary;
• B - Mapping of the site and controlled sampling required;
• C - No-go or relocate pylon position
• D - Preserve site, or extensive data collection and mapping of the site; and
• E - Preserve site
• F - Impacts on these sites by the development will be evaluated as follows:

**Measure of Heritage Site Significance**

The following site significance classification minimum standards as prescribed by SAHRA (2006) and approved by ASAPA for the SADC region were used for the purpose of this report.

*Table 4: Site significance classification standards as prescribed by SAHRA*

<table>
<thead>
<tr>
<th>FIELD RATING</th>
<th>GRADE</th>
<th>SIGNIFICANCE</th>
<th>RECOMMENDED MITIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Significance (NS)</td>
<td>Grade 1</td>
<td>-</td>
<td>Conservation; National Site nomination</td>
</tr>
<tr>
<td>Provincial Significance (PS)</td>
<td>Grade 2</td>
<td>-</td>
<td>Conservation; Provincial Site nomination</td>
</tr>
<tr>
<td>Local Significance (LS)</td>
<td>Grade 3A</td>
<td>High Significance</td>
<td>Conservation; Mitigation not advised</td>
</tr>
<tr>
<td>Local Significance (LS)</td>
<td>Grade 3B</td>
<td>High Significance</td>
<td>Mitigation (Part of site should be retained)</td>
</tr>
</tbody>
</table>
### 3.5. Methodology for Impact Assessment in terms of Environmental Impact Assessment Methodologies including Measures for Environmental Management Plan Consideration

The determination of the effects of environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts. This is in line with specialist requirements as required by the client. For example, the request that:

- Assesment of key issues;
- Analysis of the activities relating to the proposed development;
- Assessment of the potential impacts arising from the activities, without mitigation, and
- Investigation of the relevant mitigation measures for both the construction and operational phases.

<table>
<thead>
<tr>
<th>FIELD RATING</th>
<th>GRADE</th>
<th>SIGNIFICANCE</th>
<th>RECOMMENDED MITIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generally Protected A (GP.A)</td>
<td>-</td>
<td>High / Medium Significance</td>
<td>Mitigation before destruction</td>
</tr>
<tr>
<td>Generally Protected B (GP.B)</td>
<td>-</td>
<td>Medium Significance</td>
<td>Recording before destruction</td>
</tr>
<tr>
<td>Generally Protected C (GP.A)</td>
<td>-</td>
<td>Low Significance</td>
<td>Destruction</td>
</tr>
</tbody>
</table>

In order to address the client a request, the current methodology was employed in the report thus results in a circular route, which allows for the evaluation of the efficiency of the process itself. The assessment of actions in each phase [that should] be conducted in the following order:
The following Assessment Criteria is Used for Impact Assessment

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrices use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability: describes the likelihood of the impact actually occurring

- **Improbable:** the possibility of the impact occurring is very low due to the circumstances, design or experience.
- **Probable:** there is a probability that the impact will occur to the extent that provision must be made therefore.
- **Highly Probable:** it is most likely that the impact will occur at some stage of the development.
- **Definite:** the impact will take place regardless of any prevention plans and there can only be relied on mitigatory measures or contingency plans to contain the effect.

Duration: the lifetime of the impact

- **Short Term:** the impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
- **Medium Term:** the impact will last up to the end of the phases, where after it will be negated.
- **Long Term:** the impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
- **Permanent:** the impact is non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.
Scale: the physical and spatial size of the impact

- **Local**: the impacted area extends only as far as the activity, e.g. footprint
- **Site**: the impact could affect the whole or measurable portion of the above mentioned properties.
- **Regional**: the impact could affect the area including the neighbouring residential areas.

Magnitude/Severity: Does the impact destroy the environment, or alter its function

- **Low**: the impact alters the affected environment in such a way that natural processes are not affected.
- **Medium**: the affected environment is altered, but functions and processes continue in a modified way.
- **High**: function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

- **Negligible**: the impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
- **Low**: the impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
- **Moderate**: the impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
- **High**: The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The significance is calculated by combining the criteria in the following formula:

\[ \text{Sum} \ (\text{Duration}, \ \text{Scale}, \ \text{Magnitude}) \times \text{Probability} \ (\text{Table} \ -2) \]
S = Significance weighting; Sc = Scale; D = Duration; M = Magnitude; P = Probability

Table 5 - The significance weightings for each potential impact are as follows:

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability</td>
<td>Improbable</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Probable</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Highly Probable</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Definite</td>
<td>5</td>
</tr>
<tr>
<td>Duration</td>
<td>Short term</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Medium term</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Long term</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Permanent</td>
<td>5</td>
</tr>
<tr>
<td>Scale</td>
<td>Local</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Site</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Regional</td>
<td>3</td>
</tr>
<tr>
<td>Magnitude/Severity</td>
<td>Low</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>8</td>
</tr>
<tr>
<td>Significance</td>
<td>Sum (Duration, Scale, Magnitude) x Probability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Negligible</td>
<td>≤20</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>&gt;20≤40</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>&gt;40≤60</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>&gt;60</td>
</tr>
</tbody>
</table>

The significance of each activity was rated without mitigation measures (WOM) and with mitigation (WM) measures for both construction, operational and closure phases of the proposed development. To address the question of Heritage Management Plan the following table is used for Measures to be included in the EMP. This table is relevant in that it addresses key issues at the various stages of the project by also addresses how some of the
key concerns that develop from a heritage point of view can be mitigated.

Table 6 -Measures for inclusion in the draft Environmental Management Plan:

<table>
<thead>
<tr>
<th>OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goals; this take into account the findings of the environmental impact assessment specialist studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project component/s</td>
</tr>
<tr>
<td>Potential Impact</td>
</tr>
<tr>
<td>Activity/risk source</td>
</tr>
<tr>
<td>Mitigation: Target/Objective</td>
</tr>
<tr>
<td>Mitigation: Action/control</td>
</tr>
<tr>
<td>List specific action(s) required to meet the mitigation target/objective described above</td>
</tr>
<tr>
<td>Performance Indicator</td>
</tr>
<tr>
<td>Monitoring</td>
</tr>
</tbody>
</table>

4. ASSUMPTIONS, EXCLUSIONS AND UNCERTAINTIES
The assumptions, exclusions and uncertainties that exist in terms of the present study are discussed in the following sub-sections.

4.1. Assumptions
The current study is a Heritage Scoping study and as such, a historical and archival desktop study were undertaken to develop a baseline database for the study area. This process
involves searching for potential heritage and archaeological site that are known to occur in the region and which may be indentified on site based on what is known about the region in which the site is located.

Using Google Earth and cadastral database to identify features associated with the cultural environment that may yield tangible heritage resources within the development footprint during the physical survey phase of the project.

The assumption is that a preliminary Scoping Phase survey would have taken place and this would have also necessitated a heritage social consultative process with some of the Interested and Affected Parties (I&AP) to ascertain known archaeological and heritage sites or resources in their properties such as presence or existence of graves and cemeteries, historic built environment and landscape features etc. However, both these process did not take place due to issues of access.

4.2. Exclusions
The following exclusions or limitations have direct consequence to the study and its results:

- There was no deeds search for the proposed Cascades Iron Ore Mine development footprint from a heritage resources management point of view. Normally we undertake such search in cases where the developer is conducting initial project viability studies. In the case of the Cascades Iron Ore Mine, other processes have been initiated to deal with among other issues such as land claims etc. There was therefore no need to conduct a deeds search for the property.

- There was no scoping site survey to orientate the archaeologist and heritage consultant of the terrain in which the proposed development is to take place and the study is purely desktop based. The preliminary scoping survey often assist to channel the research process in an manner that would lead to detailed background search of features in the landscape that have been spotted during the survey.

4.3. Uncertainties
Based on the fact that the study is purely desktop with no physical site orientation of the project area – there are many uncertainties about what the actual environment looks like in reality. What type of communities are there and how do they define their cultural environmental space and how this may influence among other things the burial processes and
based on this how to use such clues in spotting the area under consideration for heritage sites such as burial grounds and graves, initiation sites and places of prayer and worship.

5. FINDINGS

5.1. Cadastral Search
Two maps were used to assess the evolution of the landscape in and around the study area and they include:

A 1905 Geographic Journal Map on the physical features of the Transvaal (Figure 8).

- This map does not show much about the human activities within the study area or it’s surrounding except for naming towns.
- Near the study area the towns of Amsterdam and Piet Retief are shown on the map.
- Also shown on the map and north of the study area is the NZASM railway line linking the Transvaal Republiek and Delagoa Bay.
- The NZASM railway system was developed under the leadership of President Kruger of the Transvaal Republiek in the 1800s.
- In terms of relative dating, using this particular, the towns of Amsterdam and Piet Retief are older than 105 to date.
- This further tells us about the existence of farming communities in the area between Piet Retief and Amsterdam.
- The site is shown east of the Escarpment – in what is defined as the Middle Veld.

The second map is a 1955 1:250.000 topographic map of Mbabane (Edition 1-AMS), SG36-9, Series 2501, show the following about the study area (Figure 9 & 10):

- The farm Ishlelo is the only farm shown within the proposed development footprint.
- Evercasen is shown on the map as is with recent and modern maps used to plot activities within the development footprint.
- The R33 Road which traverses the site from the north-west to south is shown to be in existence already.
- The N2 and the railway line to Richards Bay are also shown to be already in existence.
- The Transvaal and the Swazi border is also clearly depicted.
• Also important about this map is the depiction of homesteads within the broader study areas as indicated through the use of a circle (red) – various homesteads are on both the western and eastern side of the R33 Road linking Amsterdam and Piet Retief.
• Also note the terrain which is undulating as described in the affected environment above (brown arrows show contours)
• The gorge shown in the developed maps of the study area is also shown through the use of a yellow arrow.
Figure 8- A 1906 Geographical Journal Map showing proximity location of the study area between Amsterdam and Piet Retief. Note some of the major rivers in the region as indicated through the use of blue arrows. Indicated by the brown arrow is the NZASM railway line which
linked the Transvaal Republiek and Delagoa Bay – developed under the leadership of President Kruger of the Transvaal Republiek.

Figure 9- 1955 1:250000 map of South Africa and Mbabane
5.2. Deeds Search:
No deeds search was conducted as part of this study as per the reasons given in the exclusion section of this report.

5.3. HIAs Conducted in and around the proposed development area:
An HIA conducted east of the proposed development footprint by Dr Johnny van Schalkwyk of the National Cultural Museums in Pretoria yielded the following information about the farm immediately east of the study area (2005):

- Stone tools- which included cores and flakes dating to Middle Stone Age and some to Late Stone Age materials.
- All the Stone Age material discovered were not in their primary context and all surface materials
- A small piece of pottery near the river was found
- Slags derived from iron smelting activities was discovered along a developed road
- A mine adit was also discovered and the adit is thought to be associated with gold mining or ochre mining associated with Iron Age people.
- Found in association with the mine adit is circular structure of 1m in diameter.

These findings suggest prehistoric and historic human activities in the area around the site and can be used for site specific analysis of the proposed Cascades Iron Ore Mine.

5.4. Findings from Earth Spotting of the Affected Environment and the Identified Cultural Environmental Features.

The Google Earth search focused on areas that have the potential to yield archaeological and rock art sites. This exercise focused on areas such as hills and valleys. The area south of 3 proposed mining pits and south the topsoil dump and waste dump yielded (Figure 11 & 12):

- A gorge that could potentially yield rock art sites if properly surveyed. This is because the region is known for rock art among some of the known forms of archaeological material culture.
- The area below the waste dump – spreading further north also show slopes – these are other potential rock art areas and they will require survey during the detailed assessment of the project.

The survey using Google Earth also focused on areas of built environment and landscapes to identify farmsteads, communities and other built up areas that could yield historic sites as well as burial grounds and graves. A total of 5 communities were yielded within 2 of the 3 mine blocks. Out of the 5 communities, 3 are located in the mining block located in the far west and 2 in the central mining block (Figures 11 & 12). Located immediately south of the 3 mining blocks another community is found west of and south of the archaeological and rock art potential yielding gorge (Figures 11 & 12).

All the identified areas that could yield cultural resources are overlain on a 1:50.000 map and superimposed against the proposed mining infrastructure (Figure 13). This map (Figures 12 and 11) show that there will be impact on communities by the proposed mining infrastructure. North of the proposed development area a total of 5 communities will require relocation and this may also impact on their burial grounds and grave sites. The disturbance of burial
grounds and graves will invertible result because Nguni language speakers bury their deceased or loved ones within the homestead – meaning that there is high probability of finding burial grounds and graves within the 5 communities identified within the 3 mining blocks.

Four other communities are affected by the pipeline, plants and stockpiles. Out of the 4 communities, 3 are located along the R33 Road linking Amsterdam and Piet Retief and 1 is located north of the railway side and will undoubtedly be affected by the proposed mine activities (*Figure 13*).

*Figure 11*- Google Earth image showing potential archaeological and rock art yielding areas- a Gorge in purple colour and slopes as indicated by yellow arrow.
Figure 12- Map showing potential archaeological and heritage yielding areas – in green are communities with a potential to yield burial grounds and graves and in light blue colour along the gorge (south of the waste dump and top soil) is the archaeology and rock art potential yielding area. The map excludes some of the mine infrastructure such as excavation pits and building infrastructure.
Figure 13 - Distribution of communities within and along the proposed mining infrastructure areas including mining pits excluded in the above map (Figure 12).

6. DISCUSSION OF THE RESULTS

From the background information search of the broader Mpumalanga region it is a known fact that the province has archaeological, rock art, historical and other cultural heritage resources. Close to the study area on Farm Evergreen 425IT (east and north of the development area) some of the Stone Age (Middle & LSA) resources have been identified in a secondary context (van Schalkwyk, 2005). Presence of built environment and landscape feature (with a potential to yield burial grounds and graves sites) has been confirmed through the use of Google Earth (Figure 11) and the 1955 map of the study area also show presence of communities or
households within the study area (*Figures 9 & 10*). Some of the key issues that have a potential to affect heritage resources have been tabled in Table 7 blow. This table include key issues, types of resources that may be impacted, nature impacts and resulting from which activities of the project and mitigatory measures to be considered past the heritage scoping phase – this through conducting a detailed HIA study that will involve onsite investigation of the proposed development area to identify, record, document and map out the various types of heritage resources. Assess their levels of heritage significance through among other means field grading and later the impact significance levels through assessment of impacts of the proposed development of the identified heritage resources (*Table 7*).
### Table 7- quantification of the key issues affecting the cultural environment and their potential to heritage resources

<table>
<thead>
<tr>
<th>SCOPING PHASE</th>
<th>Archaeological &amp; Rock Art</th>
<th>Built Environment &amp; Landscape, &amp; Initiation Sites</th>
<th>Burial Grounds &amp; Graves</th>
<th>Places of Prayer, Worship &amp; initiation Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impacts</td>
<td>Destruction of archaeological sites in and around the proposed development area for Cascades Iron Ore Mine – in areas such as the gorge and the slopes which have been identified and defined as archaeological and rock art yielding areas.</td>
<td>Destruction of built environment and landscape features such as historic buildings, and trees which may have cultural significance.</td>
<td>Destruction of farming and local community burial grounds and graves sites, in particular for the communities located within the 3 mining blocks and the 4 communities to the south along the pipeline, plant and stockpiles.</td>
<td>Each community has a form of worship or is culturally associated with some sort of spiritual belief. The construction will impact on communities within the 3 mining blocks. Depending on the final mine plan, they may have to be relocated. In some communities, their place of worship and prayer are often associated with a kraal, a small ancestral hut or a tree in the yard.</td>
</tr>
<tr>
<td>Activities relating to the proposed development that may cause impacts</td>
<td>Blasting during pit excavation may result in high levels of dust and in the case that rock art sites are located within the gorge they may be covered in dust in the process</td>
<td>Blasting during pit excavation may result to crack in the un-relocated communities and the other is relocation and destruction of people’s ancestral grounds.</td>
<td>Relocation of communities within the mining pits area will result to relocation of burial grounds associated with such communities.</td>
<td>Relocation of communities within the mining pits area will result to communities and their relocation of worship, prayer and ancestral grounds such</td>
</tr>
<tr>
<td>Potential impacts arising from the activities, without mitigation</td>
<td>Loss of archaeological and rock art sites that could yield more information about the people who settled the area during prehistoric times, up to historic times. These resources may include among others ore mine sites as it has been suggest in the Evergreen HIA that ruminants of slag have been identified in the area.</td>
<td>Loss of information and database about the type of colonial and pre-colonial architecture of the region and the area under consideration. For pre-colonial architecture will include stone structures as described in the Evergreen HIA report. Initiation sites are some of the built environment and landscape that could be impacted.</td>
<td>Loss and destruction of people’s graves and ancestral grounds result to loss of community and family memory and dislocation. Loss of information about the type of burial practices in the area something which can be studied during relocation of graves within the 3 proposed mining pits.</td>
<td>Destruction and dislocation of family and community memory associated with places of prayer, worship and initiation sites</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
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</tr>
<tr>
<td>Relevant mitigation measures for both the</td>
<td>The study is at scoping level and did not include the physical survey of the study area. The first measure to be put in place to ensure proper management and conservation of cultural environment and the various heritage resources associated with it will be to conduct a Heritage Impact Assessment (HIA) study of the proposed development area with a particular focus on areas with the proposed mining infrastructure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>construction and operational phases.</td>
<td>survey with identify and map out all heritage resources and take photographs of each and record their status. Once this onsite identification process has taken place, sites field grading should be undertaken and the sites should be mapped against the proposed mining infrastructure and levels of impact assessed and evaluated. Proper and sound mitigation measures should then be discussed based on tangible results of the presence of heritage resources within the development areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. CONCLUSIONS
The following conclusions are made about the proposed development area:

- The study is only a desktop scoping assessment and it did not include the physical survey of the proposed development area.
- The proposed development area has a potential to yield archaeological and rock art sites dating from Stone Age, Iron Age to Historic period. This conclusion is based on the known database of the archaeology and heritage of the region and on the fact that similar resources have been identified on a farm located north and east of the project area – Farm Evergreen 425 IT which yielded such site within close proximity to the study area.
- It is concluded that at least a today of 5 communities will be directly impacted by the proposed development and they may require to be relocated.
- Often associated with many rural communities are burial grounds and graves – the hypothesis is that such resources will be found in the yards or immediately outside the yards of these communities.
- Other 4 communities will be directly affected by the proposed pipeline leading to the railway siding to connect with the railway to Richards Bay. This infrastructure can, however, be deviate to avoid these communities as it is not the main mine area.
8. RECOMMENDATIONS

The following recommendations are made about the proposed development:

- It is recommended that a detailed heritage impact assessment (HIA) be conducted once this report has been reviewed by the SAHRA and MPHRA.
- The HIA should include an onsite verification of heritage resources.
- Recording and documenting of identified resources must be undertaken using the necessary tools and equipment and impact evaluation and assessment process.
- Resources to be assessed in terms of their heritage significance using the system of field grading.
- Assess levels of impacts as a result of proposed development.
- The HIA should make recommendations for mitigating / managing impacts on affected resources, individuals and communities.
- Once the HIA has been completed, details of compensation to be resolved between khombi Mining and affected parties.
9. REFERENCES

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