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ENVIRONMENTAL



Integrated Environmental Authorisation Process for the Proposed Dagsoom Twyfelaar Coal Mining Project near Ermelo, Mpumalanga

Heritage Impact Assessment

Project Number:

DAG5603

Prepared for:

Dagsoom Coal Mining (Pty) Ltd

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EXECUTIVE SUMMARY

Dagsboom Coal Mining (Pty) Ltd (hereinafter Dagsboom) propose to develop an underground coal mine, the Twyfelaar Coal Mine, near Ermelo in the Mpumalanga Province (the Project). Dagsboom intends to apply for a Mining Right in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). This will require Environmental Authorisation (EA) and an Integrated Water Use Licence (IWUL) Application in compliance with the South African national environmental legislative framework.

The Project will consist of three underground sections accessed by boxcuts that will later be developed into mine adits. Dagsboom intend to concentrate the associated surface infrastructure around these three access areas, avoiding the wetlands present in the area and taking cognisance of additional environmental sensitivities.

Dagsboom appointed Digby Wells Environmental (hereinafter Digby Wells) to undertake the necessary Environmental Impact Assessment (EIA) process including the Heritage Resources Management (HRM) process in support of the EIA.

The aim of the HRM process was to comply with the regulatory requirements encapsulated in Section 38(3) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA). Digby Wells completed the following activities as part of the Heritage Impact Assessment (HIA):

- Description of the predominant cultural landscape supported through primary and secondary data collection;
- Assessment of the Cultural Significance (CS) of the identified heritage resources;
- Identification of potential impacts to heritage resources based on the Project description and Project activities;
- An evaluation of the potential impacts to heritage resources relative to the sustainable socio-economic benefits that may result from the Project;
- Recommending feasible management measures and/or mitigation strategies to avoid and/or minimise negative impacts and enhance potential benefits resulting from the Project; and
- Submission of the HIA report to the Heritage Resource Authorities (HRAs) for Statutory Comment as required under Section 38(8) of the NHRA.

Digby Wells identified 27 heritage resources with very high to negligible CS values. The table below provides a summary of the CS values of the identified heritage resources.

There Project presents potential direct and indirect impacts to identified heritage resources. The current proposed infrastructure design layout suggests that the Project will directly impact STE-005. This heritage resource is considered to have negligible CS and, in keeping with the South African Heritage Resources Agency (SAHRA) Minimum Standards, the impact to this heritage resource was not assessed in detail. The potential indirect impact to the burial

grounds and graves within the Project area includes the loss of access resulting in the degradation of CS. The last table below presents an overview of the assessment of this impact. The preceding table outlines the potential risk to unidentified heritage resources that may occur within the Project area.

Based on Digby Wells' understanding of the Project, while considering the defined cultural landscape and known heritage resources, Digby Wells recommends:

- Dagsoom amends the infrastructure design of the discard dump, where possible, to avoid STE-005. Despite its negligible CS value, this structure is afforded general protection under Section 34 of the NHRA and Dagsoom must obtain a Section 34 Permit to destroy or alter this structure;
- Where the redesign of the infrastructure layout is not feasible, Dagsoom must complete the Permit application process in compliance with Section 34 of the NHRA and Chapter III of the NHRA Regulations and obtain a permit prior to the commencement of construction of the discard dump;
- Dagsoom must develop and implement a CMP to manage *in situ* heritage resource. The CMP must include any applicable mitigation measures, management strategies and proposed monitoring schedules and outline the roles and responsibilities of those involved. This document must be submitted to the HRAs for approval prior to implementation;
- Where rock art sites are identified within the Project area, Dagsoom must immediately notify the HRAs and must include such sites in the Project-specific CMP; and
- A project-specific CFP must be developed and approved by the HRAs prior to the commencement of the construction of Project-related infrastructure.

Where these recommendations are adopted, Digby Wells does not object to the implementation of the Project from a heritage perspective.

Summary of the CS of Identified Heritage Resources

Resource ID	Description	INTEGRITY	CS
<i>Vryheid Formation</i>	A geological formation of very high palaeontological sensitivity.	4	Very High
BGG-001 to BGG-013	Burial grounds and graves	4	Very High
HST-002	A historical site linked to BGG-008		Medium
HST-001 and HST-003	Isolated historical artefacts which most likely represent wash.	1	Negligible
STE-001 to STE-009 Wf-001 and Wf-002	Structural remains of the historical built environment.	2	

Summary of the potential risk to heritage resources

Unplanned event	Potential impact	Mitigation / Management / Monitoring
Encountering unidentified <i>in situ</i> remnants of historical built environment resources during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 34 of the NHRA	Establish Project-specific Chance Find Procedures (CFPs) as a condition of authorisation. Refer to Section 9 for more detailed recommendations.
Accidental exposure of fossil bearing material implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 35 of the NHRA	
Accidental exposure of <i>in situ</i> archaeological material during the implementation of the Project.		
Accidental exposure of <i>in situ</i> burial grounds or graves during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 36 of the NHRA.	
Accidental exposure of human remains during the construction phase of the Project.		
Increased dust generated by Project activities	Negative changes to the <i>status quo</i> and integrity of heritage resources generally protected under Section 35 of the NHRA	Should rock art sites be identified within the Project area, Dagsoom must immediately notify the HRAs and must include such sites in the CMP.

Summary of the Impact Assessment

Impact	Duration	Extent	Intensity	Consequence	Probability	Significance
	Pre-mitigation:					
Indirect impact to Burial Grounds and Graves	Project Life	Local	Very high - negative	Highly detrimental	Probable	Minor - negative
	Post-mitigation:					
Indirect impact to Burial Grounds and Graves	Beyond project life	Local	High - positive	Moderately beneficial	Highly probable	Moderate - positive

GLOSSARY OF TERMS

Term	Definition
Archaeological	Material remains resulting from human activity that are in a state of disuse and older than 100 years, including artefacts, human and hominid remains and artificial features and structures. Rock art created through human agency older than 100 years, including any area within 10 m of such representation. Wrecks older than 60 years - either vessels or aircraft - or any part thereof that was wrecked in South Africa on land, internal or territorial waters, and any cargo, debris or artefacts found or associated therewith. Features, structures and artefacts associated with military history that are older than 75 years and the sites on which they are found, e.g. battlefields.
Archaeologist	A trained professional who uses scientific methods to excavate, record and study archaeological sites and deposits.
Artefact	Any object manufactured or modified by human beings.
Burial Grounds and Graves Consultation (BGGC)	The regulated consultation process required in terms of Section 36 of the NHRA and Regulation GNR 548 to the Act when burial grounds and graves are identified within a project area.
Ceramic (syn. pottery)	In an archaeological context any vessel or other object produced from natural clay that has been fired. Indigenous ceramics associated with Farming Communities are low-fired wares, typically found as potsherds. Imported and more historic ceramics generally include high-fired wares such as porcelain, stoneware, etc.
Ceramic facies / facies	Subgroups of a primary ceramic tradition or sequence. Typically used in ceramic analyses. Various facies are attributed to different temporal periods based of radiometric dates obtained from archaeological contexts. Facies are often used to infer cultural identity of archaeological groups. However, in context of this study identified ceramic facies merely provide a relative temporal context for archaeological sites in the landscape.
Ceramic tradition	The sequence of ceramic styles that develop out of each other and form a continuum. A tradition is the primary group to which subsequent ceramic facies belong. A ceramic tradition can be broadly associated with various linguistic and cultural groups, but do not represent any given ethnic identity, especially during the LFC period.
Conservation	In relation to heritage resources includes the protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance.



Cultural significance (CS)	<p>The aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. A heritage may have cultural significance or other special value because of its: Importance in the community, or pattern of South Africa's history. Possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage. Importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects. Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group. Importance in demonstrating a high degree of creative or technical achievement at a particular period. Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa. Significance relating to the history of slavery in South Africa.</p>
Development	<p>Any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including: Construction, alteration, demolition, removal or change of 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 hoardings. Any change to the natural or existing condition or topography of land. Any removal or destruction of trees, or removal of vegetation or topsoil.</p>
Early Farming Community/ies	<p>The first Farming Communities (also known as Early Iron Age) that appear in the southern archaeological record during the early first millennium CE. The EFC period is generally dated from c. 200 CE to 1000 CE.</p>
Early Stone Age	<p>The South African ESA dates from ~3 Mya to c. 250 Kya. This period is associated with later <i>Australopithecus</i> and early <i>Homo</i> species. The lithic industries that characterise the ESA include Oldowan and Early Acheulian, typically as simple core tools, choppers handaxes and cleavers.</p>

Excavation	The scientific excavation, recording and retrieval of archaeological deposit and objects through the use of accepted archaeological procedures and methods, and excavate has a corresponding meaning.
Farming Community/ies	Term signifying the appearance in the southern African archaeological of Bantu-speaking agricultural based societies from the early first millennium CE. The term replaces the <i>Iron Age</i> as a more accurate description for groups who practiced agriculture and animal husbandry, extensive manufacture and use of ceramics, and metalworking. The Farming Community period is divided into an Early and Late phase. The use of Later Farming Communities especially removes the artificial boundary between archaeology and history.
Field Rating	SAHRA requires heritage resources to be provisionally rated in accordance with Section 7 of the NHRA that provides a three tier grading system of resources that form part of the national estate. The rating system distinguishes between four categories: Grade I: Heritage resources with qualities so exceptional that they are of special national significance. Grade II: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region. Grade III: Other heritage resources worthy of conservation. General Protected: i.e. generally protected in terms of Sections 33 to 37 of the NHRA.
Formal protection	Places with qualities so exceptional that they are of special national significance as national heritage sites or that have special qualities as provincial heritage sites.
General protection	General protections are afforded to: Objects protected in terms of laws of foreign states. Structures older than 60 years. Archaeological and palaeontological sites and material and meteorites. Burial grounds and graves. Public monuments and memorials.
Grave	A place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place.

Heritage Impact Assessment (HIA)	An assessment of the cultural significance of, and possible impacts on, diverse heritage resources that may be affected by a proposed development. A HIA may include several specialist elements such as archaeological, built environment and palaeontological studies. The HIA must supply the heritage authority with sufficient information about the sites to assess, with confidence, whether or not it has any objection to a development, indicate the conditions upon which such development might proceed and assess which sites require permits for destruction, which sites require mitigation and what measures should be put in place to protect sites that should be conserved. The content of HIA reports are clearly outlined in Section 38(3) of the NHRA and SAHRA Minimum Standards.
Heritage resource	Any place or object of cultural significance.
Heritage resources management	Process required when development is intended categorised as: Any linear development exceeding 300m in length. Construction of a bridge or similar structure exceeding 50 m in length. Any activity which will change the character of a site exceeding 0.5 hectares in extent or involving three or more existing erven or subdivisions thereof or that have been consolidated within the past five years or costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority. Re-zoning of a site exceeding one hectare in extent. Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.
Heritage site	Any place declared to be a national heritage site by SAHRA or a place declared to be a provincial heritage site by a provincial heritage resources authority.
Late Farming Community/ies	Farming Communities who either developed / evolved from EFC groups, or who migrated into southern African from the late first millennium / early second millennium CE. The LFC period evidences distinct changes in socio-political organisation, settlement patterns, trade and economic activities, including extensive trade routes. The LFC period is generally dated from c. 1000 CE well into the modern historical period of the nineteenth century.
Late Stone Age	The South African LSA dates from ~30 Kya. This period is associated with modern <i>Homo sapiens sapiens</i> and the complex hunter-gatherer societies, ancestral to the Bushmen / San and Khoi. The LSA lithic assemblage contains microlithic technology and composite tools such as arrows commonly produced from fine-grained cryptocrystallines, quartz and chert. The LSA is also associated with archaeological rock art including both paintings and engravings.

Living / intangible heritage	The intangible aspects of inherited culture that could include cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems, the holistic approach to nature, society and social relationships.
Management	In relation to heritage resources, includes the conservation, presentation and improvement of a place protected in terms of the NHRA.
Middle Stone Age	The South African MSA dates from ~300 Kya to c. 30 Kya. This period is associated with the changing behavioural patterns and the emergence of modern cognitive abilities in early <i>Homo sapiens species</i> . The lithic industries that characterise the MSA are typically more complex tools with diagnostic identifiers, including convergent flake scars, multi-faceted platforms, retouch and backing. Assemblages are characterised as refined lithic technologies such as prepared core techniques, retouched blades and points manufactured from good quality raw material.
National estate	The national estate as defined in Section 3 of the NHRA, i.e. heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations. The national estate may include: Places, buildings, structures and equipment of cultural significance. Places to which oral traditions are attached or which are associated with living heritage. Historical settlements and townscapes. Landscapes and natural features of cultural significance. Geological sites of scientific or cultural importance. Archaeological and palaeontological sites. Graves and burial grounds, including ancestral graves, royal graves and graves of traditional leaders, graves of victims of conflict, graves of individuals designated by the Minister by notice in the Gazette, historical graves and cemeteries, and other human remains which are not covered in terms of the National Health Act, 2003. Sites of significance relating to the history of slavery in South Africa. Movable objects, including objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; objects to which oral traditions are attached or which are associated with living heritage; ethnographic art and objects; military objects; objects of decorative or fine art; objects of scientific or technological interest. 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(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

Palaeontological	Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.
Palaeontologist	A trained professional who uses scientific methods to excavate, collect, record and study palaeontological sites and fossils.
Pedestrian survey	A method of examining a site in which surveyors, spaced at regular intervals, systematically walk over the area being investigated.
Phase 1 Archaeological Impact Assessment (AIA)	Phase 1 AIAs generally involve the identification and assessment of sites during a field survey of a portion of land that is going to be affected by a potentially destructive or landscape-altering activity.
Phase 2 Archaeological Impact Assessment (AIA)	Phase 2 AIAs are primarily based on salvage or mitigation excavations preceding development that will destroy or impact on a site. This may involve collecting of artefacts from the surface and / or excavation of representative samples of the artefactual material to allow characterisation of the site and the collection of suitable materials for dating the sites. Phase 2 AIAs aim to obtain a general idea of the age, significance and meaning of the site that is to be lost and to store a sample that can be consulted at a later date for research purposes. Phase 2 excavations can only be done under a permit issued by SAHRA, or other appropriate heritage agency, to the appointed archaeologist.
Phase 3 Management Plan / Conservation Management Plan (CMP)	On occasion, a site may require a Phase 3 programme involving the modification of the site or the incorporation of the site into the development itself as a site museum, a special conservation area or a display. Alternatively it is often possible to relocate or plan the development in such a way as to conserve the archaeological site or any other special heritage significance the place may have. For example, in a wilderness area or open space when sites are of public interest the development of interpretative material is recommended and adds value to the development. Permission for the development to proceed can be given only once the heritage resources authority is satisfied that measures are in place to ensure that the archaeological sites will not be damaged by the impact of the development or that they have been adequately recorded and sampled. Careful planning can minimise the impact of archaeological surveys on development projects by selecting options that cause the least amount of inconvenience and delay. The process as explained above allows the rescue and preservation of information relating to our past heritage for future generations. It balances the requirements of developers and the conservation and protection of our cultural heritage as required of SAHRA and the provincial heritage resources authorities (ASAPA).

Pre-disturbance survey (syn. reconnaissance)	A survey to record a site as it exists, with all the topographical and other information that can be collected, without excavation or other disturbance of the site.
Reconnaissance	A broad range of techniques involved in the location of archaeological sites, e.g. surface survey and the recording of surface artefacts and features, the sampling of natural and mineral resources, and sometimes testing of an area to assess the number and extent of archaeological resources. However, in terms of South African practice, reconnaissance during a so-called Phase 1 AIA never includes sampling as this is a permitted activity, usually undertaken during so-called Phase 2 AIAs (ASAPA).
Site	Any area of land, including land covered by water, and including any structures or objects thereon.
Structure	Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.
Tangible heritage	Physical heritage resources such as archaeological sites, historical buildings, burial grounds and graves, fossils, etc. Tangible heritage may be associated with intangible elements, e.g. the living cultural traditions, rituals and performances associated with burial grounds and graves and deceased persons.

ABBREVIATIONS

Abbreviation	Meaning
ASAPA	Association of Southern African Professional Archaeologists
BA	Bachelor of Arts
BCE	Before Common Era (also: Before Christ or BC)
BID	Background Information Document
BSc	Bachelor of Science
c.	circa, meaning approximately
CE	Common Era (also: <i>Anno Domini</i> or AD)
CFP	Chance Find Protocol
CRR	Comments and Response Report
CS	Cultural Significance
Digby Wells	Digby Wells Environmental
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EFC	Early Farming Community (also known as Early Iron Age)
EIA	Environmental Impact Assessment. Please note that EIA can also refer to the 'Early Iron Age'; however, in this document, this time period is referred to as 'Early Farming Community'.
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
ESA	Early Stone Age
GIS	Geographical Information System
GN R	Government Notice Regulation
GPS	Global Positioning System
HIA	Heritage Impact Assessment
Hons	Honours degree
HRAs	Heritage Resources Authorities
HRM	Heritage Resources Management
HSMP	Heritage Site Management Plan
ICOMOS	International Council on Monuments and Sites
Kya	Thousand years ago

Abbreviation	Meaning
LED	Local Economic Development
LFC	Late Farming Community also known as Late Iron Age
LSA	Late Stone Age
MIA	Middle Iron Age
MPRHA	Mpumalanga Provincial Heritage Resources Authority
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA	Middle Stone Age
MSc	Master of Science
Mya	Million years ago
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID	Notification of Intent to Develop
RoD	Record of Decision
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SCF	Statutory Comment Feedback
SEP	Stakeholder Engagement Process
SoW	Scope of Work
ToR	Terms of Reference
Wits	University of the Witwatersrand
Werf	A farmstead or multiple outbuildings associated with a farmhouse or agricultural activities. Plural: <i>werwe</i> (Afrikaans).

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Appendix B: HRM Methodology

1 Introduction

Dagsoom Coal Mining (Pty) Ltd (hereinafter Dagsoom) propose to develop an underground coal mine, the Twyfelaar Coal Mine, near Ermelo in the Mpumalanga Province (the Project). Dagsoom intends to apply for a Mining Right in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). This will require Environmental Authorisation (EA) and an Integrated Water Use Licence (IWUL) Application in compliance with:

- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The NEMA Environmental Impact Assessment (EIA) Regulations, 2017 (Government Notice Regulations [GN R] 982 as amended by GN R 326);
- The National Environmental Management: Waste Act, 2008 (Act No. 56 of 2008) (NEM:WA); and
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA).

Dagsoom appointed Digby Wells Environmental (hereinafter Digby Wells) to undertake the necessary EIA process including the Heritage Resources Management (HRM) process in support of the EIA and in compliance with the aforementioned legislation.

This report constitutes the Heritage Impact Assessment (HIA) report in compliance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

1.1 Project background and description

The Project is located approximately 8 km west of the town of Sheepmoor in the Msukaligwa Local Municipality (MLM). The MLM is located within the Gert Sibande District Municipality (GSDM) of the Mpumalanga Province. Plan 1 demonstrates the regional and local setting of the Project.

Dagsoom held an approved Prospecting Right for the farm Twyfelaar 298 IT; this, however, lapsed in 05 May 2019. Dagsoom intend to develop an underground coal mine using bord-and-pillar methodologies and will access the coal resource through a boxcut without any declines. The coal resource is sub-outcropping on the eastern and southern side of a hill located towards the northern extent of the Project area. This is referred to as 'Block A' (Refer to Plan 2 for the proposed infrastructure layout).

There are numerous wetlands and hillside seepage areas around the hill within which Block A is located. Most of the opencast mineable minerals are therefore not considered for mining. The proposed mine will instead include three underground sections accessed through three mine adits. Table 1-1 and Plan 2 presents an overview of the location of these three access areas.

Table 1-1: Proposed access areas for the Twyfelaar Coal Mine

Access Area	Affected Farm Portions ¹
Twyfelaar North	Portion 2 of the farm Twyfelaar 298 IT
Twyfelaar South	Remaining Extent (RE) and Portions 1, 2 and 7 of the farm Twyfelaar 298 IT
Klipfontein	RE of the farm Klipfontein 283 IT

Dagsoom intend to concentrate the surface infrastructure around the three access areas and outside the wetland areas. The proposed infrastructure includes:

- The underground mine accessed initially through a boxcut and later adits;
- A processing plant;
- An access and haulage road 9.6 m wide and 6 km long;
- Pollution control dam (PCD);
- Discard Dump;
- A raw water pump station and process water pump station;
- Potable water treatment plant and associated tanks;
- Sewage treatment plant;
- Reverse osmosis plant;
- Workshops and cable workshop;
- Refuel bay;
- Weighbridge and weighbridge control room; and
- Ancillary infrastructure comprising:
 - Two ventilation fans;
 - A raw water pipeline (1.49 km long) and a process water pipeline;
 - Electricity supply line (22 kV), at a maximum length of 2.3 km;
 - Offices, ablutions and two change houses and
 - Access control office.

¹ Portions 5, 8 and 9 of the farm Twyfelaar also form part of the Mining Right Area (MRA) and will be affected by the Project.

1.2 Project alternatives

Multiple alternatives were considered in the Scoping Report. These include alternative mining methodologies, mining equipment and production and scheduling. These alternatives do not affect the assessment of the impacts on heritage resources and, as such, they are not considered here.

There is potential for alternatives in terms of access to the coal resources. The present positions for the boxcuts have been selected based on the most suitable position to access the resources while considering the wetlands, distances from streams, seam access, mine layout, ventilation requirements, terraces for handling the mine product and access roads. This notwithstanding, the designs have not been finalised as there are some geotechnical considerations still outstanding and environmental considerations will also be taken into account when finalising the boxcut design. The layout presented in Plan 2 is therefore subject to change based on the findings of the EIA.

Another alternative is the 'no-go' alternative. Should the Project not obtain approval, or not go ahead for any reason, the potential negative environmental impacts associated with the development of the Twyfelaar Coal Mine would not occur. However, the potential benefits associated with the Project would also not occur.

1.3 Terms of Reference

Dagsoom appointed Digby Wells to conduct an HRM process in support of the EA application applicable to the Project and in compliance with Section 38(8) of the NHRA. Digby Wells will undertake the HIA in partial compliance with the Interim Comment² issued by the South African Heritage Resource Agency (SAHRA).

1.4 Scope of Work

The Scope of Work (SoW) for the specialist HRM process included the compilation of an HIA report to comply with the requirements encapsulated in Section 38(3) of the NHRA. Digby Wells completed the following activities as part of the SoW:

- Description of the predominant cultural landscape supported through primary and secondary data collection;
- Assessment of the Cultural Significance (CS) of the identified heritage resources;
- Identification of potential impacts to heritage resources based on the Project description and Project activities;

² Dated 10 June 2019, accessible at: <https://sahris.sahra.org.za/node/524486>. The comment also requires a specialist Palaeontological Impact Assessment (PIA) which will be included in the HRM process, but which is beyond the scope of this report.

- An evaluation of the potential impacts to heritage resources relative to the sustainable socio-economic benefits that may result from the Project;
- Recommending feasible management measures and/or mitigation strategies to avoid and/or minimise negative impacts and enhance potential benefits resulting from the Project; and
- Submission of the HIA report to the SAHRA and the Mpumalanga Provincial Heritage Resources Authority (MPHRA) for Statutory Comment as required under Section 38(8) of the NHRA.

1.5 Expertise of the specialist

Table 1-2 presents a summary of the expertise of the specialists involved in the compilation of this report. Appendix A includes the full CVs of these specialists.

Table 1-2: Expertise of the specialists

Team Member	Bio Sketch
<p>Shannon Hardwick</p> <p>ASAPA Member: 451 ICOMOS Member 38048</p> <p>Years' Experience: 2</p>	<p>Shannon joined the Digby Wells team in May 2017 as a Heritage Management Intern and has most recently been appointed as a Heritage Resources Management Consultant. Shannon is an archaeologist who obtained a Master of Science (MSc) degree from the University of the Witwatersrand in 2013, specialising in historical archaeobotany in the Limpopo Province. She is a published co-author of one paper in <i>Journal of Ethnobiology</i>. Since joining Digby Wells, Shannon has gained generalist experience through the compilation of various heritage assessments, including Heritage Scoping Reports (HSRs), HIAs, Heritage Basic Assessment Reports (HBARs) and Section 34 permit applications. Her other experience includes compiling a Community Health, Safety and Security Management Plan (CHSSMP) and various social baselines, including researching Artisanal and Small-Scale Mining as part of a Livelihood Restoration Framework (LRF). Shannon's experience in the field includes pre-disturbance surveys in South Africa, Malawi and the Democratic Republic of the Congo and fieldwork in Malawi.</p>

Team Member	Bio Sketch
<p>Justin du Piesanie</p> <p>ASAPA Member 270 ASAPA CRM Unit ICOMOS Member 14274 IAIASa Member</p> <p>Years' Experience: 12</p>	<p>Justin is the Divisional Manager for Social and Heritage Services at Digby Wells. Justin joined the company in August 2011 as an archaeologist and was subsequently made HRM Manager in 2016 and Divisional Manager in 2018. He obtained his Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2008, specialising in the Southern African Iron Age. Justin also attended courses in architectural and urban conservation through the University of Cape Town's Faculty of Engineering and the Built Environment Continuing Professional Development Programme in 2013. Justin is a professional member of the Association of Southern African Professional Archaeologists (ASAPA), and accredited by the association's Cultural Resources Management (CRM) section. He is also a member of the International Council on Monuments and Sites (ICOMOS), an advisory body to the UNESCO World Heritage Convention. He has over 12 years combined experience in HRM in South Africa, including heritage assessments, archaeological mitigation, grave relocation, NHRA Section 34 application processes, and Conservation Management Plans (CMPs). Justin has gained further generalist experience since his appointment at Digby Wells in Botswana, Burkina Faso, Cameroon, the Democratic Republic of Congo, Liberia, Malawi, Mali and Senegal on projects that have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage. Furthermore, Justin has acted as a technical expert reviewer of HRM projects undertaken in Cameroon, Malawi and Senegal. Justin's current focus at Digby Wells is to develop the HRM process as an integrated discipline following international HRM principles and standards. This approach aims to provide clients with comprehensive, project-specific solutions that promote ethical heritage management and assist in achieving strategic objectives.</p>

1.6 Structure of the report

Table 1-3 presents the structure for the remainder of the report and indicates where each section meets the information requirements encapsulated in the NHRA and Appendix 6 of Government Notice Regulation (GN R) 326 of 07 April 2017.

Table 1-3: Structure of the report

Description	App. 6	NHRA	Section
Declaration that the report author(s) is (are) independent.	(b)	-	Page ii and iii
An indication of the scope of, and the purpose for which, the report was prepared.	(c)	-	1.3 1.4



Description	App. 6	NHRA	Section
Details of the person who prepared the report and their expertise to carry out the specialist study.	(a)	-	1.5 Appendix A
Outlines the legislative framework relevant to the specialist heritage study.	-	-	2
Identifies the specific constraints and limitations of the HIA, including any assumptions made and any uncertainties or gaps in knowledge.	(i)	-	3
Describes the methodology employed in the compilation of this HIA.	(e)	-	Appendix B
An indication of the quality and age of base data used for the specialist report.	(cA)	-	4 11
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment.	(d)	-	4.5
Provides the baseline cultural landscape.	-	38(3)(a)	5
Motivates for the defined CS of the identified heritage resources and landscape.	-	38(3)(b)	6
A description of the potential impacts to heritage resources by project related activities, including: <ul style="list-style-type: none"> - Existing impacts on the site; - Possible risks to heritage resources; - Cumulative impacts of the proposed development; - Acceptable levels of change; and - Heritage-related risks to the project. 	(cB)	38(3)(c)-	6
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	(j)	38(3)(c)	
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	(f)	-	
Considers the development context to assess the socio-economic benefits of the project in relation to the presented impacts and risks.	-	38(3)(d)	7
A description of any consultation process that was undertaken during the course of preparing the specialist report and the results of such consultation.	(o)	38(3)(e)	8



Description	App. 6	NHRA	Section
A summary and copies of any comments received during any consultation process and where applicable all responses thereto.	(p)	38(3)(e)	
Details the specific recommendations based on the contents of the HIA.	-	38(3)(g)	9
An identification of any areas to be avoided, including buffers.	(g)		
Any mitigation measures for inclusion in the Environmental Management Programme (EMPr)	(k)		
Any conditions for inclusion in the environmental authorisation.	(l)		
Any monitoring requirements for inclusion in the EMPr or environmental authorisation.	(m)		
A reasoned opinion— (i) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	(n)	38(3)(g)	10
Collates the most salient points of the HIA and concludes with the specific outcomes and recommendations of the study.	-	38(3)(f) 38(3)(g)	10
Lists the source material used in the development of the report.	(cA)	-	11
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	(h)	-	Plan 4
Any other information requested by the competent authority.	(q)	-	-

2 Legislative and policy framework

Table 2-1: Applicable legislation considered in the HRM process

Applicable legislation used to compile the report	Reference where applied
<p><u>Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</u></p> <p>Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –</p> <ol style="list-style-type: none"> i. Prevent pollution and ecological degradation; ii. Promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development 	<p>The HRM process was undertaken to identify heritage resources and determine heritage impacts associated with the Project.</p> <p>As part of the HRM process, applicable mitigation measures, monitoring plans and/or remediation were recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.</p>
<p><u>National Environmental Management Act, 1998 (Act No. 107 of 1998)</u></p> <p>The NEMA, as amended, was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making on issues affecting the environment. Section 24 (1)(a), (b) and (c) of NEMA state that:</p> <p><i>The potential impact on the environment, socio-economic conditions and cultural heritage of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.</i></p> <p>The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2) and GN R.985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended.</p>	<p>The application process was undertaken in accordance with the principles of Section 2 of NEMA as well as with the EIA 2017 Regulations, promulgated in terms of NEMA.</p>



Applicable legislation used to compile the report	Reference where applied
<p><u>GN R. 982: Environmental Impact Assessment Regulations, 2014 (as amended by GN R 326 of 7 April 2017)</u></p> <p>These three listing notices set out a list of identified activities which may not commence without an Environmental Authorisation from the relevant Competent Authority through one of the following processes:</p> <ul style="list-style-type: none"> ▪ Regulation GN R. 983 (as amended by GN R 327) - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation and which must follow a basic assessment process. ▪ Regulation GN R. 984 (as amended by GN R 325) – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation and which must follow an environmental impact assessment process. ▪ Regulation GN R. 985 (as amended by GN R 324) – Listing Notice 3: This notice provides a list of various environmental activities which have been identified by provincial governmental bodies which if undertaken within the stipulated provincial boundaries will require environmental authorisation. The basic assessment process will need to be followed. 	<p>Refer to the Scoping Report and Notification of Intent to Develop (NID)³ for a full description of the Listed Activities triggered by the proposed Project.</p> <p>To comply with the regulations, an EIA process must be completed in support of Environmental Authorisation in terms of Listing Notice 1 and 2. This HIA was completed to inform the EIA process to comply with Section 24 of the NEMA.</p>
<p><u>National Water Act, 1998 (Act No. 36 of 1998) (NWA)</u></p> <p>Part 7 of the NWA outlines the requirements for individual applications for licences and Part 8 outlines the requirements in terms of compulsory licences for water use in respect of a specific resource.</p> <p>The responsible authority may request additional information from an applicant in terms of Part 7 or Part 8. Such additional information may include an environmental or other assessment to be undertaken in terms of the NEMA and which is to be considered alongside the application.</p>	<p>An environmental assessment was undertaken in compliance with the NEMA and NEMA EIA Regulations, which also satisfies the requirements of the NWA.</p> <p>This HIA was completed to inform the environmental assessment and comply with Section 24 of the NEMA and Section 38(8) of the NHRA.</p>

³ South African Heritage Resources Information System (SAHRIS) Case ID: 13794. Accessible at: <https://sahris.sahra.org.za/heritage-reports/dag5603-nid>

Applicable legislation used to compile the report	Reference where applied
<p><u>National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></p> <p>The NHRA is the overarching legislation that protects and regulates the management of heritage resources in South Africa, with specific reference to the following Sections:</p> <ul style="list-style-type: none"> ▪ 5. General principles for HRM ▪ 6. Principles for management of heritage resources ▪ 7. Heritage assessment criteria and grading ▪ 38. Heritage resources management <p>The Act requires that Heritage Resources Authorities (HRAs), be notified as early as possible of any developments that may exceed certain minimum thresholds in terms of Section 38(1), or when assessments of impacts on heritage resources are required by other legislation in terms of Section 38(8) of the Act.</p>	<p>The HIA was compiled to comply with Section 5, 38(3), (4) and (8) of the NHRA. This HIA was submitted to the responsible HRAs. In this instance, this refers to SAHRA and MPHRA.</p>
<p><u>NHRA Regulations, 2000 (GN R 548)</u></p> <p>The NHRA Regulations regulate the general provisions and permit application process in respect of heritage resources included in the national estate. Applications must be made in accordance with these regulations. The following Chapters are applicable to this assessment:</p> <ul style="list-style-type: none"> ▪ II. Permit Applications and General Provisions for Permits; ▪ III: Application for Permit: National Heritage Site, Provincial Heritage Site, Provisionally-Protected Place or Structure older than 60 years; ▪ IV: Application for Permit: Archaeological or Palaeontological or Meteorite; ▪ IX: Application for Permit: Burial Grounds and Graves; ▪ X: Procedure for Consultation regarding Protected Area; ▪ XI: Procedure for Consultation regarding Burial Grounds and Graves; and ▪ XII: Discovery of Previously Unknown Graves. 	<p>The HRM process was undertaken with cognisance of the applicable regulations. The proposed mitigation strategies and management measures must comply with these requirements.</p>

Table 2-2: Applicable policies considered in the HRM process

Applicable policies used to compile the report	Reference where applied
<p><u>SAHRA Archaeology, Palaeontology and Meteorites (APM) Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports (2007)</u></p> <p>The guidelines provide the minimum standards that must be adhered to for the compilation of a HIA report.</p> <p>Chapter II Section 7 outlines the minimum requirements for inclusion in the heritage assessment as follows:</p> <ul style="list-style-type: none"> ▪ Background information on the Project; ▪ Background information on the cultural baseline; ▪ Description of the properties or affected environs; ▪ Description of identified sites or resources; ▪ Recommended field rating of the identified sites to comply with Section 38 of the NHRA; ▪ A statement of Cultural Significance in terms of Section 3(3) of the NHRA; and ▪ Recommendations for mitigation or management of identified heritage resources. 	<p>The HIA report was compiled to adhere to the minimum standards as defined by Chapter II of the SAHRA APM Guidelines (2007).</p>

3 Constraints and limitations

Digby Wells encountered constraints and limitations during the compilation of this report. Table 3-1 presents an overview of these limitations and the consequences.

Table 3-1: Constraints and Limitations

Description	Consequence
<p>Whilst every attempt was made to obtain the latest available information, the reviewed literature does not represent an exhaustive list of information sources for the various study areas.</p>	<p>The cultural heritage baseline presented in Section 5 below is considered accurate but may not include new data or information which may not have been made available to the public.</p>
<p>Results from previously-completed heritage assessments as sourced from SAHRIS, that may have formed part of the Project area were not verified in-field.</p>	<p>It is assumed the previously recorded heritage resources are accurate and true.</p>
<p>SAHRA requires a PIA process be completed by a suitably-qualified palaeontologist, as included in the Interim Comment. Digby Wells has not included a PIA in this report.</p>	<p>Digby Wells will complete the PIA process and compile a separate report which Digby Wells will submit as part of the present HRM process.</p>



Description	Consequence
<p>The mine access design was not finalised at the time of the survey or compilation of this report and is subject to change based on the findings of the EIA.</p>	<p>Every effort was made to cover the extent of the study area⁴. The survey was focused on the proposed infrastructure layout current at the time of the survey. Some heritage resources in the Project area may not have been identified.</p> <p>The infrastructure layout will be informed in part by the results of the heritage assessment.</p>
<p>The pre-disturbance survey was informed by two community members who directed the heritage specialist to known heritage sites, including burial grounds and graves and historical structures (refer to Section 8).</p> <p>This notwithstanding, and whilst every attempt was made to survey the extent of the site-specific study area, this report does not present an exhaustive list of identified heritage resources.</p>	<p>Digby Wells recorded the known burial grounds and graves, as identified by the local community members. Digby Wells acknowledges the possibility that the community members may not be aware of all heritage resources within the Project area and unknown heritage resources that remain unidentified may occur within the Project area.</p> <p>Previously unidentified heritage resources may be encountered. Should this occur, Dagsoom must alert the HRAs of the find and may need to enlist the services of a suitably qualified archaeologist or palaeontologist to advise them on the way forward.</p>
<p>Archaeological and palaeontological resources commonly occur at subsurface levels. These types of resources cannot be adequately recorded or documented by assessors without destructive and intrusive methodologies and without the correct permits issued in terms of Section 35 of the NHRA.</p>	<p>The reviewed literature, previously-completed heritage assessments and the results of the field survey are in themselves limited to surface observations.</p> <p>Subsurface tangible heritage may be exposed during Project activities. Should this occur, Dagsoom must alert the HRAs of the find and may need to enlist the services of a suitably qualified archaeologist or palaeontologist to advise them on the way forward.</p>

⁴ Refer to Section **Error! Reference source not found.** for a description of the study area.

4 Methodology

4.1 Defining the study area

Heritage resources do not exist in isolation to the greater natural and social⁵ environment. To develop the cultural baseline and focus the assessment, Digby Wells defined three nested study areas to be considered in this study. These include:

- The *site-specific* study area: the farm portions extent associated with the proposed Project, including a 500 m buffer area;
- The *local* study area: the area most likely to be influenced by any changes to heritage resources in the Project area, or where project development could cause heritage impacts. Defined as the area bounded by the local municipality, which in this instance is the MLM, with particular reference to the immediate surrounding properties or farms. The local study area is specifically examined to offer a backdrop to the socio-economic conditions within which the proposed development will occur. The local study area furthermore provides the local development and planning context that may contribute to cumulative impacts; and
- The *regional* study area: the area bounded by the district municipality demarcation, in this case the GSDM. Where necessary, the regional study area may be extended outside the boundaries of the district municipality to include areas closest to the Project area. The aim of this is to include much wider expressions of specific types of heritage resources and historical events. The regional study area also provides the regional development and planning context that may contribute to cumulative impacts.

4.2 Statement of Cultural Significance

Digby Wells designed the significance rating process to provide a numerical rating of the CS of identified heritage resources. This process considers heritage resources assessment criteria set out in subsection 3(3) of the NHRA, which determines the intrinsic, comparative and contextual significance of identified heritage resources. A resource's importance rating is based on information obtained through review of available credible sources and representativity or uniqueness (i.e. known examples of similar resources to exist).

The rationale behind the heritage value matrix takes into account that a heritage resource's value is a direct indication of its sensitivity to change (i.e. impacts). Value, therefore, was determined prior to completing any assessment of impacts.

The matrix rated the potential, or importance, of an identified resource relative to its contribution to certain values – aesthetic, historical, scientific and social. Resource

⁵ The social environment consists of socio-economic, socio-political and socio-cultural aspects.

significance is directly related to the impact on it that could result from Project activities, as it provided minimum accepted levels of change to the resource.

4.3 Definition of heritage impacts

Potential impacts to heritage resources may manifest differently across geographical areas or diverse communities when one considers the simultaneous effect to the tangible resource and social repercussions associated with the intangible aspects. Furthermore, potential impacts may concurrently influence the CS of heritage resources. This assessment therefore considers three broad categories adapted from Winter & Baumann (2005, p. 36). Table 4-1 presents a summary of the types of impacts.

Table 4-1: Impact definition

Category	Description
Direct Impact	Affect the fabric or physical integrity of the heritage resource, for example destruction of an archaeological site or historical building. Direct impacts may be the most immediate and noticeable. Such impacts are usually ranked as the most intense, but can often be erroneously assessed as high-ranking.
Indirect Impact	Occur later in time or at a different place from the causal activity, or as a result of a complex pathway. For example, restricted access to a heritage resource resulting in the gradual erosion of its CS that may be dependent on ritual patterns of access. Although the physical fabric of the resource is not affected through any direct impact, its significance is affected to the extent that it can ultimately result in the loss of the resource itself.
Cumulative Impact	<p>Result from in-combination effects on heritage resources acting within a host of processes that are insignificant when seen in isolation, but which collectively have a significant effect. Cumulative effects can be:</p> <ul style="list-style-type: none"> ▪ Additive: the simple sum of all the effects, e.g. the reclamation of a historical TSF will minimise the sense of the historic mining landscape. ▪ Synergistic: effects interact to produce a total effect greater than the sum of the individual effects, e.g. the removal of all historical TSFs will sterilise the historic mining landscape. ▪ Time crowding: frequent, repetitive impacts on a particular resource at the same time, e.g. the effect of regular blasting activities on a nearby rock art site or protected historical building could be high. ▪ Neutralizing: where the effects may counteract each other to reduce the overall effect, e.g. the effect of changes from a historic to modern mining landscape could reduce the overall impact on the sense-of-place of the study area.

Category	Description
	<ul style="list-style-type: none"> Space crowding: high spatial density of impacts on a heritage resource, e.g. density of new buildings resulting in suburbanisation of a historical rural landscape.

4.4 Secondary data collection

Data collection assists in the development of a cultural heritage baseline profile of the study area under consideration. Qualitative data was collected to inform this HIA and was primarily obtained through secondary information sources, i.e. desktop literature review and historical layering.

A survey of diverse information repositories was made to identify appropriate relevant information sources. These sources were analysed for credibility and relevance. These credible, relevant sources were then critically reviewed. The objectives of the literature review include:

- Gaining an understanding of the cultural landscape within which the proposed Project is located; and
- Identify any potential fatal flaws, sensitive areas, current social complexities and issues and known or possible tangible heritage.

Repositories that were surveyed included the South African Heritage Resources Information System (SAHRIS), online/electronic journals and platforms and select internet sources. This HIA includes a summary and discussion of the most relevant findings. Table 4-2 lists the sources consulted in the literature review (refer to Section 11 for more detailed references).

Table 4-2: Qualitative data sources

Reviewed Qualitative Data	
Databases	
Genealogical Society of South Africa (GSSA) database (2011)	University of the Witwatersrand (WITS) Archaeological Database (2010)
SAHRIS	SAHRIS Palaeo-sensitivity Map (PSM)
Statistics South Africa (2011)	Wazimap (Wazimap, 2017)



Reviewed Qualitative Data		
SAHRIS Cases		
MapID: 00655	Map ID: 00719	Case ID: 4309
Map ID: 00659	Map ID: 01025	Case ID: 5472
Map ID: 00662	Case ID: 1487	Case ID: 6251
Map ID: 00672	Case ID: 1722	Case ID: 9404
Map ID: 00710	Case ID: 1724	Case ID: 11496
		Case ID: 12164
Cited Text		
Bamford, 2012, 2014, 2016	Behrens & Swanepoel, 2008	Brodie, 2008
Clark, 1982	Deacon & Deacon, 1999	Delius & Cope, 2007
Delius, et al., 2014	Eastwood, et al., 2002	Esterhuysen & Smith, 2007
Groenewald & Groenewald, 2014	Huffman, 2007	Johnson, et al., 2006
Landau, 2010	Maggs, 1976	Makhura, 2007
Mitchell, 2002	Mucina & Rutherford, 2010	Potgieter, 1955
Rubidge, 2008, 2013a, 2013b	Smith & Ouzman, 2004	Smith & Zubieta, 2007
Swanepoel, et al., 2008	Voortrekkers, 2014	

Table 4-3 below lists the sources of historical imagery. Historical layering is a process whereby diverse cartographic sources from various time periods are layered chronologically using Geographic Information Systems (GIS). The rationale behind historical layering is threefold, as it:

- Enables a virtual representation of changes in the land use of a particular area over time;
- Provides relative dates based on the presence or absence of visible features; and
- Identified potential locations where heritage resources may exist within an area.

Table 4-3: Aerial imagery considered

Aerial photographs						
Job no.	Flight plan	Photo no.	Map ref.	Area	Date	Ref.
515	515 of 1	01421	2630	Mbabane	1964	National Geographical Institute
		01423				
		01425				
		01455				
		01457				
		01459				

4.5 Primary data collection

Shannon Hardwick undertook a pre-disturbance survey of the Project area between 12 and 14 August 2019. Shannon Hardwick and Justin du Piesanie returned to site on 09 September 2019 to ground-truth some potential heritage resources which were identified on the aerial and historical imagery. The surveys were a combination of a vehicular and pedestrian survey, which was adapted to the terrain and the likelihood of heritage resources occurring in the area. The surveys were non-intrusive (i.e. no sampling was undertaken). The aim of the surveys was to:

- Visually record the current state of the cultural landscape; and
- Record a representative sample of the visible, tangible heritage resources present within the development footprint area, site-specific study area and greater study area.

Identified heritage resources were recorded as waypoints using a handheld GPS device. The heritage resources were also recorded through written and photographic records. Plan 4 presents the results of the pre-disturbance survey, including the waypoints and GPS tracks.

4.6 Site naming convention

Heritage resources identified by Digby Wells during the field survey are prefixed by the SAHRIS case identification generated for this Project. Information on the relevant period or feature code and site number follows (e.g. 13794/BGG-001). The site name may be shortened on plans or figures to the period/feature code and site number (e.g. BGG-001). Table 4-4 presents a list of the relevant period and feature codes (refer to Section 5 for an explanation of what these terms mean).

Table 4-4: Feature and period codes relevant to this HIA

Feature or Period Code	Reference
BGG	Burial Grounds and Graves
STE	(Historical) Structure
HLP	Historical Layering Point
HST	Historical Site
LFC	Late Farming Community site
Wf	(Historical) Werf

Heritage resources identified through secondary data collection were prefixed by the relevant SAHRIS case or map identification number (*where applicable*) and the original site name as used by the author of that assessment (e.g. 2881/Site 1).

5 Cultural heritage baseline description

The site-specific Project area is underlain by geological features within the Karoo Supergroup. The Karoo Supergroup is well known for terrestrial vertebrate fossils, distinctive fossil plant assemblages, thick glacial deposits and extensive dolerite dykes and sills among the sediments (Johnson, et al., 2006). Two geological features of the Karoo Supergroup specifically underlie the Project area. The first are the Karoo dolerites, which are intrusive diatremes⁶ classified as plutonic igneous rocks (Rubidge, 2008; 2013a; 2013b). These features are considered to have negligible palaeontological sensitivity as they contain no fossiliferous material (Rubidge, 2013a; 2013b; SAHRA, 2013; Groenewald & Groenewald, 2014). The Karoo dolerite suite is therefore not considered in the impact assessment.

The *Vryheid Formation* is the second significant geological formation underlying the study area. The formation constitutes the basal layer of the Ecca Group within the Karoo Supergroup and was deposited in a deltaic⁷ environment (Bamford, 2016). This occurred approximately 280 million years ago. The *Vryheid Formation* includes shales, mudstones, sandstones and coals. This layer is the primary fossil-bearing layer in the regional study area and is considered of very-high palaeontological sensitivity (SAHRA, 2013; Groenewald & Groenewald, 2014).

Fossil plants are usually preserved in the shales between the coal horizons and, to a lesser extent, within the sandstone surface outcrops (Bamford, 2012; 2014; 2016). Common fossil plants within the *Vryheid Formation* include *Glossopteris* leaves, roots and inflorescences; and

⁶ Formations which are created when rising magma comes into contact with groundwater. This contact potentially results in gaseous explosions and a volcanic pipe (the diatreme).

⁷ When lithologies are deposited onto an alluvial plain through river action.

Calamites stems. Coal deposits can potentially also include fossils of mammal-like reptiles and amphibians. These are however, rarely, if ever, preserved with plant fossils.

Table 5-1 provides a general breakdown of the timeframes within the archaeological and cultural past of Mpumalanga. Figure 5-1 below provides a breakdown of the previously-identified heritage resources representing each of these periods. Plan 3 presents the spatial relationship between the identified heritage resources within the regional setting.

Table 5-1: Archaeological periods in Mpumalanga

The Stone Age	Early Stone Age (ESA)	2 mya to 250 thousand years ago (kya)
	Middle Stone Age (MSA)	250 kya to 20 kya
	Later Stone Age (LSA)	20 kya to 500 CE (Common Era ⁸)
There appears to be a gap in the record in Mpumalanga between approximately 7000 and 2000 BCE.		
Farming Communities	Early Farming communities (EFC)	500 to 1400 CE
	Late Farming Communities (LFC)	1100 to 1800 CE
Historical Period	-	1500 CE to 1994 (Behrens & Swanepoel, 2008)

Adapted from Esterhuysen & Smith (2007)

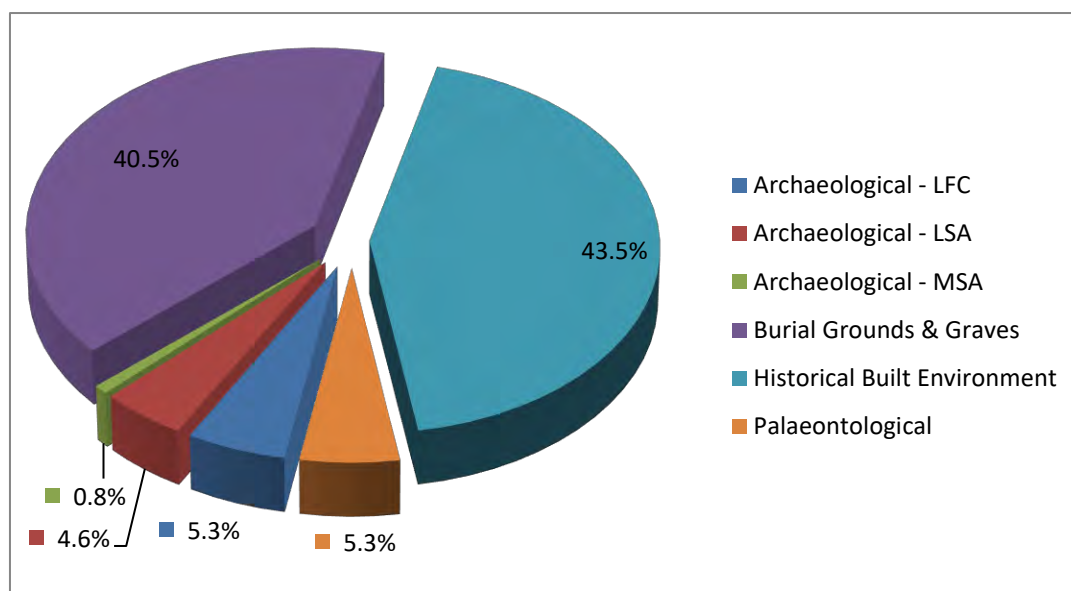


Figure 5-1: Heritage resources identified within the regional study area

⁸ Common Era (CE) refers to the same period as *Anno Domini* ("In the year of our Lord", referred to as AD): i.e. the time after the accepted year of the birth of Jesus Christ and which forms the basis of the Julian and Gregorian calendars. Years before this time are referred to as 'Before Christ' (BC) or, here, BCE (Before Common Era).

The cultural heritage landscape is dominated by the historical built environment and burial grounds and graves, although there are expressions of the MSA and LSA and LFC periods. The section that follows will present a brief overview of the archaeological periods present within the regional study. The reviewed literature included no reports of archaeological material representing the ESA or EFC periods and, as such, these will not be described further in this report.

The Stone Age is divided into three phases defined by the production of stone tools by various hominid species: the ESA, the MSA and the LSA. The MSA dates from approximately 250 to 20 kya. High proportions of blades that are created through the Levallois technique and which are minimally modified characterise the early MSA (Clark, 1982). The MSA is further defined by blades and points which were produced from good-quality raw materials and the use of bone tools, ochre, beads and pendants (Deacon & Deacon, 1999). A single isolated stone tool represents the MSA within the regional study area (du Piesanie, et al., 2013).

The LSA started approximately 40 kya and continued up to the historical period, overlapping in some areas with the Farming Community period. LSA stone tools are specialised and specific tools are created for specific functions (Mitchell, 2002). The inclusion of bone tools into the archaeological record further characterises this period. LSA sites commonly include diagnostic artefacts, such as microlithic scrapers and segments.

In southern Africa, the LSA is closely associated with hunter-gatherer groups, including the San (Mitchell, 2002). Due to the nomadic nature of the LSA peoples, open-air sites are generally poorly preserved and difficult to identify. Potgieter (1955) documented regional hunter-gatherer occupations around the Chrissiesmeer Lake District, which is approximately 50 km north of the Project area.

The LSA is further characterised by evidence of ritual practises and complex societies (Deacon & Deacon, 1999). This can be expressed through rock art. In Mpumalanga, three rock art painting traditions occur and are associated with particular cultural groups. These traditions are widely dispersed and include:

- Fine line painting associated with autochthonous LSA hunter-gatherer groups. This tradition is the first and oldest tradition and produced using fine brushes, quills or sticks. These images are predominantly painted in red, white and black and, more rarely, in bichrome or polychrome. Images generally include realistic and proportionally-correct animals such as various antelope species, human figures and symbolic beings (Eastwood, et al., 2002);
- Finger paintings associated with the later arrival of pastoralists. This tradition was first described by Ben Smith and Sven Ouzman (Smith & Ouzman, 2004) and is typified by finger-painted geometric images. These include circles, finger lines, finger dots and handprints and are mostly created in red pigment. Images are sometimes created in red and white pigments and occasionally only in white. The tradition extends in linear bands following the proposed migration routes of the pastoralists from southern Angola

and western Zambia to the southern Cape (Smith & Ouzman, 2004; Eastwood, et al., 2002; Smith & Zubieta, 2007); and

- Finger paintings associated with much later, possibly historic, farming communities. No expressions of this tradition are known to occur within the study area under consideration.

Within the larger study area, rock art represents the LSA period (van Schalkwyk, 2003a; du Piesanie, et al., 2013). Rock art accounts for 4.6% of the heritage resources recorded in the regional study area and no other expressions of the LSA were recorded.

The Farming Community period correlates to the movements of Bantu-speaking agropastoralists into southern Africa. The results of the literature review demonstrate heritage resources associated only with the LFC. The LFC is represented by stonewalling or through secondary tangible indicators such as ceramics and evidence for domestic animals, including dung deposits and faunal remains. Huffman (2007) provides a reference for the possible distribution of ceramic facies within the regional study area. Table 5-2 provides an overview of these ceramic facies.

Table 5-2: Common ceramic facies found in Mpumalanga

Facies	Period	Key Characteristics
Uitkomst	1650 CE – 1820 CE	Stamped arcades, appliqué and blocks of parallel incisions, stamping and chord impressions
Rooiberg	1650 CE – 1750 CE	Stamped rim band, mixture of stamped and incised bands, arcades and triangles in the neck
Icon	1300 CE – 1500 CE	Multiple incised bands separated by colour and lip decorations on bowls
Madikwe	1500 CE – 1700 CE	Multiple bands of cord impressions, incisions, stabs and punctates separated by colour
Letaba	1600 CE – 1840 CE	Hatched bands on shoulder, below black and red triangles
Klingbeil	1000 CE – 1200 CE	Triangles in neck bordered with slashes, punctates on shoulder

Stonewalling is the most visible indicator of LFC settlements. Several types of stonewalling have been described through decades of research and, within the larger study area, the most common is Type V. Maggs (1976) first described these settlements, which consist of many primary enclosures grouped around a ring. The enclosures may be contiguous or linked by secondary walling to form a secondary enclosure. There is no surrounding perimeter wall, although there may be additional free-standing structures around the periphery of the settlement.

Heritage resources associated with the LFC account for 5.3% of the identified heritage resources. Within the larger study area, these resources include:

- Ash middens, which are most likely the remains of old cattle kraals (van Schalkwyk, 2003c);
- Potsherds (du Piesanie, et al., 2013; Karodia, et al., 2013);
- A site with multiple components (du Piesanie, et al., 2013); and
- Stonewalling (du Piesanie & Nel, 2018).

The historical period⁹ is commonly regarded as the period characterised by contact between Europeans and Bantu-speaking African groups and the written records associated with this interaction. However, the division between the LFC and historical period is artificial, as there is a large amount of overlap between the two.

Throughout the transitions between the LFC and the historical period (and through the historical period itself), migration, population growth, climatic variation and trade to the east significantly impacted the Pedi, Koni and other groups already on the Mpumalanga Highveld. The rise of power blocs, including violent displacement and political centralisation, characterised this time (Makhura, 2007). The Ndwandwe, the Swazi and the Ndebele (led by Mzilikazi) were seen as the dominant forces on the landscape, although smaller groups of invaders and raiders contributed to these events (Delius, et al., 2014).

The period of approximately 1817 to 1826 AD is generally referred to as the Mfecane or, north of the Orange River, the Difaqane. Many aspects of the Mfecane/Difaqane have been debated and challenged (Landau, 2010). The traditional understanding of the period is that Mzilikazi and his Ndebele group were pushed out of their territory by the Zulu group led by Shaka. This displacement had a knock-on effect, as multiple groups were subsequently displaced to the north and the west. A drought during this time exacerbated the instability and increased the pressure on food supplies, which were already running low. European settlers, traders, missionaries and travellers moving into the interior further added to instability and resulting power struggles. The Mfecane/Difaqane was characterised by unprecedented (at least within the records of the Europeans travelling within southern Africa) social and political mobilisation and violence across the Highveld as individuals sought personal and food security

As a result of social and political upheaval, the Mpumalanga Highveld was vulnerable to intrusive groups including the Swazi and the *Voortrekkers*. Groups of Afrikaners initiated a move from the Cape to the interior to establish an independent state in approximately 1835. The migration of these *Voortrekkers* is commonly referred to as the Great Trek (or *Groot Trek*). The first permanent settlement that was established as a result of this movement was

⁹ In southern Africa, especially in Mpumalanga, the last 500 years represents a formative period that is marked by enormous internal economic invention and political experimentation that shaped the cultural contours and categories of modern identities outside of European contact. This period is currently not well documented, but is being explored through the 500 year initiative (Swanepoel, et al., 2008).

Ohrigstad (approximately 200 km north-east from the Project area) in 1845 (Delius & Cope, 2007; Voortrekkers, 2014).

Soon after settling in the Mpumalanga Highveld area, the Trekboers (now farmers) discovered and exploited the Highveld Coalfields. The coal was initially used by the Boers as a domestic resource; however the discovery of gold in the Witwatersrand in 1886 created an enormous demand for coal (Brodie, 2008; Pistorius, 2008a; 2008b). This increase in the demand for coal drove the commercial exploitation of the coal, until the industry was put on hold by the outbreak of the South African War of 1899-1902 (previously referred to as the Second Anglo-Boer War), which officially started on October 9th, 1899. There are two notable battles associated with the South African War within the regional study area: the Battles of Lake Chrissie (February 6th, 1901) and Bakenlaagte (October 30th, 1901).














Heritage resources representing the historical period include:

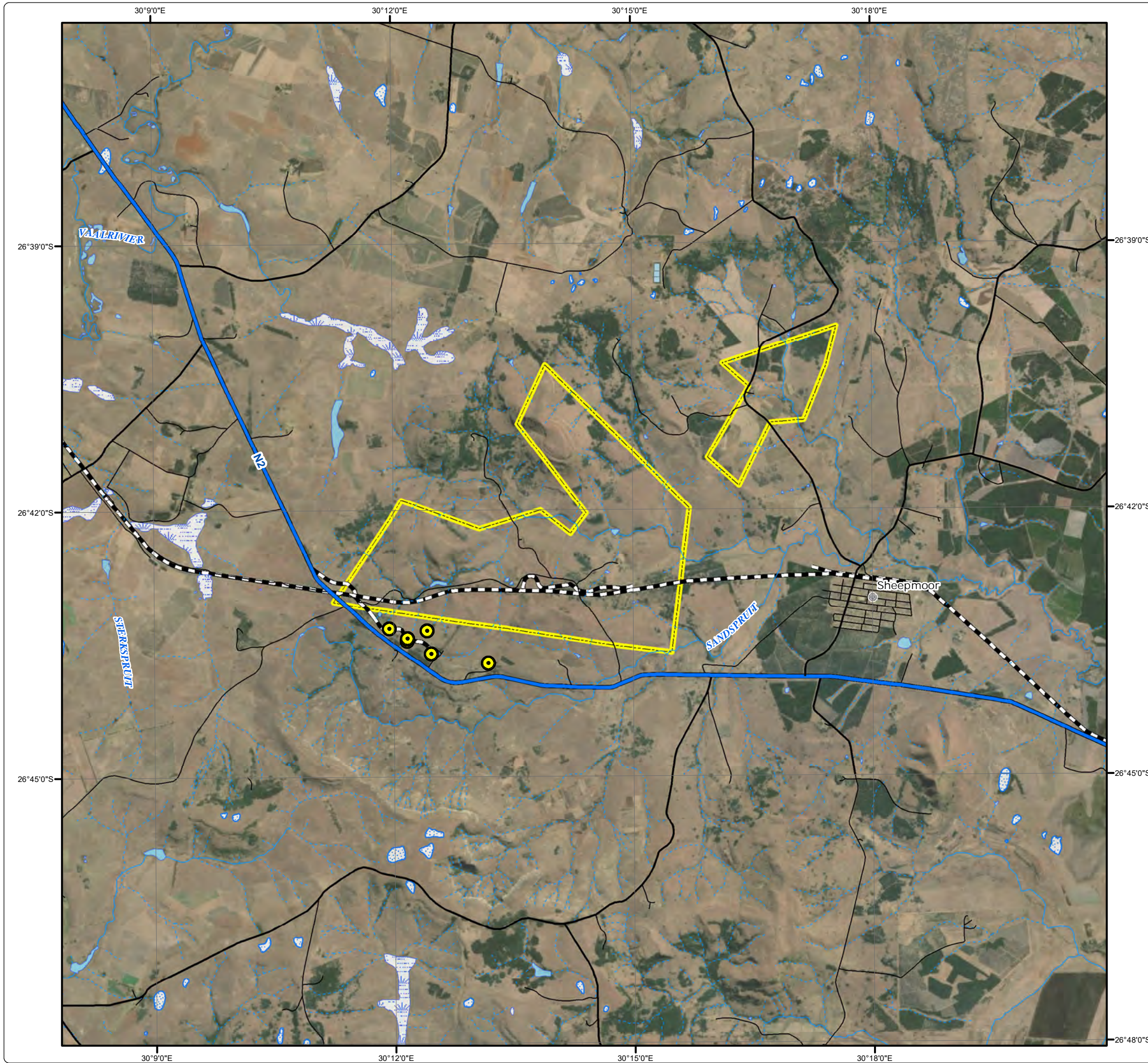
- Burial grounds and graves, which range in size from single graves to approximately one hundred graves (Van Schalkwyk, 1998; 2002; 2003a; 2003b, 2016; Van Schalkwyk & Moifatswane, 2003; Fourie & van der Walt, 2007; Pistorius, 2011; du Piesanie, et al., 2013; Karodia, et al., 2013; Pelser, 2013a; 2013b; Higgitt & Karodia Khan, 2014; du Piesanie & Nel, 2016; 2018); and
- Historical buildings which include structural remains, remains of functional structures and the remains of *werwe* (farmsteads) (Van Schalkwyk, 1998, 2016; Van Schalkwyk & Moifatswane, 2003; Fourie & van der Walt, 2007; Pistorius, 2011; du Piesanie, et al., 2013; Karodia, et al., 2013; Pelser, 2013a; 2013b; Higgitt & Karodia Khan, 2014; du Piesanie & Nel 2016, 2018).

Twyfelaar Coal Mine

HRM Site Matrix

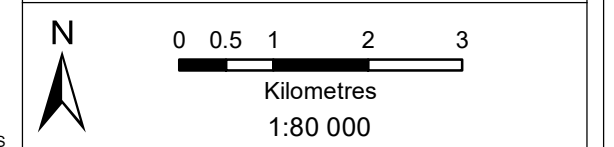
Legend

-  HRM Site Matrix
-  Project Area
-  Other Town
-  National Route
-  Secondary Road
-  Street
-  Railway Line
-  Non-Perennial
-  Perennial
-  Dams and lakes
-  Reservoirs and water tanks
-  Marsh and swamps
-  Non-perennial pans



• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator Ref #: prv.DAG5603.201909.108
 Datum: WGS 1984 Revision Number: 1
 Central Meridian: 31°E Date: 16/09/2019





5.1 Existing environment

Table 5-3 presents an overview of the natural environment within which the Project is situated. The Project is considered a “greenfields development” in that there has been minimal investment and development on the affected properties. Figure 5-2 presents the condition of the Project area at the time of the pre-disturbance survey.

The Project area has been greatly disturbed through anthropogenic activity, including cultivation, the grazing of livestock, houses and modern structures, agricultural features (including several cattle kraals, dams and boreholes) and informal/untarred roads. Additionally, the Project area is intersected by a national road and a railway line. There is a quarry and a Waste Rock Dump (WRD) adjacent to the railway line within the Project area.

Table 5-3: Summary of the vegetation setting of the Project

Biome	Bio-region	Vegetation Type
Grassland	Mesic Highveld Grassland	<u>Eastern Highveld Grassland (GM12)</u> Short dense grassland dominated by the typical Highveld grass composition with small, scattered rocky outcrops. These outcrops include wiry sour grasses and some woody species. This vegetation type occurs on slightly to moderately undulating plains with some low hills and pan depressions and typically occurs between 1 520 to 1 780 m altitude. This type is associated with the shales and sandstones of the <i>Madzaringwe Formation</i> within the Karoo Supergroup. This vegetation type is endangered and large portions of the unit have been transformed by cultivation, plantations, mines, urbanisation and dams. Erosion in this vegetation type is generally very low.
		<u>Wakkerstroom Montane Grassland (GM 14)</u> This vegetation type consists predominantly of short montane grasslands on plateaus and flatter areas with short forests and thickets occurring in steep slopes and drainage areas. This unit type is generally found between 1 440 and 2 200 m elevation and includes low mountains and undulating plains. This vegetation type is associated with the mudstones, sandstones and shales of the <i>Madzaringwe</i> and <i>Volksrust Formations</i> of the Karoo Supergroup. This vegetation type is considered ‘Least Threatened’ and occurs in South African Natural Heritage Sites, although very little of the vegetation type is protected formally. Agriculture does not pose a serious threat to the transformation of this type, as it is generally associated with lower temperatures and shallower soil. Black wattle is an aggressive invasive species in riparian areas of this vegetation type.

Adapted from Mucina & Rutherford (2010)



Figure 5-2: Photographs illustrating the current environment within the Project area

5.2 Results from the pre-disturbance survey

Table 5-4 includes descriptions of the heritage resources identified during the pre-disturbance and ground-truthing surveys. Plan 4 presents the spatial distribution of these sites and includes the tracks, indicating the areas that were surveyed. Figure 5-4 and Figure 5-5 below present photographs of select heritage resources identified during the pre-disturbance and ground-truth surveys.

Table 5-4: Heritage Resources Identified Through the Pre-Disturbance Survey¹⁰

Site Name	Description
BGG-001	Burial ground of six visible graves. All the graves are marked by stone and soil heaps and one of the graves has a metal marker for a headstone. The inscription is legible, and the grave belongs to the Zondo family and is dated to 2015. Two of the burials have large stones as headstones and epitaphs have been painted on the stones. One grave appears to belong to the Mbuken family. The other headstone is no longer legible. There are no legible dates on the headstones, although the community members indicated that one grave was approximately seven years old. One grave may be a child grave. The graveyard is not fenced but is adjacent to a property fence.
BGG-002	A burial ground of seven visible graves, although it is possible the burial ground includes more. The burial ground has been fenced off, but the fencing is very dilapidated and there is no evidence of a gate. Two of the graves are marked with a cement slab, brick fittings and granite headstones. These both belong to the Maseko family and date to 2007 and 2009. The other five visible graves are marked with stone and soil heaps and do not have headstones.
BGG-003	A burial ground within Wf-001. The burial ground has been fenced off, although the fencing is in a state of disrepair. There are five visible burials within the burial ground, of which four are marked by stone and soil heaps. One of these graves has a headstone which dates to 2013. The fifth grave is marked by a cement slab and granite fittings and headstone. This grave dates to 2009. Both these graves belong to the Linda family.
BGG-004	Burial ground of approximately 32 graves. All these graves are marked by stone and soil heaps and none have headstones or legible inscriptions. The burial ground was not fenced, and the graves were located within a stand of invasive Black Wattle trees. The trees around the graves had been felled. The community members said that these graves were "very old" and may therefore be considered historical graves (i.e. older than 60 years).
BGG-005	An individual grave marked with a stone and soil heap. There is no headstone and the grave are not fenced or otherwise demarcated.

¹⁰ In accordance with new SAHRA procedures, the GPS co-ordinates of these heritage resources have not been included in documents available to the public.



Site Name	Description
BGG-006	Two graves marked with stone and soil heaps. There are no headstones and the graves are not fenced or otherwise demarcated. This vegetation surrounding these graves was very overgrown.
BGG-007	An unfenced burial ground including approximately 20 graves. The burial ground is on a slope and there has been some wash. Of these graves, five are marked by cement slabs and headstones and one grave is marked by a cement border with stones piled on top of the grave. Two of the graves with cement slabs appear to be child graves. The other graves are marked by stone and soil piles. No graves have legible inscriptions.
HST-002 BGG-008	<p>HST-002 includes the remains of three one-roomed structures. The first is approximately 1.5 m at height and is missing the roof. No windows or doors are visible. The second structure is approximately 1.8 m at height and three of the four walls remain. The third structure is larger than the other two but it more collapsed. Three of the four walls are visible and are approximately 0.5 m at height. These structures most likely represent housing for the farm labourers. The GPS point on Plan 4 refers to the middle of the three structures.</p> <p>BGG-008 consists of a burial ground in proximity to HST-002 and is separated by a stone wall with what may include a small kraal. The burial ground is unfenced and includes 14 visible graves in a line parallel to the stone wall. These graves are all marked by stone and soil heaps and several have small markers as headstones. None of these are legible. These graves most likely represent the farm workers who lived in the three structures at HST-002.</p> <p>The historical imagery is unclear but the structures correspond to three voids in a heavily wooded area. It is therefore assumed that the structures are present at the time of the imagery and should be considered historical to ensure compliance with Section 34 of the NHRA.</p>
BGG-009	An unfenced burial ground including three visible graves. All these graves are marked with stone and soil piles. One grave has a headstone but there is no legible inscription.
BGG-010	An unfenced graveyard including nine visible graves. All these graves are marked with stone and soil heaps and none have headstones.
BGG-011	An individual grave adjacent to the garden and near the house in a fenced-off property. The burial is marked by a stone and soil heap and does not have a headstone.
BGG-012	A burial ground on the border of the Project area but may be impacted by the Project should Dagsoom wish to fence off the Mining Right Area. Access was not possible to assess the burial ground in detail; however, 17 graves were visible. Of these, five are marked by granite fittings and headstones and one with a headstone made of what appears to be a red stone. The headstones were not all legible at a distance but the red grave belongs to the Sivengo family and dates to 2013.



Site Name	Description
BGG-013	An unfenced burial ground adjacent to one of the farmhouses. The burial ground includes 12 visible graves which are marked by stone and soil piles. One grave has a legible headstone. The grave belongs to the Mkhwanazi family but the date is not legible.
HST-001	An isolated European ceramic sherd. The ceramic is white with blue stripes and may be a fragment from a cup or mug. The sherd was found in a cattle track and most likely represents wash (i.e. the sherd is <i>ex situ</i>). The historical imagery suggests that the area in which the sherd was found has been cultivated previously.
HST-002	Described with BGG-008 above.
HST-003	An isolated fragment of European ceramic. The ceramic has a faint blue border / stripe. The sherd most likely represents wash from the structure nearby (i.e. the sherd is <i>ex situ</i>).
STE-001	A small stonewalled kraal in a state of collapse. The kraal is oblong in shape and is approximately 12 m long. There is a tree growing in the centre of the kraal, where a wall divides the kraal into two sections. The community members were not sure if the kraal had been constructed recently or not. In the historical imagery, this area is heavily wooded and the structure is not visible.
STE-002	The ruins of one (larger) square and one (smaller) rectangular structure in proximity to each other. Both structures appear to have one room each (i.e. there are no internal divisions). There is a fence running through the smaller of the two structures and no fittings remain. The community members estimated that the smaller square was 50 to 60 years old and should therefore be considered historical. The historical imagery is unclear but shows an area that is sparsely wooded.
STE-003	The structural remains of a building with two rooms. There are more structural remains in proximity. The ruins appear to include one main structure (a house with two rooms) and two smaller structures. The historical imagery is unclear but shows an area that is sparsely wooded.
STE-004	The structural remains of an old kraal. The historical imagery is unclear but shows an area that is sparsely wooded.
STE-005	Structural remains of a rectangular structure made of stone and cement. Three of the four walls remain standing (approximately 1 m at height). There is a second square structure nearby which includes ruins of wood and metal wire. The historical imagery is unclear but shows an area surrounded by fields and what appears to be a road leading past the structure. It is therefore assumed that the structure is at least 55 years old and should be considered a historical structure to ensure compliance with Section 34 of the NHRA.
STE-006	The remains of a historical building. The community members estimate the structure was built in the 1920s. The historical imagery is unclear but shows an area adjacent to fields and what appears to be a road leading past the structure. It is therefore assumed that the structure is historical.

Site Name	Description
STE-007	Structural remains of a building made of stone. There is one room (i.e. no internal divisions) in the structure. The historical imagery is unclear and the structure is not visible on the imagery.
STE-008	Remains of a rectangular structure. Only the two shorter walls remain and are approximately 0.5 m at height. The historical imagery is unclear but shows a void at this point in a heavily wooded area. It is therefore assumed that the structure is present at this time and should be considered a historical structure to ensure compliance with Section 34 of the NHRA.
STE-009	The remains of a structure with a single room. The walls are approximately 1 m at height. The historical imagery is unclear.
Wf-001	<p>A farmhouse and several outbuildings which appear to be a historical werf, although there are also modern buildings present. The historical structures remain standing with roofs, although there are varying degrees of damage to the buildings. The buildings appear to include a barn and shed. The farmhouse is occupied.</p> <p>The historical imagery is not clear, however, there are lines of trees demarcating what could be a werf in this area. It is therefore assumed that the werf is at least 55 years old and should be considered a historical werf to ensure compliance with Section 34 of the NHRA.</p>
Wf-002	<p>Structural remains of three structures and a perimeter wall. The largest structure (most likely the main house) has nine rooms. Most of the exterior and interior walls are still standing, although the roof is absent. One door frame was still standing and there were no other fittings. The second structure had a collapsed and burnt thatch roof and three rooms. One external door was completely bricked up and another was left open. The windows were partially or completely bricked up. The third structure was very short and included one room. The single window was completely bricked up.</p> <p>Rubble and material culture had been deposited near the main house and there was a cement foundation in proximity. There is a square kraal made of rock near the structures and is in a state of disrepair. A modern, occupied house has been constructed adjacent to the kraal although the kraal does not appear to be in use.</p> <p>The historical imagery is not clear, however, there a historical road visible on the imagery leading to this point. It is therefore assumed that the werf is present at the time of the historical imagery and should be considered a historical werf to ensure compliance with Section 34 of the NHRA</p>

Figure 5-3 presents the results of the historical layering. The historical imagery presents a landscape that is a mix of cultivated land and natural flora. Some parts of the Project area include large stands of dense trees. There are several roads within the Project area, some of which are still in use today. The railway track does not appear in the historical imagery and parts of the road to the town of Sheepmoor have been altered.

Several points of interest were identified on the historical imagery and current aerial imagery as potential stonewalled settlements. These points were verified in the second survey and were confirmed to not be stonewalled settlements.

Alien Invasive Plants (AIPs), especially the Black Wattle which is present in the Project area, will outcompete native vegetation and create conditions favourable to their own dispersal where possible. In cases where seeds drop from an individual tree and sprout, this can result in circular or semi-circular stands. These stands can mimic the appearance of stonewalled structures on remote sensing imagery, as the stonewalled circles protect seeds and young trees which results in trees establishing themselves in circular stands along the walls.

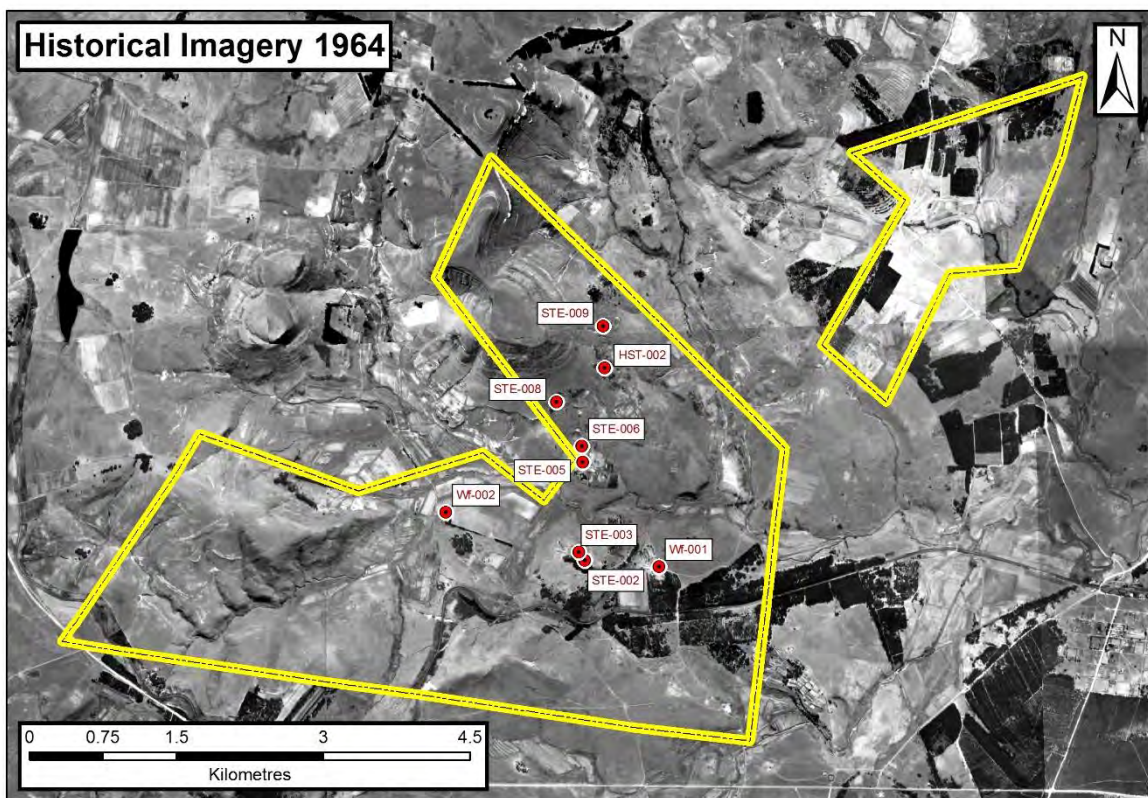


Figure 5-3: Historical imagery showing the Project area in 1964 with points of interest



STE-001: Small kraal of indeterminate age



Historical structures at Wf-001



Graves within the stand of Black Wattle trees that had been cleared (BGG-004)



Two graves marked by stone and soil heaps in overgrown grass (BGG-006)



Structural remains of STE-005



Remains of one of the farm labourers houses at HST-002

Figure 5-4: Photographs of select heritage resources identified during the pre-disturbance survey



Isolated ceramic sherd (HST-001)



Main structure of Wf-002 with rubble and material culture scatter



Grave marked by stone and soil heap at BGG-001



Grave marked by cement slabs with small markers as headstones (BGG-007)

Figure 5-5: Photographs of select heritage resources identified during the pre-disturbance survey

6 Impact assessment

6.1 Cultural Significance of the identified landscape

Heritage resources are intrinsic to the history and beliefs of communities. They characterise community identity and cultures and are finite, non-renewable and irreplaceable. Considering the innate value of heritage resources, HRM acknowledges that these have lasting worth as evidence of the origins of life, humanity and society. Notwithstanding the inherent value ascribed to heritage, it is incumbent on the assessor to determine the significance of these resources to allow for the implementation of appropriate management. This is achieved through assessing the value of heritage resources relative to the prescribed criteria encapsulated in policies and legal frameworks.

This section presents a statement of CS as is relevant to newly-identified heritage resources and the greater cultural landscape of the site-specific study area. The statement of significance considers the importance or the contribution of the identified heritage resources and the landscape to four broad value categories: aesthetic, historical, scientific and social, to summarise the CS and other values described in Section 3(3) of the NHRA.

Two categories of heritage resources were recorded during the field surveys of the site-specific study area. These comprised:

- Burial grounds and graves (13 records); and
- Historical resources, including the historical built environment and historical material culture (14 records).

The assessment of the CS and Field Ratings demonstrated that the identified have a CS designation ranging from negligible to very-high. Table 6-1 presents a summary of this assessment. Sites of the same type that share the same CS have been grouped together in terms of the impact assessment (refer to Section 6.2).

Table 6-1: CS and Field Ratings of newly identified heritage resources within the Project Area

Resource ID	Type	Description	Aesthetic	Historic	Scientific	Social	INTEGRITY	Designation	Recommended Field Rating	Field Rating Description	Minimum Mitigation ¹¹
VRYH	Geological	<i>Vryheid Formation</i>	- This geological formation was not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA.	- This geological formation was not assessed against historic criteria as defined in Section 3(3) of the NHRA.	5 The fossils within this palaeontologically sensitive formation potentially provide significant scientific information and are considered rare heritage resources.	- This geological formation was not assessed against social criteria as defined in Section 3(3) of the NHRA.	4 The integrity of the formation is considered to be excellent with both tangible and intangible fabric preserved.	Very High 20	Grade I	Heritage resources with qualities so exceptional that they are of special national significance.	Project design must change to avoid all change to resource; Conserved in entirety and included in Conservation Management Plan (CMP).
BGG-001	Burial / grave	Burial Grounds & Graves	- Burial grounds and graves were not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA.	- Burial grounds and graves were not assessed against historic criteria as defined in Section 3(3) of the NHRA.	- Burial grounds and graves were not assessed against scientific criteria as defined in Section 3(3) of the NHRA.	5 Burial grounds and graves have specific connections to communities or groups for spiritual reasons. The significance is universally accepted.	4 The integrity of burial grounds is considered to be excellent with both tangible and intangible fabric preserved.	Very High 20	Grade I	Heritage resources with qualities so exceptional that they are of special national significance.	Project design must change to avoid the resource completely and resources must be included in CMP. A Grave Relocation Process (GRP) may be necessary should the project design not be changed.
BGG-002											
BGG-003											
BGG-004											
BGG-005											
BGG-006											
BGG-007											
BGG-008											
BGG-009											
BGG-010											
BGG-011											
BGG-012											
BGG-013											

¹¹ Please note: this recommended mitigation refers to the minimum mitigation requirements as encapsulated in the NHRA. Project-specific mitigation measures are presented in Section 9



Resource ID	Type	Description	Aesthetic	Historic	Scientific	Social	INTEGRITY	Designation	Recommended Field Rating	Field Rating Description	Minimum Mitigation ¹¹
HST-002	Site	Remains of labourer housing	2 The techniques demonstrated here are generally well represented; however, this is a superior example.	3 This structure is linked to the graves of the labourers themselves. This is uncommon within the region.	2 This resource is generally well represented; however, this example presents superior information potential due its association with the three structures and the graves.	4 The association of the structures with the graves presents rare social value.	4 The meaning and relationship between the graves and the houses is well established, although there is some encroachment on the setting	Medium	General Protection IV A	Resources under general protection in terms of NHRA sections 34 to 37 with Medium significance	Mitigation of resource to include detailed recording and mapping, and limited sampling, e.g. Shovel Test Pits (STPs).
HST-001	Occurrence	Isolated historical artefacts	1 These items show techniques that are commonly represented in diverse landscapes	1 These artefacts represent a broad time period and cannot be linked to a more specific community or event.	1 The artefacts include information potential that is not of superior quality to those found in diverse landscapes	1 These artefacts are linked to a broad community and time period but do not represent a more specific community or event.	1 These artefacts most likely represent wash from structures up the hill. There is therefore limited information potential and extensive encroachment on the setting.	Negligible	General Protection IV C	Resources under general protection in terms of NHRA sections 34 to 37 with Negligible significance	Sufficiently recorded, no mitigation required
HST-003											
STE-001	Occurrence	Structural remains of the historical built environment	1 These structures showcase techniques that are commonly represented in diverse landscapes	1 These structures represent a broad time period and cannot be linked to a more specific community or event.	1 The structures represent information potential that is not of superior quality to those found in diverse landscapes	1 These structures are linked to a broad community and time period but do not represent a more specific community or event.	2 The fabric of these structures is poorly preserved and there is some encroachment on the setting.	Negligible	General Protection IV C	Resources under general protection in terms of NHRA sections 34 to 37 with Negligible significance	Sufficiently recorded, no mitigation required
STE-002											
STE-003											
STE-004											
STE-005											
STE-006											
STE-007											
STE-008											
STE-009											



Resource ID	Type	Description	Aesthetic	Historic	Scientific	Social	INTEGRITY	Designation	Recommended Field Rating	Field Rating Description	Minimum Mitigation ¹¹
Wf-001	Occurrence	Structural remains of the historical built environment	1	1	1	1	3	Negligible	General Protection IV C	Resources under general protection in terms of NHRA sections 34 to 37 with Negligible significance	Sufficiently recorded, no mitigation required
Wf-002			These structures showcase techniques that are commonly represented in diverse landscapes	These structures represent a broad time period and cannot be linked to a more specific community or event.	The structures represent information potential that is not of superior quality to those found in diverse landscapes	These structures are linked to a broad community and time period but do not represent a more specific community or event.	The fabric of the werwe are preserved, the meaning is evident and there is limited encroachment on the setting.				

6.2 Heritage Impact Assessment

The assessment of potential impacts to heritage resources considers the activities associated with the Project as described in Section 1.1, specifically the construction and operation of the aforementioned underground coal mine and associated infrastructure. There are potential direct and indirect impacts to identified heritage resources. Section 6.2.1 describes the potential indirect impacts to burial grounds and graves.

The current proposed infrastructure design layout suggests that the Project will directly impact only STE-005. The site is located in the proposed footprint for the discard dump. STE-005 is a heritage resource of negligible CS¹².

The SAHRA Minimum Standards recommend that heritage resources with negligible CS require no additional mitigation and their inclusion into an HIA report is considered to be sufficient in terms of recording these resources. The inclusion of the resource in Table 5-4 and Figure 5-4 is adequate to meet these requirements. To this effect, potential impacts posed to the STE-005 are not considered in this section.

6.2.1 Indirect Impacts to Burial Grounds and Graves

The potential indirect impact to the burial grounds and graves within the Project area includes the loss of access resulting in the degradation of CS. This is expected to occur when the community of Next-of-Kin (NoK) may not be able access the individual heritage resources. Table 6-2 below presents a summary of the assessment of direct impacts to BGG-001 and BGG-002.

Table 6-2: Summary of the potential direct impact to Burial Grounds and Graves

IMPACT DESCRIPTION: Indirect impact on burial grounds and graves				
Dimension	Rating	Motivation		
PRE-MITIGATION				
Duration	Project Life (5)	The degradation of the CS of these resources will occur as long as access is not possible. Later generations may be able to replace the social significance of the resources once access is restored.	Consequence: Extremely detrimental (-14)	Significance: Moderate – negative (-56)

¹² This notwithstanding, as a historical structure, STE-005 is still afforded general protection under Section 34 of the NHRA and may not be altered or demolished without a permit issued by MPHRA.



IMPACT DESCRIPTION: Indirect impact on burial grounds and graves				
Dimension	Rating	Motivation		
Extent	Local (3)	Should access to these heritage resources not be possible, most or all the burial grounds will be impacted.		
Intensity x type of impact	Very high - negative (-6)	The loss of the CS of these heritage resources is considered a moderate change to a resource with very high CS.		
Probability	Probable (4)	Given the nature of the Project, it is likely that access to the heritage resources will be impacted or removed which will likely lead to the loss of CS.		
MITIGATION:				
<p>Dagsoom must develop and implement a CMP to prevent the degradation of the fabric of the burial grounds and graves through the Project lifecycle and preserve the CS of the heritage resources. Dagsoom must also develop and implement an Access Protocol to allow individuals access to the burial grounds and graves. This Access Protocol can be developed considering the relevant safety and security measures of the mine, the requirements of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA) and the needs of the community. Information regarding the Access Protocol must be made publicly available and can be developed as part of the CMP.</p>				
POST-MITIGATION				
Duration	Beyond project life (6)	Should the CMP be developed and implemented, the benefits will extend beyond the lifecycle of the Project.	Consequence: Highly beneficial (14)	Significance: Moderate – positive (84)
Extent	Local (3)	The CMP will some of the individual heritage resources within the Project area.		
Intensity x type of impact	High - positive (5)	Implementation of the CMP will be considered a minor change to a heritage resource of very high CS.		
Probability	Highly probable (6)	Should the CMP be implemented, it is most likely that the heritage resources will be impacted in a positive way.		

6.3 Cumulative impacts on the cultural landscape

Cumulative impacts occur from in-combination effects of various impacts on heritage resources acting within a host of processes that result in an incremental effect. The importance of identifying and assessing cumulative impacts is that the whole is often greater than the sum of its parts. This implies that the total effect of multiple stressors or change processes acting simultaneously on a system may be greater than the sum of their effects when acting in isolation.

This Project in conjunction with other planned developments in line with the strategic development plans for the Mpumalanga Province requires consideration to identify the possible in-combination effects of various impacts to known heritage resources. Table 6-3 presents a summary of the possible cumulative impacts of the Project.

Table 6-3: Summary of potential cumulative impacts

Type	Cumulative Impact	Direction of Impact	Extent of Impact
Additive, Synergistic	The development and operation of the proposed Project will add to the existing and proposed infrastructure in the area and will contribute to the degradation of the sense-of-place of the cultural landscape. Considering the greater development landscape, the effects from the various proposed developments will interact to produce a total greater effect on the cultural landscape and degradation thereof.	Negative	Local
Neutralizing	The <i>in-situ</i> conservation of some or all of the identified heritage resources will conserve tangible markers of the historical landscape. This will be a positive cumulative impact on the cultural landscape and may counter some of the degradation of the sense-of-place as described above.	Positive	Local

6.4 Low risks and unplanned events

This section considers the potential risks *to* protected heritage resources, as well as the potential heritage risks that could arise *for* Dagsoom in terms of implementation of the Project. These two aspects are discussed separately.

Section 5.2 describes the heritage resources identified during the pre-disturbance survey; however, this is not an exhaustive list of all heritage resources within the Project area. If heritage resources are subsequently identified, and where Dagsoom knowingly does not take

proactive management measures, potential risks to Dagsoom may include litigation in terms of Section 51 of the NHRA and social or reputational repercussions. Table 6-4 presents a summary of the primary risks that may arise for Dagsoom.

Table 6-4: Identified heritage risks that may arise for Dagsoom

Description	Primary Risk
Heritage resources with a high CS rating are inherently sensitive to any development in so far that the continued survival of the resource could be threatened. In addition to this, certain heritage resources are formally protected thereby restricting various development activities.	Negative Record of Decision (RoD) and/or development restrictions issued by the Institute and/or SAHRA in terms of Section 38(8) of the NHRA.
Impacting on heritage resources formally and generally protected by the NHRA without following due process. Due process may include social consultations and/or permit application processes to SAHRA and/or MPHRA.	Fines Penalties Seizure of Equipment Compulsory Repair / Cease Work Orders Imprisonment

If additional heritage resources are identified during construction of the proposed infrastructure, potential risks to those heritage resources will need to be assessed. Table 6-5 provides an overview of these potential unplanned events, the subsequent impact that may occur and mitigation measures and management strategies to remove or reduce these risks.

Table 6-5: Identified unplanned events and associated impacts

Unplanned event	Potential impact	Mitigation / Management / Monitoring
Encountering unidentified <i>in situ</i> remnants of historical built environment resources during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 34 of the NHRA	Establish Project-specific Chance Find Procedures (CFPs) as a condition of authorisation. Refer to Section 9 for more detailed recommendations.
Accidental exposure of fossil bearing material implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 35 of the NHRA	
Accidental exposure of <i>in situ</i> archaeological material during the implementation of the Project.		



Unplanned event	Potential impact	Mitigation / Management / Monitoring
Accidental exposure of <i>in situ</i> burial grounds or graves during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 36 of the NHRA.	
Accidental exposure of human remains during the construction phase of the Project.		
Increased dust generated by Project activities	Negative changes to the <i>status quo</i> and integrity of heritage resources generally protected under Section 35 of the NHRA	Should rock art sites be identified within the Project area, Dagsoom must immediately notify the HRAs and must include such sites in the CMP.

7 Identified heritage impacts versus socio-economic benefit

This section provides a brief overview¹³ of the socio-economic context within which the Project will be situated. The site-specific study area falls within Ward 11 of the MLM and GSDM. This section presents a summary of the information included in the Integrated Development Plans (IDPs) for these municipalities. Information from Wazimap (2017) has been used to supplement the IDP data.¹⁴

The 2011 census recorded 4 039 393 people living in Mpumalanga, approximately 7.8% of the population (Statistics South Africa, 2011; Wazimap, 2017). Of those people, 1 043 195 people lived in the GSDM. GSDM is the smallest of the three district municipalities in Mpumalanga in terms of population size. GSDM includes seven local municipalities and MLM is the fourth largest in terms of population size. The 2011 census recorded 149 378 people living in the MLM and 5 924 in Ward 11.

Unemployment is a major challenge within the regional study area (GSDM, 2019; MLM, 2019). Job creation has been highlighted as a major social need within the community (GSDM, 2019). Table 7-1 provides a summary of the relevant statistics. The trends within the regional study area are fairly consistent in terms of the relative size of the working population. Ward 11 does

¹³ For a more detailed analysis of the socio-economic context and the positive and negative impacts of the Project, refer to the Social Impact Assessment (SIA) and Social and Labour Plan (SLP) undertaken in support of the EIA.

¹⁴ These data were used because it realigns the 2011 Census data captured and presented by Statistics South Africa (2011) with new municipal boundaries used in the 2016 Municipal Elections (Open Up, 2017). This report uses the Census 2011 data as data from the 2016 Community Survey are not yet available at ward level.

show a large difference in terms of the level of employment. The published unemployment rate in GSDM in 2017 was 26.7% (GSDM, 2019). This figure increased from 2014 where the unemployment rate was 26.0%. Similarly, in MLM, unemployment increased from 23.1% in 2014 to 24.1% in 2017.

Table 7-1: Summary of the employment statistics within the regional study area

Employment Statistics	Ward 11		MLM		GSDM	
	No.	%	No.	%	No.	%
Total Population	5 924	-	149 378	-	1 043 195	-
Working Age (15-64)	2 839	47.9	88 767	59.4	600 878	57.6
Employed	956	16.1	41 698	29.7	259 129	24.8

Adapted from Statistics South Africa (2011) and Wazimap (2017)

Figure 7-1 below presents a breakdown of the employment status of the populations within the regional study area. In this figure, “not applicable” refers to members of the community who are not of economically-active age (i.e. those who are younger than 15 and aged 65 and older). Discouraged work seeker refers to those who are unemployed but are no longer seeking employment.

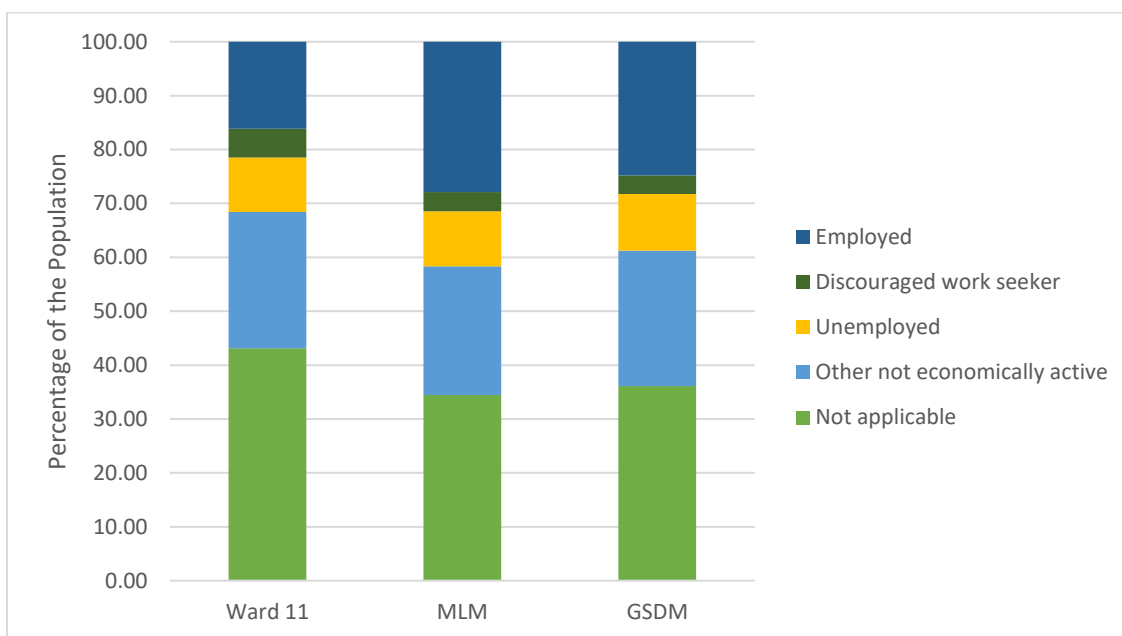


Figure 7-1: Employment status within the regional study area

Adapted from Wazimap (2017)

As of 2017, the three leading industries in terms of employment consisted of: trade (employing 21.6% of the workforce), community services (19.2%) and finance (12.5%) in GSDM (GSDM, 2019). Mining employed 6.6% of the workforce and is the third smallest industry in this regard. In terms of contribution to the economy, however, mining was the leading industry in 2017 and contributed 26.8% of the GSDM economy, although this was a decrease from 2014.

Mining at the Twyfelaar Coal Mine will be undertaken by contractors and, at the time of compiling this report, the labour-sending areas have not been identified. However, it is likely that the Project will create temporary and permanent job opportunities within the regional study area. It is also possible that there may be indirect benefits through knock-on effects which will increase employment opportunities in other sectors, such as transportation and construction industries. Additionally, the Project will supply coal for power generation. This will contribute to improving power security across South Africa.

Based on the review of the applicable planning documents and the motivation above, the potential socio-economic benefits that may result from the Project outweigh the identified impacts and risks to known heritage resources within the site-specific study area. This statement is supported by the following:

- Given Digby Wells' understanding of the Project, it is likely that the identified heritage resources can remain and be maintained *in situ*. Alternatively, the identified impacts and risks can be managed through the proposed recommendations; and
- The proposed Project will contribute to the regional and local economies;
- The proposed Project is expected to contribute (directly or indirectly) to the employment of people in an area where unemployment is a challenge.

8 Consultation

The consultation process affords Interested and Affected Parties (I&APs) opportunities to engage in the EIA process. The objectives of the Stakeholder Engagement Process (SEP) include the following:

- To ensure that I&APs are informed about the project;
- To provide I&APs with an opportunity to engage and provide comment on the project;
- To draw on local knowledge by identifying environmental and social concerns associated with the project;
- To involve I&APs in identifying methods in which concerns can be addressed;
- To verify that stakeholder comments have been accurately recorded; and
- To comply with the legal requirements.

The Public Participation Process (PPP) has been completed in part, as a process separate to the heritage specialist assessment. No formal consultation was undertaken as part of this assessment. Should any I&AP comments be submitted in relevance to heritage resources during the SEP, these will be considered in the final EIA report.

Site surveys can often present an opportunity for informal consultation with specific stakeholders (usually farm owners, managers and employees). This consultation can result in the identification of burial grounds and graves – importantly, these could include formal burial grounds or graves, sometimes with no visible surface markers – or in the identification of sacred sites or other places of importance, which may not otherwise be identified.

The pre-disturbance survey was guided by members of the community, specifically Mr Welcome Ndisa. Mr Ndisa coordinated with other members of the community to assist the heritage specialist in identifying all the known burial grounds within the Project area and also assisted in identifying historical structures. Table 5-4 includes all the graves known to Mr Ndisa and the community members with whom he liaised.

9 Recommendations

To mitigate against the identified direct and indirect impacts against cultural heritage resources, Digby Wells recommends:

- Dagsoom amends the infrastructure design of the discard dump, where possible, to avoid STE-005. Despite its negligible CS value, this structure is afforded general protection under Section 34 of the NHRA and Dagsoom must obtain a Section 34 Permit to destroy or alter this structure;
- Where the redesign of the infrastructure layout is not feasible, Dagsoom must complete the Permit application process in compliance with Section 34 of the NHRA and Chapter III of the NHRA Regulations and obtain a permit prior to the commencement of construction of the discard dump;
- Dagsoom must develop and implement a CMP to manage *in situ* heritage resource. The CMP must include any applicable mitigation measures, management strategies and proposed monitoring schedules and outline the roles and responsibilities of those involved. This document must be submitted to the HRAs for approval prior to implementation;
- Where rock art sites are identified within the Project area, Dagsoom must immediately notify the HRAs and must include such sites in the Project-specific CMP; and
- A project-specific CFP must be developed and approved by the HRAs prior to the commencement of the construction of Project-related infrastructure.

10 Conclusion

The aim of the HRM process was to comply with regulatory requirements contained within Section 38 of the NHRA through the following:

- Defining the cultural landscape within which the Project is situated;
- Identifying, as far as is feasible, heritage resources that may be impacted upon by the project as well as define the CS;
- Assessing the possible impacts to the identified heritage resources;
- Considering the socio-economic benefits of the Project; and
- Providing feasible mitigation and management measures to avoid, remove or reduce perceived impacts and risks.

These objectives were met as presented in Sections 5 through 9 above. Based on the understanding of the Project while considering the results of this assessment, Digby Wells does not object to the Project provided the recommendations detailed above are adopted.

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Heritage Impact Assessment

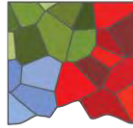
Integrated Environmental Authorisation Process for the Proposed Dagsoom Twyfelaar Coal Mining Project near Ermelo, Mpumalanga

DAG5603



DIGBY WELLS
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Appendix A: Specialist CV



DIGBY WELLS

ENVIRONMENTAL

Miss Shannon Hardwick
Heritage Resources Management Consultant
Social and Heritage Services Division
Digby Wells Environmental

1 Education

Date	Degree(s) or Diploma(s) obtained	Institution
2013	MSc (Archaeology)	University of the Witwatersrand
2010	BSc (Honours) (Archaeology)	University of the Witwatersrand
2009	BSc	University of the Witwatersrand
2006	Matric	Rand Park High School

2 Language Skills

Language	Written	Spoken
English	Excellent	Excellent
Afrikaans	Fair	Basic

3 Employment

Period	Company	Title/position
2017 to present	Digby Wells Environmental	Junior Heritage Resources Management Consultant
2016-2017	Tarsus Academy	Facilitator
2011-2016	University of the Witwatersrand	Teaching Assistant
2011	University of the Witwatersrand	Collections Assistant

4 Experience

I joined the Digby Wells in April 2017 as an archaeologist and a Heritage Resources Management intern in the Social and Heritage Services Division and have most recently been promoted to a Junior Consultant. I received my Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2013, specialising in archaeobotany and historical archaeology. I have fieldwork experience in historical archaeology as well as in Stone Age archaeology in South Africa; since joining Digby Wells, this has been expanded to include pre-disturbance surveys across South Africa and fieldwork in Malawi.

Since joining Digby Wells, I have gained generalist experience through the compilation of various heritage assessment reports in South Africa, Malawi and Mali and Section 34 Permit Applications. I have also obtained experience in compiling socio-economic documents, including a Community Health, Safety and Security Management Plan (CHSSMP) and social baselines and data analysis in South Africa, Malawi, Mali and Sierra Leone.

5 Project Experience

My project experience is listed in the table below.

Project Title	Name of Client	Project Location	Date:		Project / Experience Description
Environmental Authorisation for the Dagsoom Coal Mining Project near Ermelo, Mpumalanga Province	Dagsoom Coal Mining (Pty) Ltd	Ermelo, Mpumalanga Province	April 2019	Ongoing	Heritage Impact Assessment
Regional Tailings Storage Facility Heritage Mitigations	Ergo Mining (Pty) Ltd	Randfontein, Gauteng	April 2019	Ongoing	Section 34 Permit Application Process
Weltevreden Mine Environmental Authorisation, Water Use Licence and Mining Right Application Project	Mbuyelo Group (Pty) Ltd	Belfast, Mpumalanga	April 2019	Ongoing	Heritage Impact Assessment
Environmental Authorisation for the proposed Lephalale Pipeline Project, Limpopo Province	MDT Environmental (Pty) Ltd	Lephalale, Limpopo Province	April 2019	Ongoing	Notification of Intent to Develop
Heritage Resources Management Process Update for the Exxaro Matla Mine	Exxaro Coal Mpumalanga (Pty) Ltd	Kriel, Mpumalanga Province	February 2019	Ongoing	Heritage Site Management Plan Update
Environmental Authorisation for the proposed Musina-Makhado Special Economic Zone Development Project, Limpopo Province	Limpopo Economic Development Agency	Vhembe District Municipality, Limpopo Province	February 2019	Ongoing	Heritage Impact Assessment
Songwe Hills Rare Earth Elements Project	Mkango Resources Limited	Phalombe District, Malawi	February 2019	Ongoing	Heritage Impact Assessment

Project Title	Name of Client	Project Location	Date:		Project / Experience Description
Elandsfontein Colliery Burial Grounds and Graves Chance Finds	Anker Coal and Mineral Holdings SA (Pty) Ltd Elandsfontein Colliery (Pty) Ltd	Clewer, Emalahleni, Mpumalanga Province	November 2018	December 2018	Site Inspection
Environmental Authorisation Process to Decommission a Conveyor Belt Servitude, Road and Quarry at Twistdraai East Colliery	Sasol Mining (Pty) Ltd	Secunda, Mpumalanga Province	November 2018	Ongoing	Notification of Intent to Develop
Environmental and Social Impact Assessment for the Bougouni Lithium Project, Mali	Future Minerals S.A.R.L.	Bougouni, Mali	October 2018	Ongoing	Heritage Impact Assessment
Environmental Authorisation for the Nomalanga Estates Expansion Project, KwaZulu-Natal	Nomalanga Property Holdings (Pty) Ltd	Greytown, KwaZulu-Natal	October 2018	Ongoing	Heritage Impact Assessment
Environmental Authorisation for the Temo Mine proposed Rail, Road and Pipeline Development, Limpopo Province	Temo Coal Mining (Pty) Ltd	Lephalale, Limpopo Province	August 2018	Ongoing	Heritage Impact Assessment
Gorumbwa RAP Audit	Randgold Resources Limited	Kibali Sector, Democratic Republic of the Congo	July 2018	December 2018	Resettlement Action Plan Audit
Sasol Sigma Defunct Colliery Surface Mitigation Project: Proposed Rover Diversion and Flood Protection Berms	Sasol Mining (Pty) Ltd	Sasolburg, Free State Province	June 2018	November 2018	Notification of Intent to Develop

Project Title	Name of Client	Project Location	Date:		Project / Experience Description
Basic Assessment and Regulation 31 Amendment / Consolidation for Sigma Colliery: Mooikraal and Sigma Colliery: 3 Shaft	Sasol Mining (Pty) Ltd	Sasolburg, Free State Province	April 2018	Ongoing	Notification of Intent to Develop
Sasol Mining Sigma Colliery Ash Backfilling Project, Sasolburg, Free State Province	Sasol Mining (Pty) Ltd	Sasolburg, Free State Province	April 2018	July 2018	Heritage Basic Assessment Report Update
Constructed Landfill Site for the Sierra Rutile Limited Mining Operation, Southern Province, Sierra Leone	Sierra Rutile Limited	Southern Province, Sierra Leone	April 2018	May 2019	Social Impact Assessment
Environmental Impact Assessment for the Klipspruit Colliery Water Treatment Plant and associated pipeline, Mpumalanga	South32 SA Coal Holdings (Pty) Ltd	Ogies, Mpumalanga Province	March 2018	Ongoing	Notification of Intent to Develop; Social baseline
Proposed construction of a Water Treatment Plant and associated infrastructure for the Treatment of Mine-Affected Water at the Kilbarchan Colliery	Eskom Holdings SOC Limited	Newcastle, KwaZulu-Natal Province	February 2018	Ongoing	Heritage Impact Assessment
Belfast Implementation Project	Exxaro Coal Mpumalanga (Pty) Ltd	Belfast, Mpumalanga Province	February 2018	Ongoing	Section 34 Permit Application
Newcastle Landfill Project	GCS Water and Environmental Consultants	Newcastle, KwaZulu-Natal	January 2018	March 2019	Heritage Impact Assessment

Project Title	Name of Client	Project Location	Date:		Project / Experience Description
NHRA Section 34 Permit Application process for the Davin and Queens Court Buildings on Erf 173 and 174, West Germiston, Gauteng Province	IDC Architects	Johannesburg, Gauteng Province	January 2018	May 2018	Section 34 Permit Application Process
Basic Assessment and Environmental Management Plan for the Proposed pipeline from the Mbali Colliery to the Tweefontein Water Reclamation Plant, Mpumalanga Province	HCI Coal (Pty) Ltd Mbali Colliery	Ogies, Mpumalanga Province	November 2017	February 2018	Heritage Basic Assessment Report
The South African Radio Astronomy Observatory Square Kilometre Array Heritage Impact Assessment and Conservation Management Plan Project	The South African Radio Astronomy Observatory (SARAO)	Carnarvon, Northern Cape Province	November 2017	July 2018	Heritage Impact Assessment; Conservation Management Plan
Environmental Impact Assessment for the proposed Future Developments within the Sun City Resort Complex	Sun International (Pty) Ltd	Rustenburg, North West Province	November 2017	Ongoing	Heritage Impact Assessment Conservation Management Plan Social Baseline
Environmental Fatal Flaw Analysis for the Mabula Filling Station	Mr van den Bergh	Waterberg, Limpopo Province	November 2017	November 2017	Fatal Flaw Analysis



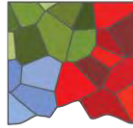
Project Title	Name of Client	Project Location	Date:		Project / Experience Description
Environmental Impact Assessment for the Blyvoor Gold Mining Project near Carletonville, Gauteng Province	Blyvoor Gold Capital (Pty) Ltd	Carletonville, Gauteng	October 2017	Ongoing	Notification of Intent to Develop; Social Baseline
Heritage Resources Management Process for the Exxaro Matla Mine	Exxaro Coal Mpumalanga (Pty) Ltd	Kriel, Mpumalanga Province	August 2017	October 2018	Heritage Impact Assessment
Liwonde Additional Studies	Mota-Engil Africa	Liwonde, Malawi	June 2017	June 2018	Community Health, Safety and Security Management Plan
Environmental Impact Assessment for the Millsite TSF Complex	Sibanye-Stillwater	Randfontein, Gauteng	June 2017	December 2017	Heritage Impact Assessment
Heritage Resources Management Process for the Portion 296 of the farm Zuurfontein 33 IR Proposed Residential Establishment Project	Shuma Africa Projects (Pty) Ltd	Ekurhuleni (Johannesburg), Gauteng	May 2017	June 2017	Notification of Intent to Develop
NHRA Section 35 Archaeological Investigations, Lanxess Chrome Mine, North-West Province	Lanxess Chrome Mine (Pty) Ltd	Rustenburg, North West Province	March 2017	August 2017	Archaeological Phase 2 Mitigation
Environmental and Social Input for the Pre-Feasibility Study	Birimium Gold	Bougouni, Mali	January 2017	October 2018	Pre-Feasibility Study; Heritage Impact Assessment

6 Professional Registration

Position	Professional Body	Registration Number
Member	Association of Southern African Professional Archaeologists (ASAPA)	451
Member	International Council on Monuments and Sites (ICOMOS)	38048

7 Publications

Esterhuysen, A.B. & Hardwick, S.K. 2017. Plant remains recovered from the 1854 siege of the Kekana Ndebele, Historic Cave, Makapan Valley, South Africa. *Journal of Ethnobiology* 37(1): 97-119.



DIGBY WELLS

ENVIRONMENTAL

Mr. Justin du Piesanie
Divisional Manager: Social and Heritage Services
Social and Heritage Services Department
Digby Wells Environmental

1 Education

Date	Degree(s) or Diploma(s) obtained	Institution
2015	Continued Professional Development, Intermediate Project Management Course	PM.Ideas: A division of the Mindset Group
2013	Continued Professional Development Programme, Architectural and Urban Conservation: Researching and Assessing Local Environments	University of Cape Town
2008	MSc	University of the Witwatersrand
2005	BA (Honours) (Archaeology)	University of the Witwatersrand
2004	BA	University of the Witwatersrand
2001	Matric	Norkem Park High School

2 Language Skills

Language	Written	Spoken
English	Excellent	Excellent
Afrikaans	Proficient	Good

3 Employment

Period	Company	Title/position
2018 to present	Digby Wells Environmental	Divisional Manager: Social and Heritage Services
2016-2018	Digby Wells Environmental	Unit Manager: Heritage Resources Management
2011-2016	Digby Wells Environmental	Heritage Management Consultant: Archaeologist
2009-2011	University of the Witwatersrand	Archaeology Collections Manager
2009-2011	Independent	Archaeologist
2006-2007	Maropeng & Sterkfontein Caves UNESCO World Heritage Site	Tour guide

4 Experience

I joined the company in August 2011 as an archaeologist and was subsequently made manager of the Heritage Unit and subsequently the Divisional Manager for Social and Heritage Services in 2016 and 2018 respectively. I obtained my Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2008, specialising in the Southern African Iron Age. I further attended courses in architectural and urban conservation through the University of Cape Town's Faculty of Engineering and the Built Environment Continuing Professional Development Programme in 2013. I am a professional member of the Association of Southern African Professional Archaeologists (ASAPA), and accredited by the association's Cultural Resources Management (CRM) section. I am also a member of the International Council on Monuments and Sites (ICOMOS), an advisory body to the UNESCO World Heritage Convention. I have over 10 years combined experience in HRM in South Africa, including heritage assessments, archaeological mitigation, grave relocation, and NHRA Section 34 application processes. I gained further generalist experience since my appointment at Digby Wells in Botswana, Burkina Faso, Cameroon, the Democratic Republic of Congo, Liberia, Malawi, Mali, Senegal and Tanzania on projects that have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage. Furthermore, I have acted as a technical expert reviewer of HRM projects undertaken in Cameroon and Senegal. As Divisional Manager for Social and Heritage Services at Digby Wells Environmental, I manage several large capital Projects and multidisciplinary teams placing me in the best position to identify and exploit points of integration between the HRM process and greater social landscape. This approach to HRM, as an integrated discipline, is grounded in international HRM principles and standards that has allowed me to provide comprehensive,

project-specific solutions that promote ethical heritage management and assist in achieving the strategic objectives of our clients, as well as maintain or enhance Cultural Significance of the relevant cultural heritage resources.

5 Project Experience

Please see the following table for relevant Project experience:

PROJECT	LOCATION	DATES		PROJECT TYPE		CLIENT
Kibali Kalimva & Ikamva Pit ESIA	Orientele Province, Democratic Republic of Congo	2019	2019	Heritage Assessment	Impact	Barrick Gold Corporation
Ergo City Deep HSMP	Johannesburg, Gauteng, South Africa	2019	2019	Heritage Management Plan	Site	Ergo (Pty) Ltd
Ergo RTSF Section 34 Process	Westonaria, Gauteng, South Africa	2019	-	Section 34 Destruction Applications	Permit	Ergo (Pty) Ltd
Twyfelaar EIA	Ermelo, Mpumalanga, South Africa	2019	2019	Heritage Assessment	Impact	Dagsoom Coal Mining (Pty) Ltd
Sasol River Diversion	Sasolburg, Free State, South Africa	2019	2019	Heritage Assessment	Impact	Sasol Mining
Sun City EIA and CMP	Pilanesberg, North-West Province, South Africa	2018	2019	Heritage Assessment and Conservation Management Plan	Impact	Sun International
Exxaro Matla HRM	Kriel, Mpumalanga, South Africa	2017	2019	Heritage Assessment and Conservation Management Plan	Impact	Exxaro Coal Mpumalanga (Pty) Ltd
Exxaro Belfast GRP	Belfast, Mpumalanga, South Africa	2013	-	Grave Relocation		Exxaro Coal Mpumalanga (Pty) Ltd
Eskom Northern Strengthening	KZN KwaZulu-Natal, South Africa	2016	2018	Heritage Assessment	Impact	ILISO Consulting
Thabametsi GRP	Lephalale, Limpopo Province, South Africa	2017	2018	Grave Relocation		Exxaro Resources Ltd

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
SKA HIA and CMP	Carnarvon, Northern Cape, South Africa	2017	2018	Heritage Impact Assessment and Conservation Management Plan	SARAO
Grootegeeluk Watching Brief	Lephalale, Limpopo Province, South Africa	2017	2017	Watching Brief	Exxaro Resources Ltd
Matla HSMP	Kriel, Mpumalanga Province, South Africa	2017	2017	Heritage Site Management Plan	Exxaro Coal Mpumalanga (Pty) Ltd
Ledjadja Coal Borrow Pits	Lephalale, Limpopo Province, South Africa	2017	2017	Heritage Basic Assessment	Ledjadja Coal (Pty) Ltd
Exxaro Belfast Implementation Project PIA	Belfast, Mpumalanga, South Africa	2017	2017	Palaeontological Impact Assessment	Exxaro Coal Mpumalanga (Pty) Ltd
Lanxess Chrome Mine Archaeological Mitigation	Rustenburg, North West Province, South Africa	2017	2017	Phase 2 Excavations	Lanxess Chrome Mine (Pty) Ltd
Tharisa Apollo EIA Project	KwaZulu- Natal, South Africa	2017	2017	Heritage Impact Assessment	GCS (Pty) Ltd
Queen Street Section 34 Process	Germiston, Johannesburg, Gauteng, South Africa	2017	2017	Section 34 Destruction Permit Applications	IDC Architects
Goulamina EIA Project	Goulamina, Sikasso Region, Mali	2017	2017	Heritage Impact Assessment	Birimian Limited
Zuurfontein Residential Establishment Project	Ekurhuleni, Gauteng, South Africa	2017	2017	Notification of Intent to Develop	Shuma Africa Projects
Kibali Grave Relocation Training and Implementation	Orientele Province, Democratic Republic of Congo	2017	2017	Grave Relocation	Randgold Resources Limited
Massawa EIA	Senegal	2016	2017	Heritage Impact Assessment and Technical Reviewer	Randgold Resources Limited



PROJECT	LOCATION	DATES	PROJECT TYPE	CLIENT
Beatrix EIA and EMP	Welkom, Free State, South Africa	2016 2017	Heritage Impact Assessment	Sibanye Stillwater
Sun City Chair Lift	Pilanesberg, North-West Province, South Africa	2016 2017	Notification of Intent to Develop and Heritage Basic Assessment	Sun International
Hendrina Underground Coal Mine EIA	Hendrina, Mpumalanga, South Africa	2016 2017	Heritage Impact Assessment	Umcebo Mining (Pty) Ltd
Elandsfontein Update	EMP Clewer, Mpumalanga, South Africa	2016 2017	Heritage Impact Assessment	Anker Coal
Groningen and Inhambane PRA	Limpopo Province, South Africa	2016 2016	Heritage Basic Assessment	Rustenburg Platinum Mines Limited
Palmietkuilen MRA	Springs, Gauteng, South Africa	2016 2016	Heritage Impact Assessment	Canyon Resources (Pty) Ltd
Copper Sunset Sand Mining S.102	Free State, South Africa	2016 2016	Heritage Basic Assessment	Copper Sunset Sand (Pty) Ltd
Grootvlei MRA	Springs, Gauteng, South Africa	2016 2016	Notification of Intent to Develop	Ergo (Pty) Ltd
Lambda EMP	Mpumalanga, South Africa	2016 2016	Palaeontological Impact Assessment	Eskom Holdings SOC Limited
Kilbarchan Basic Assessment and EMP	Newcastle, KwaZulu-Natal, South Africa	2016 2016	Heritage Basic Assessment	Eskom Holdings SOC Limited
Grootegeeluk Amendment	Lephalale, Limpopo Province, South Africa	2016 2016	Notification of Intent to Develop	Exxaro Coal Resources (Pty) Ltd
Garsfontein Township Development	Pretoria, Gauteng, South Africa	2016 2016	Notification of Intent to Develop	Leungo Construction Enterprises
Louis Botha Phase 2	Johannesburg, Gauteng, South Africa	2016 2016	Phase 2 Excavations	Royal Haskoning DHV
Sun City Heritage Mapping	Pilanesberg, North-West	2016 2016	Phase 2 Mapping	Sun International

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT	
	Province, South Africa					
Gino's Building Section 34 Destruction Permit Application	Johannesburg, Gauteng, South Africa	2015	2016	Heritage Assessment Section 34 Destruction Application	Impact and 34 Permit	Bigen Africa Services (Pty) Ltd
EDC Block Refurbishment Project	Johannesburg, Gauteng, South Africa	2015	2016	Heritage Assessment Section 34 Application	Impact and Permit	Bigen Africa Services (Pty) Ltd
Namane IPP and Transmission Line EIA	Steenbokpan, Limpopo Province, South Africa	2015	2016	Heritage Assessment	Impact	Namane Resources (Pty) Ltd
Temo Coal Road Diversion and Rail Loop EIA	Steenbokpan, Limpopo Province, South Africa	2015	2016	Heritage Assessment	Impact	Namane Resources (Pty) Ltd
Sibanye WRTRP	Gauteng, South Africa	2014	2016	Heritage Assessment	Impact	Sibanye Stillwater
NTEM Iron Ore Mine and Pipeline Project	Cameroon	2014	2016	Technical Review		IMIC plc
NLGM Constructed Wetlands Project	Liberia	2015	2015	Heritage Assessment	Impact	Aureus Mining
ERPM Section 34 Destruction Permits Applications	Johannesburg, Gauteng, South Africa	2015	2015	Section 34 Destruction Applications	34 Permit	Ergo (Pty) Ltd
JMEP II EIA	Botswana	2015	2015	Heritage Assessment	Impact	Jindal
Oakleaf ESIA Project	Bronkhorstspuit, Gauteng, South Africa	2014	2015	Heritage Assessment	Impact	Oakleaf Investment Holdings
Invula Project	Kriel, Mpumalanga, South Africa	2014	2015	Heritage Assessment	Impact	Ixia Coal
VMIC Vanadium EIA Project	Mokopane, Limpopo, South Africa	2014	2015	Heritage Assessment	Impact	VM Investment Company
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012	2015	Heritage Assessment	Impact	Aquarius Resources

PROJECT	LOCATION	DATES	PROJECT TYPE	CLIENT
Nzoro 2 Hydro Power Project	Orientele Province, Democratic Republic of Congo	2014 2014	Social consultation	Randgold Resources Limited
Eastern Basin AMD Project	Springs, Gauteng, South Africa	2014 2014	Heritage Assessment Impact	AECOM
Soweto Cluster Reclamation Project	Soweto, Gauteng, South Africa	2014 2014	Heritage Assessment Impact	Ergo (Pty) Ltd
Klipspruit South Project	Ogies, Mpumalanga, South Africa	2014 2014	Heritage Assessment Impact	BHP Billiton
Klipspruit Extension: Weltevreden Project	Ogies, Mpumalanga, South Africa	2014 2014	Heritage Assessment Impact	BHP Billiton
Ergo Pipeline Assessment	Rondebult Basic Johannesburg, South Africa	2014 2014	Heritage Assessment Basic	Ergo (Pty) Ltd
Kibali ESIA Update Project	Orientele Province, Democratic Republic of Congo	2014 2014	Heritage Assessment Impact	Randgold Resources Limited
GoldOne Consolidation	EMP Westonaria, Gauteng, South Africa	2014 2014	Gap analysis	Gold One International
Yzermite PIA	Wakkerstroom, Mpumalanga, South Africa	2014 2014	Palaeontological Impact Assessment	EcoPartners
Sasol Mooikraal Basic Assessment	Sasolburg, Free State, South Africa	2014 2014	Heritage Assessment Basic	Sasol Mining
Rea Vaya Phase II C Project	Johannesburg, Gauteng, South Africa	2014 2014	Heritage Assessment Impact	ILISO Consulting
New Liberty Gold Project	Liberia	2013 2014	Grave Relocation	Aureus Mining
Putu Iron Ore Mine Project	Petroken, Liberia	2013 2014	Heritage Assessment Impact	Atkins Limited

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
Sasol Twistdraai Project	Secunda, Mpumalanga, South Africa	2013	2014	Notification of Intent to Develop	ERM Southern Africa
Kibali Gold Hydro- Power Project	Orientele Province, Democratic Republic of Congo	2012	2014	Heritage Impact Assessment	Randgold Resources Limited
SEGA Gold Mining Project	Burkina Faso	2013	2013	Technical Reviewer	Cluff Gold PLC
Consbrey and Harwar Collieries Project	Breyton, Mpumalanga, South Africa	2013	2013	Heritage Impact Assessment	Msobo Coal
Falea Uranium Mine Environmental Assessment	Falea, Mali	2013	2013	Heritage Scoping	Rockgate Capital
Daleside Acetylene Gas Production Facility	Gauteng, South Africa	2013	2013	Heritage Impact Assessment	ERM Southern Africa
SEGA Gold Mining Project	Burkina Faso	2012	2013	Socio Economic and Asset Survey	Cluff Gold PLC
Kibali Gold Project Grave Relocation Plan	Orientele Province, Democratic Republic of Congo	2011	2013	Grave Relocation	Randgold Resources Limited
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012	2012	Heritage Impact Assessment	Aquarius Resources
Environmental Authorisation for the Gold One Geluksdal TSF and Pipeline	Gauteng, South Africa	2012	2012	Heritage Impact Assessment	Gold One International
Platreef Burial Grounds and Graves Survey	Mokopane, Limpopo Province, South Africa	2012	2012	Burial Grounds and Graves Survey	Platreef Resources
Resgen Boikarabelo Coal Mine	Limpopo Province, South Africa	2012	2012	Phase 2 Excavations	Resources Generation
Bokoni Platinum Road Watching Brief	Burgersfort, Limpopo Province, South Africa	2012	2012	Watching Brief	Bokoni Platinum Mine

PROJECT	LOCATION	DATES	PROJECT TYPE	CLIENT	
Transnet NMPP Line	Kwa-Zulu Natal, South Africa	2010	2010	Heritage survey	Umlando Consultants
Archaeological Impact Assessment – Witpoortjie Project	Johannesburg, Gauteng, South Africa	2010	2010	Archaeological Impact Assessment	ARM
Der Brochen Archaeological Excavations	Steelpoort, Mpumalanga, South Africa	2010	2010	Phase 2 Excavations	Heritage Contracts Unit
De Brochen and Booyesdal Archaeology Project	Steelpoort, Mpumalanga, South Africa	2010	2010	Site Mapping	Recording: Heritage Contracts Unit
Eskom Thohoyandou Electricity Network	Limpopo Province, South Africa	2010	2010	Heritage Statement	Strategic Environmental Focus
Bathhako Mine Expansion	North-West Province, South Africa	2010	2010	Phase 2 Mapping	Heritage Contracts Unit
Wenzelrust Excavations	Shoshanguve, Gauteng, South Africa	2009	2009	Phase 2 Excavations	Heritage Contracts Unit
University of the Witwatersrand Parys LIA Shelter Project	Parys, Free State, South Africa	2009	2009	Phase 2 Mapping	University of the Witwatersrand
Archaeological Assessment of Modderfontein Holdings	Johannesburg, Gauteng, South Africa	2008	2008	Heritage Assessment	Basic ARM
Heritage Assessment of Rhino Mines	Thabazimbi, Limpopo Province, South Africa	2008	2008	Heritage Assessment	Impact Rhino Mines
Cronimet Project	Thabazimbi, Limpopo Province, South Africa	2008	2008	Archaeological surveys	Cronimet
Eskom Thohoyandou SEA Project	Limpopo Province, South Africa	2008	2008	Heritage Statement	Eskom
Witbank Dam Archaeological Assessment	Witbank, Mpumalanga, South Africa	2007	2007	Archaeological survey	ARM

PROJECT	LOCATION	DATES	PROJECT TYPE	CLIENT
Sun City Archaeological Site Mapping	Sun City, Pilanesberg, North West Province, South Africa	2006 2006	Site Mapping Recording:	Sun International
Klipriviersberg Archaeological Survey	Meyersdal, Gauteng, South Africa	2005 2006	Archaeological surveys	ARM

6 Professional Registrations

Position	Professional Body	Registration Number
Member	Association for Southern African Professional Archaeologists (ASAPA); ASAPA Cultural Resources Management (CRM) section	270
Member	International Council on Monuments and Sites (ICOMOS)	14274
Member	Society for Africanist Archaeologists (SAfA)	N/A
Member	International Association of Impact Assessors (IAIA) South Africa	5494

7 Publications

Huffman, T.N. & du Piesanie, J.J. 2011. Khami and the Venda in the Mapungubwe Landscape. *Journal of African Archaeology* 9(2): 189-206

du Piesanie, J.J., 2017. Book Review: African Cultural Heritage Conservation and Management. *South African Archaeological Bulletin* 72(205)

Heritage Impact Assessment

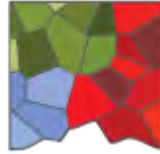
Integrated Environmental Authorisation Process for the Proposed Dagsoom Twyfelaar Coal Mining Project near Ermelo, Mpumalanga

DAG5603



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Appendix B: HRM Methodology



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Cultural Significance, Field Rating and Impact Assessment

Methodology Statement

Project Number:

ZZZ9999

Prepared for:

Internal Document

June 2019

Digby Wells and Associates (South Africa) (Pty) Ltd
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This document has been prepared by Digby Wells Environmental.

Report Type:	Methodology Statement
Project Name:	Cultural Significance, Field Rating and Impact Assessment
Project Code:	ZZZ9999

Revision History

Name	Responsibility	Version	Date
Johan Nel ASAPA Member 095	HRM Unit Manager	Ver. 1	May 2014
		Ver. 2	October 2014
		Ver. 3	May 2015
Justin du Piesanie ASAPA Member 270	Divisional Manager: Social and Heritage Services	Ver. 4	January 2016
		Ver. 5	June 2016
		Ver. 6	June 2019

This report is provided solely for the purposes set out in it and may not, in whole or in part, be used for any other purpose without Digby Wells Environmental prior written consent.

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1 Introduction

Cultural heritage resources are intrinsic to the history and beliefs of communities. They characterise community identity and cultures, are finite, non-renewable and irreplaceable. Considering the innate value of cultural heritage resources, Heritage Resources Management (HRM) acknowledges that these have lasting worth as evidence of the origins of life, humanity and society. It is incumbent of the assessor to determine the cultural significance¹ (CS) of cultural heritage resources to allow for the implementation of appropriate management. This is achieved through assessing cultural heritage resources' value relative to certain prescribed criteria encapsulated in policies and legal frameworks, such as the South African National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

Commensurate to the NHRA, with specific reference to Section 38, this methodology aims to ensure that clients protect cultural heritage during implementation of project activities by either avoiding, removing or reducing the intensity of adverse impacts to tangible² and intangible³ cultural heritage resources within the defined area of influence.

The methodology to define CS and assess the potential effects of a project is discussed separately in the sections below.

2 Evaluation of Cultural Significance and Field Ratings

2.1 Cultural Significance Determination

Digby Wells developed a CS Determination Methodology to assign identified cultural heritage resources with a numerical CS rating in an objective as possible way and that can be independently reproduced provided that the same information sources are used, should this be required.

This methodology determines the intrinsic, comparative and contextual significance of identified cultural heritage resources by considering their:

1. Importance rated on a six-point scale against four criteria; and
2. Physical integrity rated on a five-point scale.

¹ Cultural significance is defined as the intrinsic "aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance" of a cultural heritage resource. These attributes are combined and reduced to four themes used in the Digby Wells significance matrix: aesthetic, historical, scientific and social.

² (i) Moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls.

³ Cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

The assigned ratings consider information obtained through a review of available credible sources and representativity or uniqueness (i.e. known examples of similar resources to exist), as well as the current preservation *status-quo* as observed.

Figure 2-2 depicts the CS formula and importance criteria, and it describes ratings on the importance physical integrity scales

2.2 Field Rating Determination

Grading of heritage resources remains the responsibility of heritage resources authorities. However, the South African Heritage Resources Agency (SAHRA) Minimum Standards requires heritage reports include Field Ratings for identified resources to comply with section 38 of the NHRA. Section 7 of the NHRA provides for a system of grading of heritage resources that form part of the national estate and distinguishes between three categories.

The field rating process is designed to provide a numerical rating of the recommended grading of identified heritage resources. The evaluation is done as objectively as possible by integrating the field rating into the significance matrix.

Field ratings guide decision-making in terms of appropriate minimum required mitigation measures and consequent management responsibilities in accordance with Section 8 of the NHRA. Figure 2-1 presents the formula and the parameters used to determine the Field Ratings.

Field Rating = Average Sum of Aesthetic + Historic + Scientific + Social			
rated against			
Value	Field Rating	Designation	Authority
0	Resource not assessed	None	None
1	Resources afforded general protection in terms of Sections 34 to 37 of the NHRA and with negligible significance	Grade IV C	Local
2	Resources afforded general protection in terms of Sections 34 to 37 of the NHRA and with low significance	Grade IV B	
3	Resources afforded general protection in terms of Sections 34 to 37 of the NHRA and with medium-high significance	Grade IV A	
4	Resources afforded general protection in terms of Sections 34 to 37 of the NHRA and with high significance	Grade III B	
5	Resources afforded general protection in terms of Sections 34 to 37 of the NHRA and with very high significance	Grade II A	
6	Resources under formal protection that can be considered to have special qualities that make them significant within a province or region	Grade II	Provincial
7	Resources under formal protection that can be considered to have special qualities that make them significant within a national or international context	Grade I	National

Figure 2-1: Field Ratings Methodology

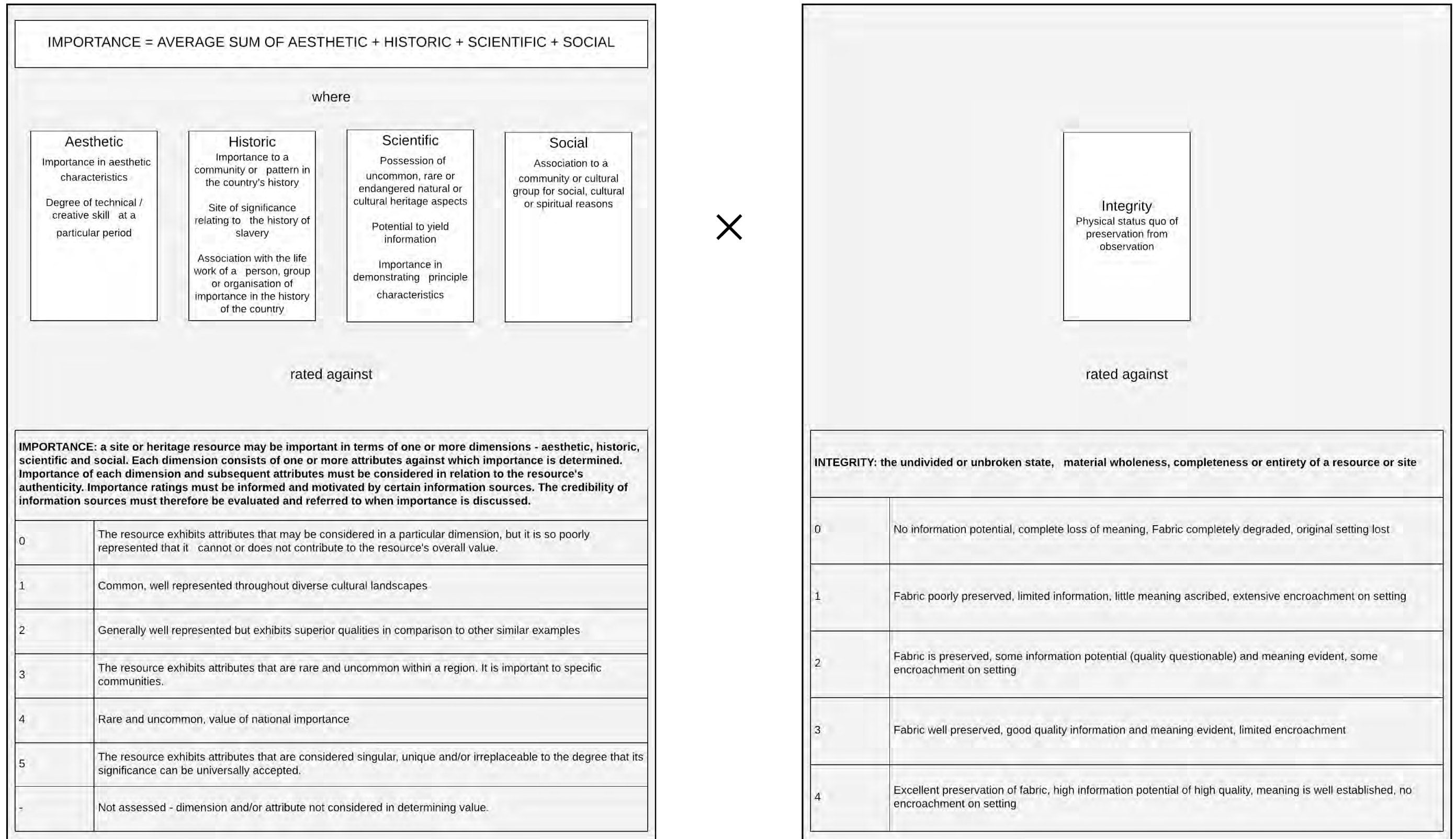


Figure 2-2: CS Determination Methodology

3 Impact Assessment Methodology

The rationale behind CS determination recognises that the value of a cultural heritage resource is a direct indication of its sensitivity to change (impacts) as well as the maximum acceptable levels of change to the resource. Therefore, the assessor must determine CS prior to the completion of any impact assessment.

These requirements in terms of international best practice standards are integrated into the impact assessment methodology to guide both assessments of impacts and recommendations for mitigation and management of resources.

The following are terms and definitions applicable to the Environmental Impact Assessment (EIA) concept (ISO 14001):

- **Project Activity:** Activities associated with the Project that result in an environmental interaction during various phases, i.e. construction, operation and decommissioning, e.g., new processing plant, new stockpiles, development of open pit, dewatering, water treatment plant;
- **Environmental Interaction:** An element or characteristic of an activity, product, or service that interacts or can interact with the environment. Environmental interactions can cause environmental impacts (but may not necessarily do so). They can have either beneficial impacts or adverse impacts and can have a direct and decisive impact on the environment or contribute only partially or indirectly to a larger environmental change;
- **Environmental Aspect:** Various natural and human environments that an activity may interact with. These environments extend from within the activity itself to the global system, and include air, water, land, flora, fauna (including people) and natural resources of all kinds; and
- **Environmental Impact:** A change to the environment that is caused either partly or entirely by one or more environmental interactions. An environmental interaction can have either a direct and decisive impact on the environment or contribute only partially or indirectly to a larger environmental change. In addition, it can have either a beneficial environmental impact or an adverse environmental impact.

The assessment process identified potential issues and impacts through examination of:

- Project phases and activities,
- Interactions between activities and the environmental aspect; and
- The interdependencies between environmental aspects.

Figure 3-1 presents a graphical summary of this concept and Figure 3-2 provides an example of the process.

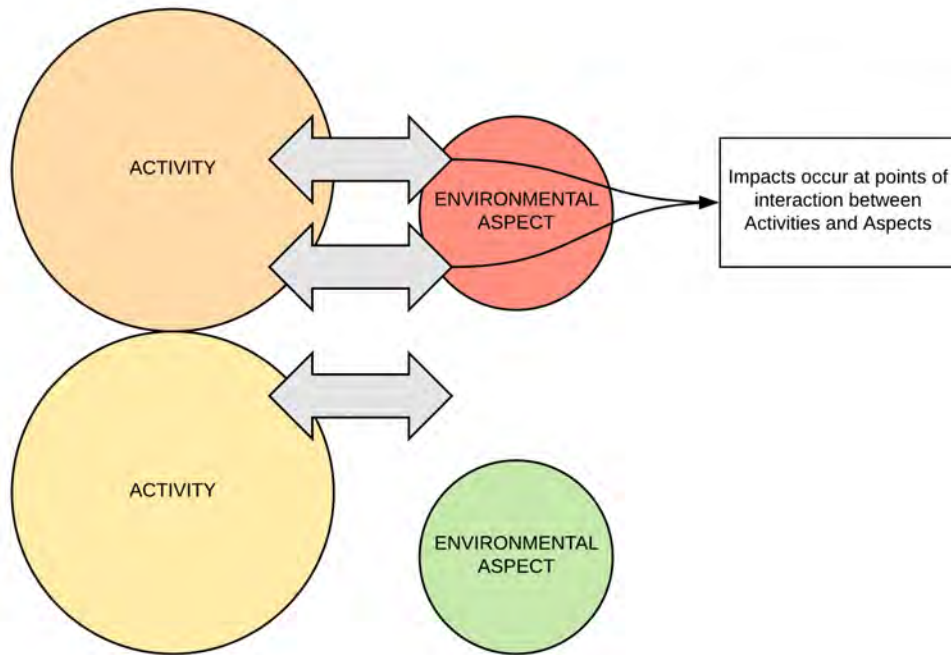


Figure 3-1: Graphical Representation of Impact Assessment Concept

Project Activity & Interaction		Environmental Aspect		Potential Environmental Impact	
Project Phase	Activity	Aspect	Interdependencies	Issue	Potential Impact
This relates to the consideration of the relevant phase of the project. Example: Construction	This refers to one or more of the activities that will be undertaken during the corresponding phase of the project. Example: Topsoil clearing	This identifies and considers the various aspects that will be affected by the project activity. Example: Heritage, Biophysical, and Social	This identifies and considers the interdependencies between the various aspects and how they may be impacted upon by the relevant activity. Example: Removal of topsoil will impact on flora which may have heritage and social implications	The issues considers the activity in relation to the identified aspects and interdependencies. Note: Activities and Aspects can have several issues resulting in various impacts. Example: Physical alteration of the land	Potential impacts are a culmination of the various categories evaluated as part of the impact assessment. Example: Topsoil clearing will remove medicinal plants that will erode indigenous knowledge systems and cultural significance.

Figure 3-2: Example of how Potential Impacts are considered



3.1 Categorising Impacts to Cultural Heritage

Impacts may manifest differently among geographical areas and diverse communities. For instance, impacts to cultural heritage resources can simultaneously affect the tangible cultural heritage resource and have social repercussions. The severity of the impact is compounded when the intensity of physical impacts and social repercussions differ significantly, e.g. removal of a grave surface dressings results in a minor physical impact but has a significant social impact. In addition, impacts to cultural heritage resources can influence the determined CS without a physical impact taking place. Given this reasoning, impacts as considered here are generally placed into three broad categories (adapted from Winter & Bauman 2005: 36):

- **Direct or primary impacts** affect the fabric or physical integrity of the cultural heritage resource, for example destruction of an archaeological site or historical building. Direct or primary impacts may be the most immediate and noticeable. Such impacts are usually ranked as the most intense, but can often be erroneously assessed as high-ranking. For example, the destruction of a low-density scatter of archaeological material culture may be assessed as a negatively high impact if CS is not considered;
- **Indirect, induced or secondary impacts** can occur later in time or at a different place from the causal activity, or because of a complex pathway. For example, restricted access to a cultural heritage resource resulting in the gradual erosion of its CS that may be dependent on ritual patterns of access. Although the physical fabric of the cultural heritage resource is not affected through any primary impact, its CS is affected, which can ultimately result in the loss of the resource itself; and
- **Cumulative impacts** result from in-combination effects on cultural heritage resources acting within a host of processes that are insignificant when seen in isolation, but which collectively have a significant effect. Cumulative effects can be:
 - **Additive:** the simple sum of all the effects, e.g. the total number of development activities that will occur within the study area;
 - **Synergistic:** effects interact to produce a total effect greater than the sum of the individual effects, e.g. the effect of each different activity on the archaeological landscape in the study area;
 - **Time crowding:** frequent, repetitive impacts on a cultural heritage resource at the same time, e.g. the effect of regular blasting activities on a nearby rock art site or protected historical building;
 - **Neutralizing:** where the effects may counteract each other to reduce the overall effect, e.g. the effect of changes in land use could reduce the overall impact on sites within the archaeological landscape of the study area; and/or

- **Space crowding:** high spatial density of impacts on a cultural heritage resource, e.g. density of new buildings resulting in suburbanisation of a historical rural landscape.

The fact that cultural heritage resources do not exist in isolation from the wider natural, social, cultural and heritage landscape demonstrates the relevance of the above distinctions: CS is therefore also linked to rarity / uniqueness, physical integrity and importance to diverse communities.

3.2 Impact Assessment

The impact assessment process is designed to provide a numerical rating of the identified potential impacts. This methodology follows the established impact assessment formula:

Impact = consequence of an event x probability of the event occurring

where:

Consequence = type of impact x (Duration + Extent + Intensity)

and

Probability = Likelihood of an impact occurring

In the formula for calculating consequence:

Type of impact = +1 (positive) or -1 (negative)

Table 3-1 presents a description of the duration, extent, intensity and probability ratings. The intensity rating definitions consider the determined CS of the identified cultural heritage resources. These criteria are used to determine the impact ratings as defined in Table 3-2 below. Table 3-3 represents the relationship between consequence, probability and significance.

The impact assessment process considers pre- and post-mitigation scenarios with the intention of managing and/or mitigating impacts in line with the EIA Mitigation Hierarchy, i.e. avoiding all impacts on cultural heritage resources. Where Project-related mitigation does not avoid or sufficiently minimise negative impacts on cultural heritage resources, mitigation of these resources may be required.

Table 3-1: Description of Duration, Extent, Intensity and Probability Ratings Used in the Impact Assessment

Value	CONSEQUENCE						PROBABILITY RATING - A measure of the chance that consequences of that selected level of severity could occur during the exposure window.	
	DURATION RATING - A measure of the lifespan of the impact		EXTENT RATING A measure of how wide the impact would occur		INTENSITY RATING- A measure of the degree of harm, injury or loss.		Probability	Description
	Probability	Description	Exposure	Description	Intensity	Description		
7	Permanent	Impact will permanently alter or change the heritage resource and/or value (Complete loss of information)	International	Impacts on heritage resources will have international repercussions, issues or effects, i.e. in context of international cultural significance, legislation, associations, etc.	Extremely high	Major change to Heritage Resource with High-Very High Value	Certain/Definite	Happens frequently. The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Beyond Project Life	Impact will reduce over time after project life (Mainly renewable resources and indirect impacts)	National	Impacts on heritage resources will have national repercussions, issues or effects, i.e. in context of national cultural significance, legislation, associations, etc.	Very high	Moderate change to Heritage Resource with High-Very High Value	High probability	Happens often. It is most likely that the impact will occur.
5	Project Life	The impact will cease after project life.	Region	Impacts on heritage resources will have provincial repercussions, issues or effects, i.e. in context of provincial cultural significance, legislation, associations, etc.	High	Minor change to Heritage Resource with High-Very High Value	Likely	Could easily happen. The impact may occur.
4	Long Term	Impact will remain for >50% - Project Life	Municipal area	Impacts on heritage resources will have regional repercussions, issues or effects, i.e. in context of the regional study area.	Moderately high	Major change to Heritage Resource with Medium-Medium High Value	Probable	Could happen. Has occurred here or elsewhere
3	Medium Term	Impact will remain for >10% - 50% of Project Life	Local	Impacts on heritage resources will have local repercussions, issues or effects, i.e. in context of the local study area.	Moderate	Moderate change to Heritage Resource with Medium - Medium High Value	Unlikely / Low probability	Has not happened yet, but could happen once in a lifetime of the project. There is a possibility that the impact will occur.

Value	CONSEQUENCE						PROBABILITY RATING - A measure of the chance that consequences of that selected level of severity could occur during the exposure window.	
	DURATION RATING - A measure of the lifespan of the impact		EXTENT RATING A measure of how wide the impact would occur		INTENSITY RATING- A measure of the degree of harm, injury or loss.		Probability	Description
	Probability	Description	Exposure	Description	Intensity	Description		
2	Short Term	Impact will remain for <10% of Project Life	Limited	Impacts on heritage resources will have site specific repercussions, issues or effects, i.e. in context of the site-specific study area.	Low	Minor change to Heritage Resource with Medium - Medium High Value	Rare / Improbable	Conceivable, but only in extreme circumstances. Have not happened during the lifetime of the project, but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Transient	Impact may be sporadic/limited duration and can occur at any time. E.g. Only during specific times of operation, and not affecting heritage value.	Very Limited	Impacts on heritage resources will be limited to the identified resource and its immediate surroundings, i.e. in context of the specific heritage site.	Very low	No change to Heritage Resource with values medium or higher, or Any change to Heritage Resource with Low Value	Highly Unlikely /None	Expected never to happen. Impact will not occur.

Table 3-2: Impact Significance Scores, Descriptions and Ratings

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	Major (positive)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the heritage resources.	Moderate (positive)
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the heritage resources.	Minor (positive)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the heritage resources.	Negligible (positive)
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the heritage resources.	Negligible (negative)
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the heritage resources.	Minor (negative)
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the heritage resources and result in severe effects.	Moderate (negative)
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects.	Major (negative)

Table 3-3 Relationship between Consequence, Probability and Significance

Relationship between consequence, probability and significance ratings																																							
		Significance																																					
Probability	7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
	6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
	5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
	4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
	3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
	2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Consequence																																					

4 Recommended Management and Mitigation Measures

The CS of an identified heritage resource informs the level of the identified potential impact to that resource which in turn informs the recommended management and mitigation requirements. Table 4-1 presents an overview of the minimum recommended mitigation requirements considering the CS of the heritage resource.

Table 4-1: Minimum Recommended Management or Mitigation Requirements Considering CS

Determined CS	Minimum Management / Mitigation Requirements ⁴
Negligible	Sufficiently recorded through assessment, no mitigation required
Low	Resource must be recorded before destruction, may include detailed mapping or surface sampling
Medium	Mitigation of the resource to include detailed recording and limited test excavations
Medium-High	Project design must aim to minimise impacts; Mitigation of resources to include extensive sampling through test excavations and analysis
High	Project design must aim to avoid impacts; Cultural heritage resource to be partially conserved, must be managed by way of Conservation Management Plan
Very High	Project design must be amended to avoid all impacts; Cultural heritage resources to be conserved in entirety and conserved and managed by way of Conservation Management Plan

The desired outcome of an impact assessment is the avoidance of all negative impacts and enhancement of positive ones. While this is not always possible, the recommended management or mitigation measures must be reasonable and feasible taking into consideration the determined CS and nature of the Project.

Two categories of impact management options are considered: avoidance and mitigation.

Avoidance requires changes or amendments to Project design, planning and siting of infrastructure to avoid physical impacts on heritage resources. It is the preferred option, especially where cultural heritage resources with high – very-high CS will be impacted.

⁴ Based on minimum requirements encapsulated in guidelines developed by SAHRA



Mitigation of cultural heritage resources may be necessary where avoidance is not possible, thus resulting in partial or complete changes (including destruction) to a resource. Such resources need to be protected until they are fully recorded, documented and researched before any negative impact occurs. Options for mitigating a negative impact can include minimization, offsets, and compensation. Examples of mitigation measures specific to cultural heritage include:

- Intensive detailed recording of sites through various non-intrusive techniques to create a documentary record of the site – “preservation by record”; and
- Intrusive recording and sampling such as shovel test pits (STPs) and excavations, relocation (usually burial grounds and graves, but certain types of sites may be relocated), restoration and alteration. Any form of intrusive mitigation is normally a regulated permitted activity for which permits⁵ need to be issued by the Heritage Resource Authorities (HRAs). Such mitigation may result in a reassessment of the value of a cultural heritage resource that could require conservation measures to be implemented. Alternatively, an application for a destruction permit may be made if the resource has been sufficiently sampled.

Where resources have negligible CS, the specialist may recommend that no further mitigation is required, and the site may be destroyed where authorised.

Community consultation is an integral activity to all above-mentioned avoidance and mitigation measures.

⁵ Permit application processes must comply with the relevant Section of the NHRA and applicable Chapter(s) of the NHRA Regulations, 2000 (Government Notice Regulation [GN R] 548) and must be issued by SAHRA or the Provincial Heritage Resources Authority (PHRA) as is applicable.