



**PHASE I ARCHAEOLOGICAL AND CULTURAL HERITAGE IMPACT
ASSESSMENT SPECIALIST REPORT FOR THE PROPOSED DEVELOPMENT
OF EXXARO DORSTFONTEIN WEST DISCARD DUMP FACILITY AND
TRANSPORTATION OF COAL FROM DCM WEST TO DCM EAST WITHIN
EMALAHLENI LOCAL MUNICIPALITY OF NKANGALA DISTRICT IN
MPUMALANGA PROVINCE.**

March, 2020

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DECLARATION

ABILITY TO CONDUCT THE PROJECT

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INDEPENDENCE

I, Munyadziwa Magoma declare that this report has been prepared independently of any influence as may be specified by all relevant department, institution and organization. I act as the independent specialist in this application, and will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant. I declare that there are no circumstances that may compromise my objectivity in performing such work, I vow to comply with all relevant Act, Regulations and applicable Legislation. Furthermore, Vhubvo Consultancy Cc, which is a company I represent in this application, is an independent service provider and apart from fair remuneration for services rendered, it has no financial interest or vested interest in the proposed project.

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EXECUTIVE SUMMARY

Introduction

Vhubvo Consultancy Cc (Vhubvo) has been appointed by Nsovo Environmental Consulting (Nsovo) to conduct an Archaeological and Cultural-Heritage Impact Assessment study for the proposed Dorstfontein Coal Mines (DCM) west expansion which includes the expansion of the existing discard dump, and a new conveyor belt and service road. The main aim of the study was to outline the archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed development. Further, the study aims to advise on mitigation measure should any sites be impacted, these mitigations will, in turn, assist the developer in making decision on the most appropriate option (s) in line with the National Heritage Resource Act, 1999 (Act 25 of 1999). The findings of this cultural study have been informed by desktop study and field survey that was undertaken through SAHRIS for previous Cultural Heritage Impact Assessments, and also for researches that have been carried out in the broader area of Kriel which is the closest town to the proposed area.

Background and Need of the Project

Exxaro Coal Central (Pty) Ltd (“Exxaro”) ‘s Dorstfontein West Mine previously mined 2 Seam and is now mining 4 Seam via bord and pillar underground mining method on the western portion of their mining rights and is intending to expand the existing discard dump facility and to construct a conveyor belt at the Dorstfontein West Mine (DCM) which is located within the jurisdiction of Emalahleni Local Municipality in the Mpumalanga Province. The Life of mine is projected to be until 2042 whilst the existing discard dump is coming to the end of its life in 2022. The purpose of this expansion project is to extend the dump facility to accommodate the disposal of the discard and slurry for the next 15 years of the Life of Mine (LOM) and to allow for easier transportation of coal from West to East through the conveyor belt.

The main infrastructure associated with the proposed Dorstfontein West Mine project includes:

- Expansion of the existing discard dump which is coming to the end of its life by 2022; and
- The construction of a conveyor belt and associated service road to convey coal from DCM West to DCM East where the coal will be loaded into trains and thereafter transported to Richards Bay Coal Terminal.

Methodology and Approach

The study method refers to the SAHRA Policy Guidelines for impact assessment, 2012. As part of this impact assessment; the following processes were followed:

- Literature Review: To understand the background archaeology of the area, a background study was undertaken and relevant institutions were consulted. These studies entail the review of archaeological and heritage impact assessment studies that have been conducted around the proposed area thorough



SAHRIS. In addition, E-journal platforms such as J-stor, Google scholars and History Resource Centre were searched. The University of Pretoria's Library collection was also pursued;

- The field survey was conducted on the **15th of January and also on the 1st of February 2019**, this also includes oral interviews;
- The final step involved the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and useful recommendations.

The applicable maps, tables, and figures, are included as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998) and the Minerals and Petroleum Resources Development Act (MPRDA) (28 of 2002).

Brief History of the Area

The history of the area began some thousands of years before the establishment of any local towns. This started with the Early Stone Age (from 2.5 million to 250 000 years ago), the Middle Stone Age (the period from 250 000 to 22 000 years ago) and the Late Stone Age (from 22 000 years ago to 200 years ago). Evidence for the MSA has been excavated at the Bushman Rock Shelter near Ohrigstad. The oldest layers date back to 40 000 years BP and the youngest to 27 000BP (Esterhuysen and Smith 2007). Evidence of LSA is widespread in Mpumalanga and includes four in eMalahleni, two in Lydenburg, 76 in White River and the southern Kruger National Park, 250 in Nelspruit, and eight in Ermelo (Smith and Zubieta 2007). The most well-known Early Iron Age site in Mpumalanga and South Africa is the Lydenburg head site which provided two occupation dates, namely AD 600 and AD 900 - AD 1100 (Evers 1981, Whitelaw 1996).

Impact statement

Several Archaeological studies have been conducted around the immediate area at large. These include studies by Coetzee 2017, Huffman 1996, Karodia 2014, Pistorius 2008, Orton 2017, Van der Walt 2014, and Van Vollenhoven 2009. From these studies, several sites of varying significance were documented. These sites mostly consist of historical farmhouse complexes and associated graveyards. These earlier studies are important to reflect on since they serve as a baseline of the type of sites that generally occur in the region of study, especially considering that agriculture practices have been conducted for more than a century. Although there is no heritage sites within the immediate footprint of the proposed DCM West expansion, and a new conveyor belt and service road, this proposal may result in various threats to heritage and graves sites since the was no subsurface inspection, the expected impacts are thus considered to be moderate (see Table 1).

Restrictions and Assumptions



This study was only limited to cultural heritage assessment and did not include any studies pertaining to risks associated with vibration analysis. It is important to note that the Social Impact Assessment and the Public Participation Process (PPP) were not part of this study. However, it is assumed that the above study and the PPP might also result in the identification of sites, features and objects, including sites of intangible heritage potential in the site or line and that these then will also have to be considered in the selection of the preferred site or line.

Survey Findings and Discussions

The main aim of the survey was to evaluate potential heritage resources that would occur within the boundaries of the proposed study area (s), as well as to determine if there is any hamartia that may prevent the proposed development from taking place.

The Phase I Archaeological and Cultural-Heritage Impact Assessment study for the proposed DCM West expansion has identified no significant impacts to archaeological material that will need to be mitigated prior development. Therefore, no archaeological or cultural heritage remains were documented on the study area.

Recommendations and Discussions

There was no significant archaeological material identified within the study. Nonetheless, the developer is reminded that unavailability of archaeological materials (e.g., pottery, stone tools, remnants of stone-walling, graves, etc) and fossils does not mean absentee, archaeological material might be hidden underground, and as such the client is reminded to take precautions during development. In the event that archaeological materials are unearthed, all development within a radius of at least 10m of such indicator should cease and the area be demarcated by a danger tape. Accordingly, a professional archaeologist should be contacted immediately. In the meantime, it is the responsibility of the contractor to protect the site from publicity (i.e., media) until a mutual agreement is reached. Noteworthy that any measures to cover up the suspected archaeological material or to collect any resources is illegal and punishable by law. In the same manner, no person may exhume or collect such remains, whether of recent origin or not, without the endorsement by PHRA.

Prior to construction of the Conveyor belt, contractors should be given training on how to identify and protect archaeological remains that may be discovered during construction. The pre-construction training should include some limited site recognition training for the types of archaeological sites that may occur during the construction phase. This should be done by an accredited archaeologist.

If any chance archaeological or previously unknown grave (s), be exhumed or discovered during the course of construction work, activities on the proposed development area should be deactivated, and a heritage specialist monitoring the project be notified immediately. In the meantime, construction activities must be stopped within a radius of at least 10m of such indicator. The area should then be demarcated by a danger tape. In the meantime, it is the responsibility of the Environmental officer and the contractor to protect the site from publicity (i.e., media) until a mutual agreement is reached. It is mandatory to report any incident of human



remains encountered to the South African Police Services, SAHRA staff member and professional archaeologist. Any measure to cover up the suspected archaeological material or to collect any resources is illegal and punishable by law under Section 35(4) and 36(3) of the National Heritage Resources Act, Act 25 of 1999. The developer should induct field worker about archaeology, and steps that should be taken in the case of exposing archaeological materials.

Conclusions

A thorough background study and survey of the proposed development was conducted and findings were recorded in line with SAHRA guidelines. It is recommended that the developer proceed with the project subject to the recommendations given above.

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ACRONYMS AND ABBREVIATIONS

AIA	Archaeological Impact Assessment
EMP	Environmental Management Plan
HIA	Heritage Impact Assessment
LIA	Late Iron Age
MIA	Middle Iron Age
EIA	Early Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
ESA	Early Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
SAHRA	South African Heritage Resources Agency



GLOSSARY OF TERMS

The following terms used in this Archaeology are defined in the National Heritage Resources Act [NHRA], Act Nr. 25 of 1999, South African Heritage Resources Agency [SAHRA] Policies as well as the Australia ICOMOS Charter (*Burra Charter*):

Archaeological 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 artifacts, human and hominid remains, and artificial features and structures.

Artefact: Any movable object that has been used modified or manufactured by humans.

Conservation: All the processes of looking after a site/heritage place or landscape including maintenance, preservation, restoration, reconstruction and adaptation.

Cultural Heritage Resources: refers to physical cultural properties such as archaeological sites, palaeontological sites, historic and prehistorical places, buildings, structures and material remains, cultural sites such as places of rituals, burial sites or graves and their associated materials, geological or natural features of cultural importance or scientific significance. This include intangible resources such religion practices, ritual ceremonies, oral histories, memories indigenous knowledge.

Cultural landscape: “the combined works of nature and man” and demonstrate “the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both internal and external”.

Cultural Resources Management (CRM): the conservation of cultural heritage resources, management, and sustainable utilization and present for present and for the future generations

Cultural Significance: is the aesthetic, historical, scientific and social value for past, present and future generations.

Chance Finds: means Archaeological artefacts, features, structures or historical cultural remains such as human burials that are found accidentally in context previously not identified during



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cultural heritage scoping, screening and assessment studies. Such finds are usually found during earth moving activities such as water pipeline trench excavations.

Compatible use: means a use, which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance.

Conservation means all the processes of looking after a place so as to retain its cultural significance.

Expansion: means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Grave: A place of interment (variably referred to as burial), including the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

Heritage impact assessment (HIA): Refers to the process of identifying, predicting and assessing the potential positive and negative cultural, social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law and which may significantly affect the cultural and natural heritage resources. The HIA includes recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

Historic Material: remains resulting from human activities, which are younger than 100 years, but no longer in use, including artifacts, human remains and artificial features and structures.

Impact: the positive or negative effects on human well-being and / or on the environment.

In situ material: means material culture and surrounding deposits in their original location and context, for instance archaeological remains that have not been disturbed.



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Interested and affected parties Individuals: communities or groups, other than the proponent or the authorities, whose interests may be positively or negatively affected by the proposal or activity and/ or who are concerned with a proposal or activity and its consequences.

Interpretation: means all the ways of presenting the cultural significance of a place.

Late Iron Age: this period is associated with the development of complex societies and state systems in southern Africa.

Material culture means buildings, structure, features, tools and other artefacts that constitute the remains from past societies.

Mitigate: The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

Place: means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.

Protected area: means those protected areas contemplated in section 9 of the NEMPAA and the core area of a biosphere reserve and shall include their buffers.

Public participation process: A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.

Setting: means the area around a place, which may include the visual catchment.

Significance: can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgments and science-based criteria (i.e. biophysical, physical cultural, social and economic).



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Site: a spatial cluster of artefacts, structures, and organic and environmental remains, as residues of past human activity.



1. Introduction

Vhubvo Consultancy Cc (Vhubvo) has been appointed by Nsovo Environmental Consulting (Nsovo) to conduct an Archaeological and cultural heritage impact assessment study for the proposed DCM West expansion project which includes a new conveyor route and expansion of an existing discard dump in the Mpumalanga Province. The study aims to outline the archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed construction, and to advise mitigation should any be affected and these will in turn assist the developer to make a decision on the most appropriate option in line with the National Heritage Resource Act, 1999 (Act 25 of 1999). The findings of this cultural study have been informed by desktop study and field survey. The desktop study was undertaken through SAHRIS for previous Cultural Heritage Impact Assessments conducted in the region of the proposed development, and also for researches that have been carried out in the area over the past years.

2. Sites Location and Description

The proposed DCM West expansion project is located on Portion 1 of the farm Boschpoort 211 IR, which is approximately 20km northeast of Delmas, 20km west of Ogies, 50km south of Bronkhorstspuit. The proposed area is disturbed due to farming activity happening in the area. Boschpoort 211 IR is approximately 151 hectares in extent and is bordered by the R547 on the northern part, the R544 on the eastern section and the R545 on the southern section (Figure 1). The proposed area had been under intensive farming (Figure 2 – 5) for the past century, and no archaeological materials could have survived or be found *in situ* as a result of disturbances brought about by farming.



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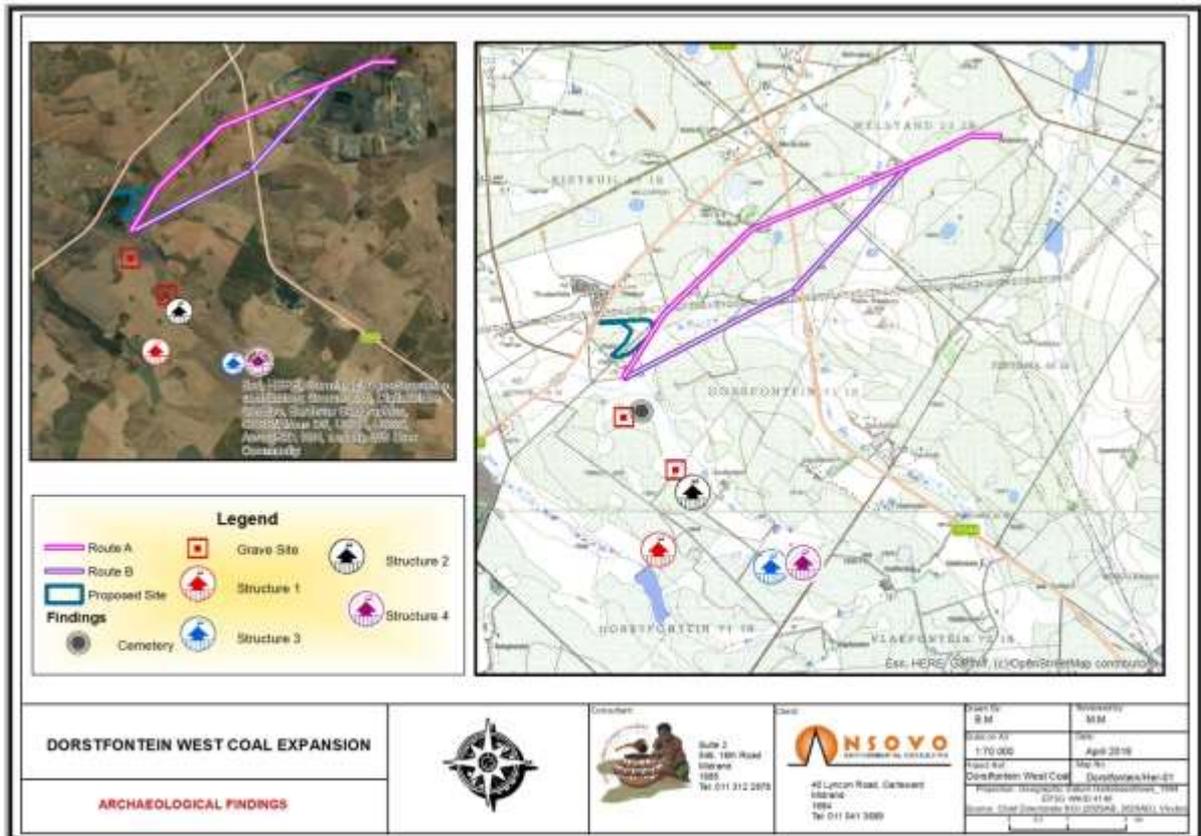


Figure 1: An overview of the topographical map of the proposed area (Courtesy Nsovo).



Figure 2: An overview of the area proposed for the expansion.



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Figure 3: An overview of the eastern section of the area proposed for the expansion.



Figure 4: View of the area where the proposed conveyor will transverse.



3. Nature of the Proposed Project

Dorstfontein West mine is an underground mine with both 2 and 4-seam operated by Exxaro Coal Central (Pty) Ltd. Exxaro Dorstfontein West proposes to undertake the following activities (hereafter referred as the project):

- Expansion of the existing discard dump which is coming to the end of its life a by 2022; and
- The construction of a conveyor belt and associated service road, from DCM West which will be linked to the conveyor systems at DCM East to ensure that coal is conveyed from DCM West to DCM East where the coal will be loaded into trains and thereafter transported to Richards Bay Terminal

Site establishment

The main construction site will be within the DCMW and DCME mine premises. The contractor shall allow for a temporary water connection, chemical toilets and sit down areas under proper shaded structures. Although water and electricity is available on site it shall be the Contractors responsibility to allow for and install temporary connections to these services which shall be installed in accordance with the requirements of Exxaro. No site will be establish on the area where the overland conveyor will be build.

Civil works

This civil works covers the ground works and service roads along the conveyor route.

Ground works and concrete plinths for the conveyor support (outside wetlands area):

- Excavation need to be done every 4m for the conveyor support structure on all areas outside the indicated wetlands areas as indicated on the conveyor route drawing with the following specifications:
 - 2m long x 400mm wide x 400mm deep
 - G5 material to be inserted into the hole and compacted
 - 1.2m x 300mm x 250mm concrete plinths to be installed on the leveled G5 base
 - Steel conveyor gantry structure to be installed on the concrete plinths

Ground works and piles for the conveyor support (inside wetlands area):

- Pile holes to be done drilled every 6m for the conveyor support structure in the wetlands areas as indicated on the conveyor route drawing with the following specifications:



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- 2 x Diameter 300mm holes to be drilled 3m to 4m deep in the existing soil every 6m inside the wetlands area
- 2 x Diameter 300mm concrete piles to be installed in the holes and leveled to 300mm protrusion above ground level
- Steel conveyor gantry structure to be installed on the concrete piles

Ground works and concrete plinths for the conveyor transfer steel structures (outside wetlands area):

- Excavation need to be done for 2 x conveyor transfer steel support structure on the areas outside the indicated wetlands as indicated on the conveyor route drawing with the following specifications:
 - Excavation holes for the support foundation as per the drawings to be dig to 1m deep.
 - G5 material to be inserted into the holes and compacted
 - Concrete plinths to be installed on the leveled G5 base
 - Steel conveyor transfer structure to be installed on the concrete plinths

Mechanical works

The mechanical conveyor structure will fit on top of the concrete plinths and piles as per the drawings. The conveyor steel transfer structures will be built on the conveyor route.

Service road

A single lane service road (2.5m wide) will be grade next to the majority distance of the conveyor. It will go around the wetlands areas and utilized the existing farm roads as indicated on the conveyor routing drawing. No material will be excavated for the road.

4. Purpose of the Cultural Heritage Study

The purpose of this Archaeological and Cultural Heritage study is to entirely identify and document archaeological sites, cultural resources, sites associated with oral histories, graves, cultural landscapes, and any structure of historical significance that may be affected by the proposed DCM West expansion project, these will, in turn, assist the developer in ensuring proper conservation measure in line with the National Heritage Resource Act, 1999 (Act 25 of 1999). Impact assessments highlight many issues facing sites in terms of their management, conservation,



monitoring and maintenance, and the environment in and around the site. Therefore, this study involves the following:

- Identification and recording of heritage resources that may be affected by the proposed DCM West expansion;
- Providing recommendations on how best to appropriately safeguard identified heritage sites. Mitigation is an important aspect of any development on areas where heritage sites have been identified.

5. Methodology and Approach

Background study introduction

The methodological approach is informed by the 2012 SAHRA Policy Guidelines for impact assessment. As part of this study, the following tasks were conducted: 1) literature review, 2), consultations with the developer and appointed consultants, 3), completion of a field survey and 4), analysis of the acquired data, leading to the production of this report.

Physical survey

The field survey was conducted on the **15th of January and also on the 1st of February 2019.** One archaeologist from Vhubvo conducted the survey in the presence of Nsovo and Exxaro officials.

Documentation

The general project area was documented. Documentation included taking photographs using cameras a 10.1 mega-pixel Sony Cybershort Digital Camera. Plotting of finds was done by a Garmin etrex Venture HC.

Oral interview

Oral interview was not initiated due to the nature of the survey.

Restrictions and Assumptions

The sign of sites of heritage potential expected in the proposed area are mostly historical houses and graves. Although no remains of Stone/ Iron Age sites are expected in the proposed area, the proposed sites could still contain camps and some areas with suitable substrates that could have been used as quarries for material to produce tools.

It is assumed that the Social Impact Assessment and the Public Participation Process might also result in the identification of sites, features and objects, including sites of intangible heritage potential in the corridors and that these then will also have to be considered in the selection of the preferred alternatives.



6. Applicable Heritage Legislation

Several legislations provide the legal basis for the protection and preservation of both cultural and natural resources. These include the National Environment Management Act (No. 107 of 1998); Mineral Amendment Act (No 103 of 1993); Tourism Act (No. 72 of 1993); Cultural Institution Act (No. 119 of 1998), and the National Heritage Resources Act (Act 25 of 1999). Section 38 (1) of the National Heritage Resources Act requires that where relevant, an Impact Assessment is undertaken in case where a listed activity is triggered. Such activities include:

- (a) *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) *the construction of a bridge or similar structure exceeding 50 m in length; and*
- (c) *any development or other activity which will change the character of an area of land, or water -*
 - (i) *exceeding 5 000 m² in extent;*
 - (ii) *involving three or more existing erven or subdivisions thereof; or*
 - (iii) *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - (iv) *the costs of which will exceed a sum set in terms of regulations by SAHRA or a Provincial Heritage Resources Authority;*
- (d) *the re-zoning of a site exceeding 10 000 m² in extent; or*
- (e) *any other category of development provided for in regulations by SAHRA or a Provincial Heritage Resources Authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.*

Section 3 of the National Heritage Resources Act (25 of 1999) lists a wide range of national resources protected under the act as they are deemed to be national estate. When conducting a Heritage Impact Assessment (HIA) the following heritage resources have to be identified:

- (a) *Places, buildings structures and equipment of cultural significance*
- (b) *Places to which oral traditions are attached or which are associated with living heritage*
- (c) *Historical settlements and townscapes*
- (d) *Landscapes and natural features of cultural significance*
- (e) *Geological sites of scientific or cultural importance*
- (f) *Archaeological and paleontological sites*
- (g) *Graves and burial grounds including-*
 - (i) *ancestral graves*
 - (ii) *royal graves and graves of traditional leaders*
 - (iii) *graves of victims of conflict*
 - (iv) *graves of individuals designated by the Minister by notice in the Gazette*
 - (v) *historical graves and cemeteries; and*
 - (vi) *other human remains which are not covered by in terms of the Human Tissue Act,1983 (Act No. 65 of 1983)*
- (h) *Sites of significance relating to the history of slavery in South Africa*
 - (i) *moveable objects, including -*
 - (i) *objects recovered from the soil or waters of South Africa, including archaeological and paleontological objects and material, meteorites and rare geological specimens*
 - (ii) *objects to which oral traditions are attached or which are associated with living heritage*
 - (iii) *ethnographic art and objects*
 - (iv) *military objects*
 - (v) *objects of decorative or fine art*
 - (vi) *objects of scientific or technological interest; and*



(vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1 of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

Other sections of the Act with a direct relevance to the AIA are the following:

Section 34(1) No person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

Section 35(4) No person may, without a permit issued by the responsible heritage resources authority:

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

Section 36 (3) No person may, without a permit issued by SAHRA or a provincial heritage resources authority:

- destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside formal cemetery administered by a local authority; or
- bring onto or use at a burial ground or grave any excavation equipment, or any equipment which assists in detection or recovery of metals.

7. Degree of Significance

This category requires a broad, but detailed knowledge of the various disciplines that might be involved. Large sites, for example, may not be very important, but a small site, on the other hand, may have great significance, as it is unique for the region. The following table is used to grade heritage resources.

Table 1: Grading systems for identified heritage resources in terms of National Heritage Resources Act (Act 25 of 1999)

Level	Significance	Possible action
National (Grade I)	Site of National Value	Nominated to be declared by SAHRA
Provincial (Grade II)	Site of Provincial Value	Nominated to be declared by PHRA
Local Grade (IIIA)	Site of High Value Locally	Retained as heritage
Local Grade (IIIB)	Site of High Value Locally	Mitigated and part retained as heritage
General Protected Area A	Site of High to Medium	Mitigation necessary before destruction
General Protected Area B	Medium Value	Recording before destruction



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General Protected Area C	Low Value	No action required before destruction
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Significance rating of sites

(i) High

(ii) Medium

(iii) Low

This category relates to the actual artefact or site in terms of its actual value as it is found today, and refers more specifically to the condition that the item is in. For example, an archaeological site may be the only one of its kind in the region, thus its regional significance is high, but there is heavy erosion of the greater part of the site, therefore its significance rating would be medium to low. Generally speaking, the following are guidelines for the nature of the mitigation that must take place as Phase 2 of the project.

High

- This is a 'do not touch' situation, alternative must be sought for the project, examples would be natural and cultural landscapes like the Mapungubwe Cultural Landscape World Heritage Site, or the house in which John Langalibalele resided.
- Certain sites, or features may be exceptionally important, but do not warrant leaving entirely alone. In such cases, detailed mapping of the site and all its features is imperative, as is the collection of diagnostic artefactual material on the surface of the site. Extensive excavations must be done to retrieve as much information as possible before destruction. Such excavations might cover more than half the site and would be mandatory; it would also be advisable to negotiate with the client to see what mutual agreement in writing could be reached, whereby part of the site is left for future research.

Medium

- Sites of medium significance require detailed mapping of all the features and the collection of diagnostic artefactual material from the surface of the site. A series of test trenches and test pits should be excavated to retrieve basic information before destruction.

Low

- These sites require minimum or no mitigation. Minimum mitigation recommended could be a collection of all surface materials and/ or detailed site mapping and documentation. No excavations would be considered to be necessary.

In all the above scenarios, permits will be required from the South African Heritage Resources Agency (SAHRA) or the appropriate PHRA as per the legislation (the National Heritage Resources Act, no. 25 of 1999). Destruction of any heritage site may only take place when the appropriate



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heritage authority has issued a permit. The following table is used to determine rating system on the receiving environment.

Table 2: Rating System		
NATURE		
This criterion includes a brief written statement of the heritage aspect being impacted upon by a particular action or activity.		
TOPOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than 75% chance of occurrence).



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REVERSIBILITY		
This describes the degree to which an impact on a heritage parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which heritage resources will be irreplaceably lost as a result of proposed activity		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resource	The impact will result insignificant loss of resources.
4	Complete loss of resource	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impact on the heritage parameter. Duration indicates the lifetime of a result of the proposed activity.		



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1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in span shorter than the construction phase (0-1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0-2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2-10 years).
3	Long term	The impact and its effects will continue or last for entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10-50 years).
4	Permanent	The only class of the impact that will non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		



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<p>This describes the cumulative effect of the impacts on the heritage parameter. A cumulative effect/impact is an effect, which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from similar or diverse activities as a result of the project activity in question.</p>		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects.
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative Impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects.
MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).



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3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapsed). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on heritage parameter.		

8. Discussion of (Pre-) History of the Area

South Africa has one of the most prolonged sequences of human development in the world. The prehistory and history of South Africa span the entire known life span of human on earth. It is thus difficult to determine precisely where to begin, and a possible choice could be the development of genus Homo millions of years ago. South African scientists have been actively involved in the study of human origins since 1925 when Raymond Dart identified the Taung child as an infant halfway between apes and humans. Dart called the remains *Australopithecus africanus*, southern ape-man, and his work ultimately changed the focus of human evolution from Europe



and Asia to Africa, and it is now widely accepted that humankind originated in Africa (Robbins et al. 1998). In many ways, this discovery marked the birth of palaeoanthropology as a discipline. Nonetheless, the earliest form of a culture known in South Africa is the Stone Age. This prehistoric period during which humans widely used stone for tool-making, stone tools were made from a variety of different sorts of stone. For example, flint and chert were shaped for use as cutting tools and weapons, while basalt and sandstone were used for ground stone. The Stone Age period is divided into Early, Middle and Late, and it is argued that there is two transitional period. Noteworthy that the time frame used for Stone Age period is an approximate and differ from one researcher to the next (see Korsman & Meyer 1999, Mitchell 2002, Robbins et al. 1998).

Stone Age period

Although a long history of research on the Early Stone Age period of southern Africa has been conducted (Mason 1962, Sampson 1974, Klein 2000, Chazan 2003), it remains a period where little is known about. This may be due to many factors which include, though not limited to retrieval techniques used, reliance on secondary, at times unknown sources and the fact that few faunae from this period has been analysed (Chazan 2003). According to Robbins et al. (1998), the Stone Age is the period in human history when a stone was mainly used to produce tools. This period began approximately 2.5 million years ago and ended around 20 000 years ago. During this period human beings became the creators of culture and was hunters and gatherers and large stone artefacts identify this area. Very few sites dating to the Early Stone Age are known to exist in the Highveld, these include in the Magaliesberg area, as well as those sites found in Maleoskop near Groblersdal where ESA Olduwan and Acheulian artefacts have been recorded.

The Middle Stone Age possibly began around 100 000 to about 200 000 years ago and extended up to around 35 000 years ago. This period is marked by smaller tools than in ESA and characterized by the production of food and the introduction of domestication of animals. Many MSA sites have evidence for control of fire; before this, rock shelters and caves would have been dangerous for human habitation due to predators. MSA people made a wide range of stone tools from both coarse- and fine-grained rock types. Sometimes the rocks used for tools were transported considerable distances, presumably in bags or other containers; as such tool assemblages from some MSA, sites tend to lack some of the preliminary cores and contain predominantly finished products like flakes and retouched pieces. Evidence of occupation during the Middle Stone Age has been found at the famous Bushman Rock Shelter. This cave was



occupied over a lengthy period. The oldest layers date back to 40 000 years BP and the youngest to 27 000BP (Esterhuysen and Smith 2007).

Microlithic Later Stone Age period began around 35 000 and extended to the later 1800 AD. According to Deacon (1984), LSA is a period when human being refined small blade tools, conversely abandoning the prepared-core technique. Thus, refined artefacts such as convex-edge scrapers, borers, and segments are associated with this period. Moreover, large quantity of art and ornaments were made during this period. The Late Stone Age of Mpumalanga and elsewhere is associated with rock paintings and engravings, as a result sites bearing rock art and engraving have been found throughout the province and is widespread, and include those found in eMalahleni, Lydenburg, White River, Kruger National Park, Nelspruit and Ermelo (Maggs 2008; Smith and Zubieta 2007; Wadley and Turner 1987).

Iron Age and Historical period

The Iron Age is the name given to the period of human history when metal was mainly used to produce artefacts. Recently, they have been a debate about the use of the name. Other archaeologists have argued that the word “Iron Age” is problematic and does not precisely explain the event of what happened in southern Africa, as such, the word farming communities has been proposed (Segobye 1998). Nonetheless, in South Africa this period can be divided into two phases. Early (200 - 1000 A.D) and Late Iron Age (1000 - 1850 A.D). Huffman (2007) has indicated that a Middle Iron Age (900 - 1300 A.D) should be included. According to Huffman (2007:361), until the 1960s and 1970s most archaeologists had not yet recognised a Middle Iron age. Instead, they began the Late Iron Age at AD 1000. The Middle Iron Age (AD 900–1300) is characterised by extensive trade between the Limpopo Confluence and the East Coast of Africa. This has been debated, with other researchers, arguing that the period should be restricted to Shashe-Limpopo Confluence. Evidence for the first farming communities in the Mpumalanga Province occurs in Höningnest Shelter near Badfontein. The co-existence of EIA potsherds and LSA stone tools suggest some form of a relation between these two groups (Esterhuysen & Smith 2007). The Welgelegen Shelter near Ermelo also reflects some relationship sort of a relationship between these two groups (Schoonraad & Beaumont 1971). EIA sites were also investigated at Sterkspruit near Lydenburg and in Nelspruit. The most recognized EIA site is the Lydenburg head site, which provided two occupation dates (Evers 1981, Whitelaw 1996). The Late Iron Age is well represented in Mpumalanga and stretches from AD1500 into the nineteenth century this period is mostly associated with stone walled sites. Military pressure from Zululand reaches the Highveld



by the 1820s. Several displaced Sotho-Tswana groups moved across the plateau. Mzilikazi raided the plateau extensively between 1825 and 1837. The Boers trekked into this area in the 1830s.

9. Findings

The main aim of the survey was to evaluate potential heritage resources that would occur within the boundaries of the proposed study area (s), as well as to determine if there is any hamartia that may prevent the proposed development from taking place. The Phase I Archaeological and Cultural-Heritage Impact Assessment study for the proposed DCM West expansion has identified no significant impacts to archaeological material that will need to be mitigated prior development. Therefore, no archaeological or cultural heritage remains were documented on the exact area during the study.

9.1 Impact Assessment

Below is a description of the impact ratings of the discard dump extension and two conveyer belt Routes. These ratings are for archaeological and cultural heritage sites known to exist in the proposed area, and include Stone and Iron Age, as well as Graves and Historical era materials. Note that these impacts are assessed as per Table 2 above:

Extension of existing Discard dump

The area proposed for the discard dump extension is invaded by shrub grass, an indication that the area was used for farming in the past.

Table 3: Anticipated impact rating

Alternatives	Ratings
Nature	Negative
Topographical Extent	The impact will only affect site.
Duration	Short term
Magnitude	Low
Probability	Possible
Reversibility	Irreversible
Irreplaceable Loss	The impact will result in no loss

Conveyor route A



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The topography on which this proposed conveyor will transverse is within the farming area. There is no archaeological material expected here since the area is disturbed to an extent that no resources could have survived.

Table 4: Anticipated impact rating

Alternatives	Ratings
Nature	Negative
Topographical Extent	The impact will only affect site.
Duration	Short term
Magnitude	Low
Probability	Possible
Reversibility	Irreversible
Irreplaceable Loss	The impact will result in no loss

Conveyor route B

Similar to the two sites above, this alternative also traverse on active farms, and there is no chance that any material can be found in this area.

Table 5: Anticipated impact rating

Alternatives	Ratings
Nature	Negative
Topographical Extent	The impact will only affect site.
Duration	Short term
Magnitude	Low
Probability	Possible
Reversibility	Irreversible
Irreplaceable Loss	The impact will result in no loss

10. Recommendations

There were no significant archaeological materials identified on the exact study area proposed for development. Nonetheless, the developer is reminded that unavailability of archaeological



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materials (e.g., pottery, stone tools, remnants of stone-walling, graves, etc) and fossils does not mean absentee, archaeological material might be hidden underground, and as such the client is reminded to take precautions during development. In the event that archaeological materials are unearthed, all development within a radius of at least 10m of such indicator should cease and the area be demarcated by a danger tape. Accordingly, a professional archaeologist or Mpumalanga Heritage Resource Authority (MPHRA) officer should be contacted immediately. In the meantime, it is the responsibility of the contractor to protect the site from publicity (i.e., media) until a mutual agreement is reached. Noteworthy that any measures to cover up the suspected archaeological material or to collect any resources is illegal and punishable by law. In the same manner, no person may exhume or collect such remains, whether of recent origin or not, without the endorsement by Mpumalanga Heritage Resource Authority (MPHRA).

Pre-development education and awareness training

Prior to development, workers should be given training on how to identify and protect archaeological remains that may be discovered during construction, The pre-development training should include some limited site recognition training for the types of archaeological sites that may occur in the areas to be developed. Below are some of the indicators of archaeological site that may be found:

- ✚ Flaked stone tools, bone tools and loose pieces of flaked stone;
- ✚ Ash and charcoal;
- ✚ Bones and shell fragments;
- ✚ Artefacts (e.g., beads or hearths); and
- ✚ Packed stones which might be uncounted underground, and might indicate a grave or collapse stone walling.

11. Conclusions

A thorough background study and survey of the proposed development was conducted and findings were recorded in line with SAHRA guidelines. It is recommended that the proposed development proceed on condition that the proposed recommendations detailed above are adhered to.

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APPENDIX 1: SITE SIGNIFICANCE

The following guidelines for determining site *significance* were developed by SAHRA in 2003. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.



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(a) Historic value

- Is it important in the community, or pattern of history?
- Does it have strong or special association with the life or work of a person, group or organization of importance in history?
- Does it have significance relating to the history of slavery?

(b) Aesthetic value

- Is it important in exhibiting particular aesthetic characteristics valued by a community or cultural group?

(c) Scientific value

- Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage?
- Is it important in demonstrating a high degree of creative or technical achievement at a particular period?

(d) Social value

- Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?

(e) Rarity

- Does it possess uncommon, rare or endangered aspects of natural or cultural heritage?

(f) Representivity

- Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects?
- What is the importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class?
- Is it important in demonstrating the principal characteristics 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?



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