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## Basic Assessment Process for the Closure of the Cooke Underground Operations

### Heritage Impact Assessment

**Prepared for:**

Sibanye Gold Limited

**Project Number:**



SIB6297

October 2020



This document has been prepared by Digby Wells Environmental.

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- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
  - I declare that there are no circumstances that may compromise my objectivity in performing such work;
  - I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



06/10/2020

*Signature of the Specialist*

*Date*

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## EXECUTIVE SUMMARY

Sibanye Gold Ltd (a subsidiary of Sibanye-Stillwater and hereinafter Sibanye) are the owners of Rand Uranium (Pty) Ltd (Rand Uranium), the operator of the Cooke Underground Operations. Sibanye appointed Digby Wells Environmental (hereinafter Digby Wells) to complete the environmental regulatory process in support of the decommissioning, rehabilitation and ultimate closure of the Cooke 3, 2 and 1 Shafts (the Project). The Project includes the cessation of underground water pumping and the discharge of mine water, the removal of shaft infrastructure and rehabilitation of wetlands in proximity to surface operations.

A Basic Assessment (BA) process has been undertaken in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R326 of 7 April 2017), as amended, promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The required closure and rehabilitation studies included a Heritage Resources Management (HRM) process in support of the BA process and in compliance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and Appendix 1: Basic Assessment Process Section 2(d) and 3(1)(h)(iv) and (vii) of the NEMA EIA Regulations 2014. This report constitutes the Heritage Impact Assessment (HIA) report to identify and quantify positive and negative impacts on the cultural heritage landscape as a result of the Project.

The aim of the HRM process was to comply with the regulatory requirements encapsulated in Section 38(3) of the NHRA. Digby Wells completed the following activities as part of the Heritage Impact Assessment (HIA) process:

- 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 five heritage resources, all burial grounds and graves. Based on the understanding of the Project and given the location of the heritage resources in relation to the Project infrastructure, Digby Wells envisages no direct or indirect impacts against cultural heritage resources identified during the pre-disturbance survey.

As noted in the existing Environmental Management Program (Shangoni Management Services (Pty) Ltd, 2008), the three Cooke shafts came into operation during the late 1970s. It is therefore unlikely<sup>1</sup> that the Project will impact heritage resources afforded general protection under Section 34 of the NHRA. Sibanye must develop a Chance Find Protocol (CFP) which must be implemented prior to the commencement of the Project and submit this to the HRA for noting.

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

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<sup>1</sup> Should any structures be older than 60 years at the time of alteration or demolition, these structures will be subject to a Section 34 permit application process.

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## ACRONYMS, ABBREVIATIONS AND DEFINITION

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

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

### NHRA and GN R 326 Appendix 6 Legislated Requirements

Description	App. 6	NHRA	Section
Declaration that the report author(s) is (are) independent.	1(b)	-	Page ii
An indication of the scope of, and the purpose for which, the report was prepared.	1(c)	-	Section 2
Details of the person who prepared the report and their expertise to carry out the specialist study.	1(a)	-	Page ii
Outlines the legislative framework relevant to the specialist heritage study.	-	-	Section 3
Identifies the specific constraints and limitations of the HIA, including any assumptions made and any uncertainties or gaps in knowledge.	1(i)	-	Section 4
Describes the methodology employed in the compilation of this HIA.	1(e)	-	Section 5
An indication of the quality and age of base data used for the specialist report.	1(cA)	-	Section 5.4
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment.	1(d)	-	Section 5.5
Provides the baseline cultural landscape.	-	38(3)(a)	Section 6.1
Motivates for the defined CS of the identified heritage resources and landscape.	-	38(3)(b)	Section 7.1
A description of the potential impacts to heritage resources by project related activities, including: <ul style="list-style-type: none"> <li>- Existing impacts on the site;</li> <li>- Possible risks to heritage resources;</li> <li>- Cumulative impacts of the proposed development;</li> <li>- Acceptable levels of change; and</li> <li>- Heritage-related risks to the project.</li> </ul>	1(cB)	38(3)(c)-	Section 6.4
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	1(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.	1(f)	-	

Description	App. 6	NHRA	Section
Considers the development context to assess the socio-economic benefits of the project in relation to the presented impacts and risks.	-	38(3)(d)	Section 6.4
A description of any consultation process that was undertaken during the course of preparing the specialist report and the results of such consultation.	1(o)	38(3)(e)	Section 10
A summary and copies of any comments received during any consultation process and where applicable all responses thereto.	1(p)	38(3)(e)	
Details the specific recommendations based on the contents of the HIA.	-	38(3)(g)	Section 11
An identification of any areas to be avoided, including buffers.	1(g)		
Any mitigation measures for inclusion in the Environmental Management Programme (EMPr)	1(k)		
Any conditions for inclusion in the environmental authorisation.	1(l)		
Any monitoring requirements for inclusion in the EMPr or environmental authorisation.	1(m)	38(3)(g)	Section 12
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	1(n)		
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)	Section 13
Lists the source material used in the development of the report.	1(cA)	-	Sections 5.4 & 14
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	1(h)	-	Plan 1

Description	App. 6	NHRA	Section
Any other information requested by the competent authority.	1(q)	-	-

## 1 Introduction

Sibanye Gold Ltd (a subsidiary of Sibanye Stillwater Ltd and hereinafter Sibanye) are the owners of Rand Uranium (Pty) Ltd (Rand Uranium), the operator of the Cooke Underground Operations. Sibanye appointed Digby Wells Environmental (hereinafter Digby Wells) to complete the environmental regulatory process in support of the decommissioning, rehabilitation and ultimate closure of the Cooke 3, 2 and 1 Shafts (the Project).

A Basic Assessment (BA) process has been undertaken in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R326 of 7 April 2017), as amended, promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The required closure and rehabilitation studies included a Heritage Resources Management (HRM) process in support of the BA process and in compliance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and Appendix 1: Basic Assessment Process Section 2(d) and 3(1)(h)(iv) and (vii) of the NEMA EIA Regulations 2014.

This report constitutes the Heritage Impact Assessment (HIA) report to identify and quantify positive- and negative impacts on the cultural heritage landscape as a result of the Project.

## 2 Project Description

The Cooke Operation includes the three underground shafts, a metallurgical plant (Cooke Gold Plant) and surface reclamation of historic gold Tailings Storage Facilities (TSFs). Rand Uranium is the holder of a converted Mining Right, (GP) 30/5/1/2/2 (07) MR, for the Cooke Underground Operations<sup>2</sup> which is located within the West Rand District Municipality, approximately 10 kilometres (km) south-east of the town Randfontein. Plan 1 indicates the local setting within which the Project is located.

The Underground Operations comprise three underground mine shaft complexes: Cooke No. 1, No. 2 and No. 3 Shafts. The underground workings are accessible through vertical shafts at each of these complexes. Infrastructure in the underground workings includes water pumping and treatment systems including clarifiers, attenuation and settling dams as well as storage areas, underground walkways and conveyors. Ancillary surface infrastructure is also in place at each of the complexes. This infrastructure includes administrative and workshop buildings and water management structures (e.g. attenuation dams, trenches and berms).

Underground mining at all three shafts ceased in May 2018 and Sibanye continued basic service maintenance as they sought a way forward for the operations. Sibanye has maintained an extensive groundwater pumping and treatment scheme to keep the underground workings dry in case of the recommencement of mining in future. Following extensive investigations, Sibanye concluded there were no feasible sustainable mining plans and, as such, are now investigating a permanent closure solution. To this end, Sibanye intends to permanently cease the underground water pumping a discharge regime, remove all surface and underground

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<sup>2</sup> Rand Uranium holds a separate converted Mining Right, (GP) 30/5/1/2/5 (173) MR.

infrastructure and ultimately apply for the closure of the Cooke Underground Operations. Sections 2.1 to 2.4 below describe the final decommissioning, rehabilitation and closure activities being applied for by Rand Uranium.

## 2.1 Cessation of Underground Water Pumping and Discharge

During the period for which the mine ceased mining and maintained basic infrastructure, Rand Uranium maintained an extensive groundwater pumping and treatment scheme to continue access to the underground mine workings through the prevention of the flooding of mining areas due to groundwater ingress. Extraneous water collected from underground is treated in a series of settlers after which it is transported to surface for further settlement, evaporation and discharge to the environment.

An overview of the process is described in Table 2-1 and depicted in Figure 2-1 below.

**Table 2-1: Water Management Process at Cooke 3, 2 and 1 Shafts**

Process step	Cooke 1 Shaft	Cooke 2 and 3 Shafts
<i>Collection and treatment of extraneous underground water</i>	<ul style="list-style-type: none"> <li>- Underground water from Cooke 1 Shaft is pumped to and treated through a series of settlers and stored in underground dams located at Cooke 1 Shaft.</li> </ul>	<ul style="list-style-type: none"> <li>- Underground water from Cooke 3 Shaft is pumped and gravitated to Cooke 2 Shaft.</li> <li>- The underground water is treated through a series of settlers and stored in underground dams located at Cooke 2 Shaft.</li> </ul>
<i>Surface treatment</i>	<ul style="list-style-type: none"> <li>- Water is pumped from the underground dams to the surface for settling of suspended solids as well as for attenuation purposes.</li> </ul>	<ul style="list-style-type: none"> <li>- From the underground dams, water is pumped to surface for settling of suspended solids as well as for attenuation purposes.</li> </ul>
<i>Transport and end-destination</i>	<ul style="list-style-type: none"> <li>- Water is discharged by means of a concrete canal into the Wonderfonteinspruit discharge point located below Cooke 1 Shaft.</li> </ul>	<ul style="list-style-type: none"> <li>- Water is discharged through a short pipeline and a concrete channel into the Magazine Pan, an artificial depression wetland where evaporation and recharge to underground aquifers.</li> </ul>



Process step	Cooke 1 Shaft	Cooke 2 and 3 Shafts
<i>Sediment disposal</i>	<ul style="list-style-type: none"> <li>- The settled solids are disposed of in sediment paddocks on surface at the shaft. Once suitably dry, the material is removed for disposal onto a licence TSF or pits via processing at the Gold Plant.</li> </ul>	<ul style="list-style-type: none"> <li>- The settled solids are disposed of in sediment paddocks on surface at the shaft. Once suitably dry, the material is removed for disposal onto a licence TSF or pits via processing at the Gold Plant.</li> </ul>

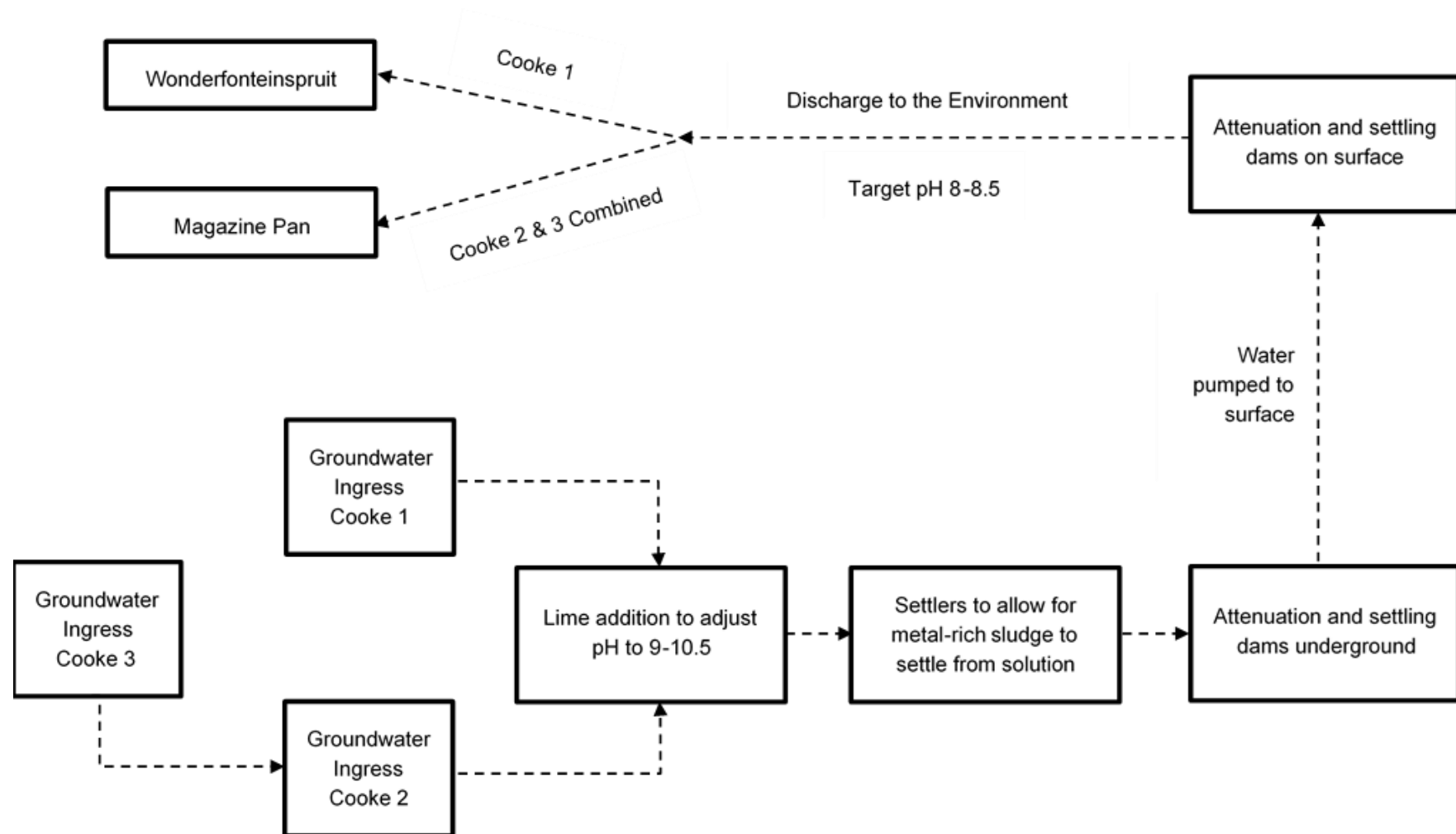


Figure 2-1: Water Management Process

The scope of decommissioning, rehabilitation and closure activities to be undertaken as a result of the cessation of underground water pumping- and discharge regime include:

- Removal and decontamination of underground infrastructure containing hydrocarbons and other contaminants (as per the waste disposal inventories kept by Sibanye) from the Cooke No. 3, No. 2 and No. 1 underground workings;
- Refurbishment of plugs between Cooke 3 and Cooke 43 Shafts, as well as between Cooke 1 and Doornkop Mine<sup>4</sup>;
- Rewatering of underground workings, including the installation of additional water volume and quality control infrastructure to control rewatering activity;
- Potential capping of the shaft barrel below the dolomitic aquifer (this is dependent on the outcomes of the groundwater specialist study);
- Decommissioning of surface dams at the shaft areas and rehabilitation of dam footprints;
- Removal of settled solids from surface paddocks and mud ponds for processing through the Plant and/or disposal into the pits;
- Rehabilitation of surface paddocks and mud ponds;
- Decommissioning and rehabilitation of concrete channels;
- Rehabilitation of Magazine Pan<sup>5</sup>; and
- Potential rehabilitation of portions of the Wonderfonteinspruit floodplain (if the floodplain has been affected) and removal of existing water discharge infrastructure.

## 2.2 Removal of Shaft Infrastructure

The scope of decommissioning, rehabilitation and closure activities for shaft infrastructure at Cooke 3, 2 and 1 Shafts comprises the removal of shaft infrastructure, buildings and stockpiles around the shaft complexes and rehabilitation of disturbed footprints. These activities will include:

- Decommissioning of shaft headgear and surface infrastructure;
- Capping of shafts (if deemed necessary);
- Sale of salvageable items;
- Disposal of waste; and

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<sup>3</sup> Owned by Ezulwini Mining Company (Pty) Ltd

<sup>4</sup> Owned by Harmony Gold Mine (Pty) Ltd

<sup>5</sup> An artificial pan used for water management.

- Rehabilitation of infrastructure footprints.

It is proposed to remove all surface infrastructure to reduce the risk of vandalization and theft by illegal activities prevalent in the area. The shafts will be capped to make the area safe and prevent access to underground workings, which will be rewatered at closure.

## 2.3 Wetland Rehabilitation

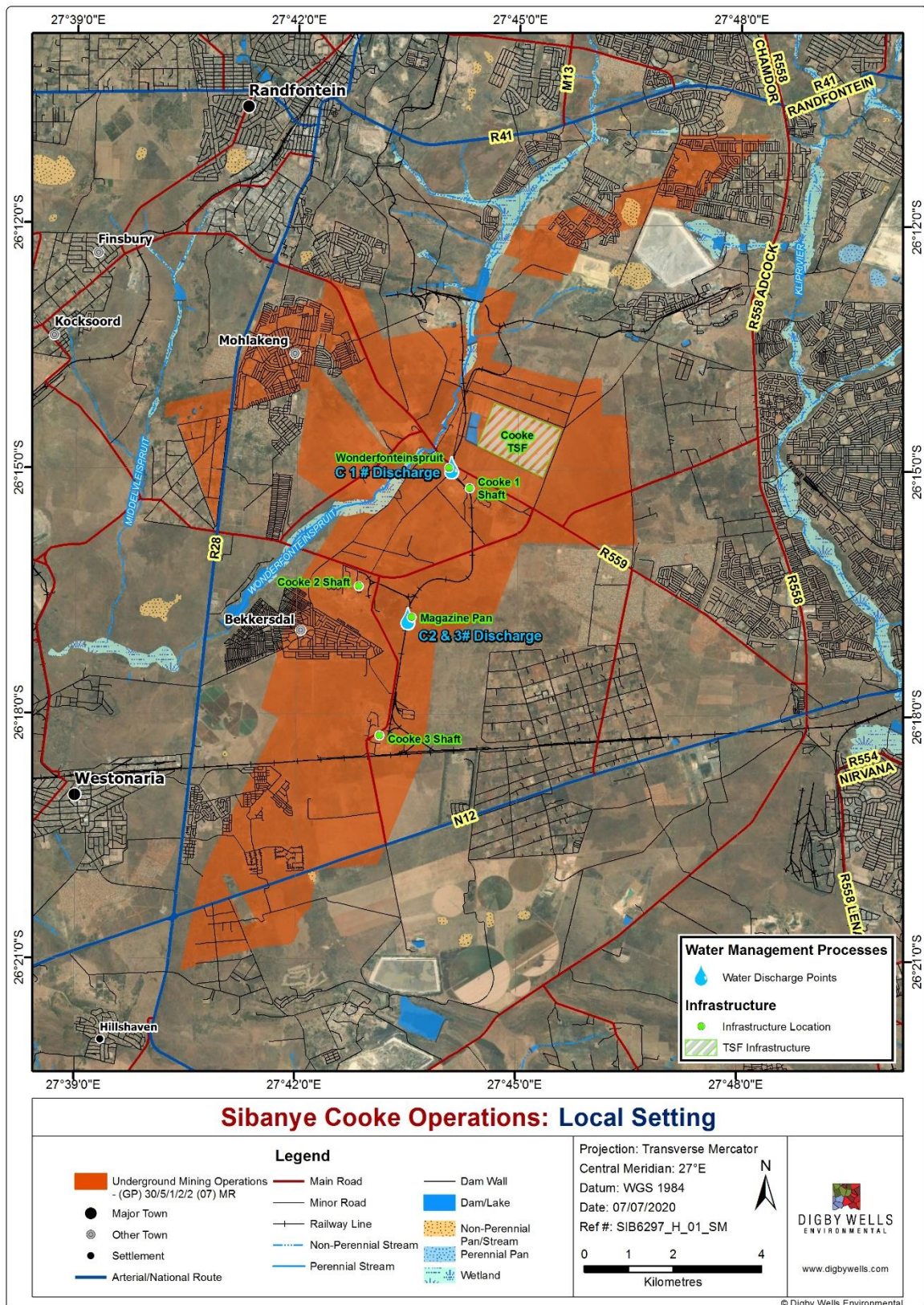
In addition to the activities proposed for the permanent closure of the Cooke Underground Operation, Sibanye also intends to undertake closure planning rehabilitation activities of wetlands located at its Cooke Surface Operations, under (GP) 30/5/1/2/5 (173) MR, which have been affected by current and historic mining activities. The wetlands include:

- Three contaminated wetlands near Lindum Dump;
- One contaminated wetland near Millsite TSF;
- The Robinson Lake; and
- The Tiger Mills wetland area.

## 2.4 Alternatives Considered

As indicated above, Rand Uranium has maintained an extensive groundwater pumping, treating and discharge regime at the Cooke Underground Operations to while investigating alternatives for the continuation of the operation. No sustainable mining plans were found to be feasible and as such, a permanent closure solution is now being sought out. The decommissioning, rehabilitation and closure activities discussed above are the only way to achieve sustainable closure.





**Plan 1: Local Setting and Infrastructure**

### 3 Relevant Legislation, Standards and Guidelines

The following international, national and regional legislative and policy documents form part of the legislative and policy framework of the HRM process. The objective is to ensure that the assessments meet all stipulated requirements to ensure legal compliance and successful integration into the regional planning context.

#### 3.1 International Conventions

No international conventions were considered for this assessment. The HRM process was completed to comply with the requirements of the South African national legislative framework as described below.

#### 3.2 National Legislation and Policy

Table 3-1 presents a summary of the national legislation applicable to this HRM process and illustrates how it will be considered in the HIA. Table 3-2 below presents the applicable policies considered in the HIA process.

**Table 3-1: Applicable Legislation Considered in the HRM Process**

Applicable legislation used to compile the report	Reference where applied
<p><b><u>Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</u></b></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> <ul style="list-style-type: none"> <li>i. Prevent pollution and ecological degradation;</li> <li>ii. Promote conservation; and</li> <li>iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development</li> </ul>	<p>The HRM process will identify heritage resources and determine the heritage impacts associated with the Project.</p> <p>As part of the HRM process, applicable mitigation measures, monitoring plans and/or remediation will be recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.</p>

Applicable legislation used to compile the report	Reference where applied
<p><b><u>National Environmental Management Act, 1998 (Act No. 107 of 1998)</u></b></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 2014 Regulations, promulgated in terms of NEMA.</p>
<p><b><u>GN R. 982: Environmental Impact Assessment Regulations, 2014 (as amended by GN R 326 of 7 April 2017)</u></b></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"> <li>• 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.</li> <li>• 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</li> </ul>	<p>To comply with the regulations, a BA process must be completed in support of EA in terms of Listing Notice 1. This HIA was completed to inform the EIA process to comply with Section 24 of the NEMA and Appendix 1: Basic Assessment Process Section 2(d) and 3(1)(h)(iv) and (vii) of the NEMA EIA Regulations 2014.</p>



Applicable legislation used to compile the report	Reference where applied
<p>must follow an environmental impact assessment process.</p> <ul style="list-style-type: none"> <li>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.</li> </ul>	
<p><b><u>National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></b></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"> <li>Section 5: General principles for HRM</li> <li>Section 6: Principles for management of heritage resources</li> <li>Section 7: Heritage assessment criteria and grading</li> <li>Section 38: Heritage resources management.</li> </ul> <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 will comply with Section 5, 38(3), (4) and (8) of the NHRA. After finalisation, the HIA report will be submitted to the responsible HRAs. In this instance, this refers to the South African Heritage Resources Authority (SAHRA) and the Provincial Heritage Resources Authority – Gauteng (PHRA-G).</p>
<p><b><u>NHRA Regulations, 2000 (GN R 548)</u></b></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"> <li>Chapter II: Permit Applications and General Provisions for Permits;</li> <li>Chapter III: Application for Permit: National Heritage Site, Provincial Heritage Site,</li> </ul>	<p>The HRM process will be undertaken cognisant of the applicable regulations. The proposed mitigation strategies and management measures must comply with these requirements.</p>



Applicable legislation used to compile the report	Reference where applied
<p>Provisionally-Protected Place or Structure older than 60 years;</p> <ul style="list-style-type: none"> <li>Chapter IV: Application for Permit: Archaeological or Palaeontological or Meteorite;</li> <li>Chapter IX: Application for Permit: Burial Grounds and Graves;</li> <li>Chapter X: Procedure for Consultation regarding Protected Area;</li> <li>Chapter XI: Procedure for Consultation regarding Burial Grounds and Graves; and</li> <li>Chapter XII: Discovery of Previously Unknown Graves.</li> </ul>	

**Table 3-2: Applicable Policies Considered in the HRM Process**

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

### 3.3 Regional Regulatory Context

No applicable regional by-laws were identified or considered for this assessment. The HRM process was completed to comply with the requirements of the South African national legislative framework as described above.

## 4 Assumptions, Limitations and Exclusions

Digby Wells encountered constraints and limitations during the compilation of this report. Table 4-1 presents an overview of these limitations and the consequences.

**Table 4-1: Constraints and Limitations**

Description	Consequence	Mitigation
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.	The cultural heritage baseline presented in Section 5.1 below is considered accurate but may not include new data or information which may not have been made available to the public or was not contained in the specialist reports conducted by Sibanye.	The EA process includes a Public Participation Process (PPP) and regulatory review processes that allow for knowledgeable persons to supply any missing information.
Results from previously-completed heritage assessments as sourced from SAHRIS, that may have formed part of the Project area or are adjacent to the Project area were not verified in-field.	It is assumed the previously recorded heritage resources are accurate and true.	
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.	The reviewed literature, previously-completed heritage assessments and the results of the field survey are in themselves limited to surface observations. Subsurface tangible heritage may be exposed during Project activities.	Should this occur, Sibanye 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.

Description	Consequence	Mitigation
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.	Previously unidentified heritage resources may be encountered.	

## 5 Methodology

### 5.1 Defining the Study Area

Heritage resources do not exist in isolation to the greater natural and social environment (including, but not limited to, socio-economic, socio-political and socio-cultural aspects). To develop an applicable cultural baseline for the Project, Digby Wells defined three nested study areas to be considered. These include:

- The *regional* study area: the area bounded by the district municipality demarcation. In this case, the Project is located in the West Rand District Municipality (WRDM) and the the City of Johannesburg Metropolitan Municipality (City of Johannesburg). 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;
- 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. The local study area is defined as the area bounded by the local municipality and includes 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. The Project is situated in the West Rand City Local Municipality (WRCLM) and the City of Johannesburg; and
- The *site-specific* study area: the farm portions extent associated with the proposed Project and that will be directly affected by the Project, including a 500 m buffer area.

### 5.2 Statement of Cultural Significance

Digby Wells designed the significance rating process to provide a numerical rating of the Cultural Significance (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 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.

### 5.3 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 5-1 presents a summary of the types of impacts.

**Table 5-1: 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	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: <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul>

Category	Description
	<ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul>

## 5.4 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 5-2 lists the sources consulted in the literature review (refer to Section 14 for more detailed references).

**Table 5-2: Qualitative Data Sources**

Reviewed Qualitative Data		
Databases		
Genealogical Society of South Africa (GSSA) database (2011)		University of the Witwatersrand (WITS) Archaeological Database (2010)
SAHRIS		Wazimap (Wazimap, 2017)
Cited Text		
Deacon & Deacon, 1999	Fairbridge, 1918	Garstang, et al., 2014
Huffman, 2007	Maggs, 1974	Mitchell, 2002
Mucina & Rutherford, 2010	Shorten, 1970	Winter & Baumann, 2005

Table 5-3 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 5-3: Aerial Imagery Considered**

Aerial photographs						
Job no.	Flight plan	Photo no.	Map ref.	Area	Date	Ref.
438	12	04469	2527 2627 2628	Brits Rand Vereeniging	1961	National Geographical Institute
		04470				
	13	02800				
		02801				
		02802				
		04443				
	14	04444				
		04445				
		04446				
		04446				

Aerial photographs						
Job no.	Flight plan	Photo no.	Map ref.	Area	Date	Ref.
	15	02882				
		02883				
		02884				
		02885				
	16	02905				
		02906				
	17	02988				

## 5.5 Primary Data Collection

Shannon Hardwick undertook a pre-disturbance survey of the Project area on 27 May 2020. Given the context of the site, the survey was predominantly vehicular with pedestrian inspections, which were adapted to the terrain and the likelihood of heritage resources occurring in the area. The survey was non-intrusive (i.e. no sampling was undertaken). The aim of the survey 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 2 presents the results of the pre-disturbance survey, including the waypoints and GPS tracks.

## 5.6 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. SIB6297/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 5-4 presents a list of the relevant period and feature codes (refer to Section 6.1 for an explanation of what these terms mean).

**Table 5-4: 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

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).

## 6 Findings and Discussion

### 6.1 Cultural Heritage Baseline Description

The cultural heritage landscape includes, but is not limited to palaeontology, archaeology, the built environment, history, burial grounds and graves, a sense of place and intangible heritage. Archaeological and built environmental resources, burial grounds and graves have been recorded in previously-completed heritage assessments done within the regional study area (refer to Section 5.1). Table 6-1 presents a summary of the various archaeological periods of South Africa.

**Table 6-1: Archaeological periods in South Africa (adapted from Esterhuysen & Smith, 2007)**

<b>The Stone Age</b>	Early Stone Age (ESA)	2 million years ago (mya) to 250 thousand years ago (kya)
	Middle Stone Age (MSA)	250 kya to 20 kya
	Later Stone Age (LSA)	20 kya to 500 Common Era (CE) <sup>6</sup>
<b>Farming Communities</b>	Early Farming communities (EFC)	500 to 1400 CE
	Late Farming Communities (LFC)	1100 to 1800 CE
<b>Historical Period</b>	-	1500 CE to 1994 (Behrens & Swanepoel, 2008)

<sup>6</sup> 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 predominantly characterised by the historical period through the built environment, burial grounds and graves. This notwithstanding, archaeological materials representing the Stone Age and the Farming Community periods have been identified within the regional study area.

The Fossil Sites of South Africa World Heritage Site, known colloquially as the Cradle of Humankind, are perhaps the most famous example of karst topography and the associated breccia within the caves has contributed significantly to the fossil heritage of South Africa (UNESCO, 2018). The fossils in these cave sites provide evidence for the occupation of the area for at least the last 2.3 mya. Hominid fossils recovered from these caves represent *Australopithecus africanus*, *Paranthropus* species and *Homo habilis*. New species recently identified in these caves include *A. prometheus*, *A. sediba* and *H. naledi*. The fossils of the Cradle of Humankind represent some of the earliest hominid species of southern Africa. This Cradle of Humankind occurs within the neighbouring the Mogale City Local Municipality of WRDM (UNESCO, 2018) and is approximately 20 km from the Project area.

The Stone Age in southern Africa is divided into three broad phases, namely: the ESA, the MSA and the LSA. These phases are determined according to the lithic tools and material cultural produced by the various hominid species through time (Deacon & Deacon, 1999; Mitchell, 2002). The ESA is comprised predominantly of large handaxes and cleavers made of coarse-grained materials (Esterhuysen & Smith, 2007). This period occurred between 2 mya and 250 kya and is associated with *Australopithecus* and early *Homo* hominid species.

The MSA dates between approximately 300 kya and 20 kya. High proportions of minimally-modified blades, created using the Levallois technique, the use of good quality raw material and the use of bone tools, ochre and pendants characterise the early MSA lithic industries (Clark, 1982; Deacon & Deacon, 1999). These tools were made and used by archaic *Homo sapiens*.

LSA lithics are specialised, i.e. specific tools were created for specific purposes (Mitchell, 2002). LSA assemblages commonly include diagnostic tools, such as scrapers and segment, and may also include bone points. The LSA is further defined by evidence of ritual practices and complex societies (Deacon & Deacon, 1999). Three rock art painting traditions occur within South Africa and each is associated with specific groups.

In southern Africa, the LSA is commonly associated with hunter-gatherers. The San (including Barsarwa, Bathwa and hunter-gatherer groups) are generally accepted as the first inhabitants of present-day South Africa (Makhura, 2007). Later, the various peoples of the Farming Community, including the ancestors of the modern Sotho-Tswana and Nguni peoples, settled in the area within which the current Project is located.

The Farming Community period correlates to the movements of Bantu-speaking agro-pastoralists into southern Africa. This period ranges from 500 to 1800 CE and is divided into an Early and a Late Farming Community period. LFC is represented by stonewalling or through secondary tangible indicators such as ceramics and evidence for domestic animals, including dung deposits and faunal remains (Maggs, 1974; Huffman, 2007).

The historical period<sup>7</sup> 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.

The Mfecane or, north of the Orange River, the Difaqane, characterised much of the history of the regional study area (see Section 5.1). This was the period of approximately 1817 to 1826 AD that was characterised by unprecedented social and political upheaval as 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, which was exacerbated by a drought at the same time. As a result of social and political upheaval, the Highveld region was vulnerable to intrusive groups including the Swazi and the *Voortrekkers* (Fairbridge, 1918; Garstang, et al., 2014).

Some of the 'empty lands' left behind from the Difaqane became host to the early white migrants who claimed large tracts of land and founded settlements and towns as they moved northwards during the 1830s. The Voortrekkers, and later the Boers, encountered resistance from inhabitants of these 'empty lands'. Soon thereafter, the British moved into the interior of South Africa. The British sought to implement British Imperial rule over the Boer republics which had recently been established. These building tensions culminated in the Transvaal War of 1880 to 1881.

Lieutenant Lys recovered a small amount of gold in 1856 from crushed conglomerate on the farm of Driefontein (Shorten, 1970). The gold reef on the Witwatersrand was discovered in 1886, when George Harrison discovered gold on the farms Wilgespruit and Langlaagte in present-day Johannesburg. This discovery triggered the Transvaal gold rush. Shortly thereafter, Paul Kruger, the then president of the *Zuid Afrikaansche Republiek* (ZAR), declared the area around the informal tented mining settlement known as Ferreira's Camp as public diggings, exacerbating the rush. The gold rush led to the establishment of several large mining companies and towns, including Johannesburg (1886), Krugersdorp (1886) and Randfontein (1890).

The discovery of gold again exacerbated tensions between the British and the Boers which remained after the Transvaal War. The British sought to bring the gold fields under their control, along with the ZAR settlements established there. These heightened tensions resulted in the Jameson Raid of 1895. Leander Jameson, a close ally of Cecil John Rhodes, led the raid, which was intended to cause an uprising amongst the British residents of the Witwatersrand. The Boers were warned of British plans and captured Jameson and his men at Doornkop, near Krugersdorp. The Jameson Raid was an important catalyst for the South African War of 1899 to 1902.

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<sup>7</sup> In southern Africa, 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).

## 6.2 Existing Environment

Table 6-2 presents an overview of the natural environment within which the Project is situated. The Project area is characterised by infrastructure characterised by the Cooke surface and underground operations. The Project area has therefore been greatly disturbed through anthropogenic activity characterised by the construction and operation of the Cooke operations. According to the existing Environmental Management Program (Shangoni Management Services (Pty) Ltd, 2008), the three Cooke shafts came into operation during the late 1970s. Figure 6-2 presents the Project area as it was in 1961. The Cooke shafts are not visible on the historical imagery.

The area surrounding the Project infrastructure has also been disturbed through additional anthropogenic activities, including agricultural activities (such as cultivation of fields and the grazing of livestock) and illegal activities (such as illegal waste dumping and mining), as well as the establishment of industrial activities, municipal services, houses, modern structures and roads, both formal and untarred. Figure 6-1 presents the condition of the Project area at the time of the pre-disturbance survey.

**Table 6-2: Summary of the Vegetation Setting of the Project**

Biome	Bio-region	Vegetation Type
Grassland	Dry Highveld Grassland	<p><u>Carletonville Dolomite Grassland (Gh15)</u></p> <p>Species-rich grassland which forms a complex mosaic pattern which is dominated by many species. This vegetation occurs on slightly undulating plains which are dissected by prominent rocky chert outcrops. This vegetation unit is linked to the dolomite and chert of the Malmani Subgroup of the Transvaal Supergroup.</p> <p>This vegetation type is considered vulnerable and almost 25% of the unit have been transformed by cultivation, urban sprawl and mining activities. Erosion in this vegetation type is generally very low.</p>
	Mesic Highveld Grassland	<p><u>Soweto Highveld Grassland (Gm8)</u></p> <p>Short to medium-high, dense, tufted grasses on gently to moderately undulating landscape on the Highveld plateau. Scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops occur amongst this vegetation. This vegetation unit is underlain by shales, sandstones and mudstones of the Madzaringwe Formation of the Karoo Supergroup or intrusive Karoo Suite dolomites.</p> <p>This vegetation unit is considered endangered. Almost half of the unit have been transformed by cultivation, urban sprawl, construction of road infrastructure and mining activities. Erosion in this vegetation type is generally very low.</p>

Adapted from Mucina & Rutherford (2010)



**Figure 6-1: Photographs Illustrating the Current Environment within the Project Area**

### **6.3 Results from the Pre-disturbance Survey**

No heritage resources were identified in the infrastructure area. Figure 6-2 presents the results of the historical layering. None of the infrastructure intended for demolition appears on the historical imagery at 1961.

Several heritage resources were identified in proximity to the Project infrastructure. Table 6-3 includes descriptions of these heritage resources identified during the pre-disturbance survey. Plan 2 presents the spatial distribution of these sites and includes the tracks, indicating the areas that were surveyed. Figure 6-3 below presents photographs of select heritage resources identified during the pre-disturbance survey.



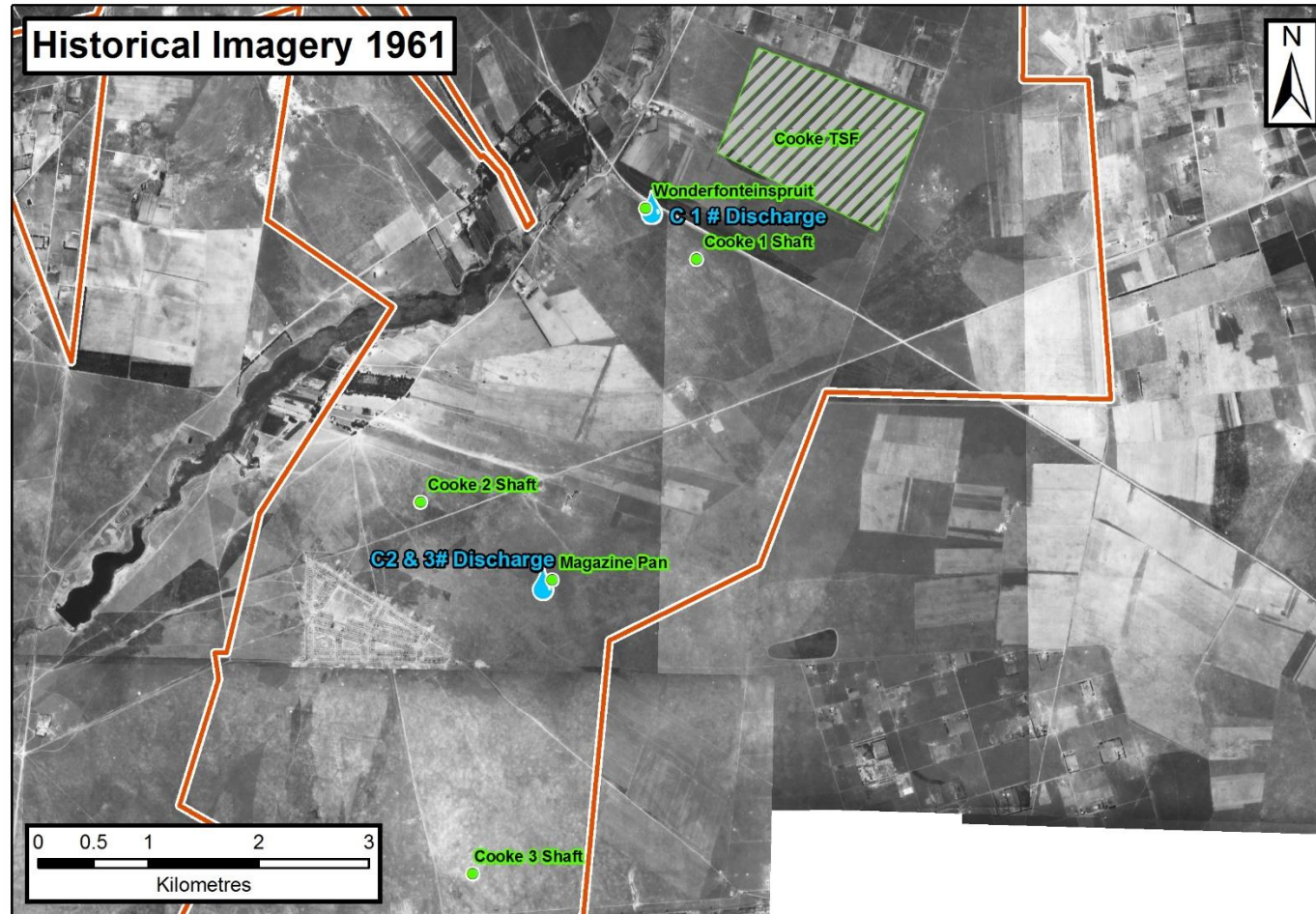
**Table 6-3: Heritage Resources Identified Through the Pre-Disturbance Survey<sup>8</sup>**

Site Name	Description
BGG-001	Burial ground of eight visible graves. Of these graves, one grave has a headstone. This headstone belongs to the Matsididi family and dates to 1968. The other visible graves are marked by stone piles and do not have headstones. The burial ground is not fenced.
BGG-002	Burial ground of five visible graves. The burial ground is very overgrown and is not fenced. One of these graves is marked by a stone pile and does not have a headstone. Of the other four graves with headstones, only one had a visible date (1927). Three of the graves belong to the Du Toit, Prinsloo and Komen families. The fourth headstone did not have a visible name.
BGG-003	Burial ground of two visible graves, both with headstones. One headstone has a legible date (1946). The burial ground was fenced off with a palisade fence, although this has since been vandalised. Sibanye has appointed a contractor to install new fencing <sup>9</sup> .
BGG-004	Burial ground of twelve visible graves in close proximity to the mine house. All graves are marked by stone piles and none have headstones. Grave goods are present, including a broken plate and glass. The burial ground is not fenced <sup>10</sup> .
Mine House	Ruins of three structures and the cement foundations of one more structure. An additional structure is located in proximity. The Sibanye employee stated that these were used as mine houses in the past. None of these structures appear on the historical imagery and are therefore assumed to be younger than 60 years.
Potential Graves	An informant in the community identified this point as a burial ground. There were no surface dressings visible at the time of the inspection to confirm the presence of graves or indicate how many graves are located in this burial ground. This area must be considered a burial ground until proven otherwise.

<sup>8</sup> In accordance with new SAHRA procedures, the GPS co-ordinates of these heritage resources have not been included in documents available to the public.

<sup>9</sup> At the time of compilation of this report and subsequent to the pre-disturbance survey, this fencing has been erected.

<sup>10</sup> Sibanye intend to delineate the burial ground. This is outside the Scope of this HRM process and report.



**Figure 6-2: Historical Imagery showing the Project Area in 1961**





**Graves at BGG-001**



**Remains of Mine House**



**Graves at BGG-004 near the Mine House**



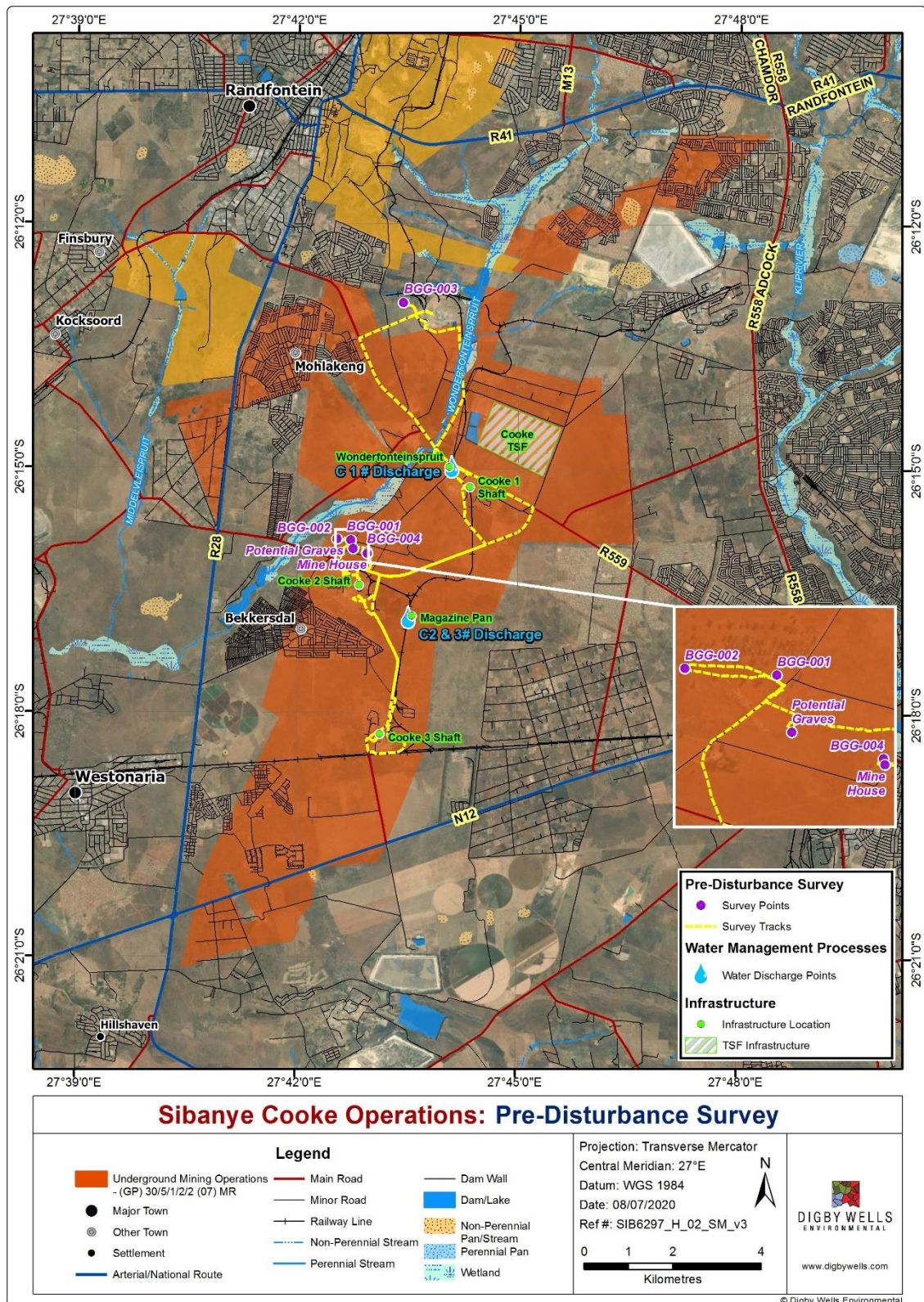
**Vandalised grave and fencing at BGG-003**



**Graves at BGG-002**

**Figure 6-3: Photographs of Heritage Resources Identified during the Pre-Disturbance Survey**





Plan 2: Results of the Pre-Disturbance Survey



## 6.4 Socio-economic Benefit Versus Heritage Impacts

The Project is located in the City of Johannesburg and the RWCLM<sup>11</sup> (within the WRDM), both within the Gauteng Province. This section presents a brief summary<sup>12</sup> of the demographic statistics relevant to the potential socio-economic benefit derived from the Project, informed by data collected during the 2016 Community Survey adapted from Wazimap (2017).

At the time of the survey, the Gauteng Province included 13 399 724 residents across three metropolitan municipalities and an additional two district municipalities. The two district municipalities are divided into three local municipalities each. The City of Johannesburg was the largest metropolitan municipality in terms of population, with 4 949 346 residents. Of the local municipalities, RWCLM is the third largest, with a population of 265 887.

Unemployment is a challenge within the regional study area. Table 6-4 presents an overview of the employment status of the populations within the regional study area.

**Table 6-4: Employment Status of the Populations within the Study Area (Census 2011)**

Employment Statistics	RWCLM		WRDM		City of Johannesburg	
	No.	%	No.	%	No.	%
Total Population	261 053	-	820 994	-	4 434 827	-
Working Age (18-64)	175,171	67.1	554,176	67.5	3,165,843	64
Employed	92 065	35.3	293 335	35.7	1 696 520	38.3
Discouraged Work Seeker	6 378	2.4	19 542	2.4	105 882	2.4
Unemployed	36 162	13.9	104 894	12.8	564 970	12.7
Other not economically active	52 170	20	172 199	12.8	855 234	19.3

Adapted from Wazimap (2017)

The Project will result in positive and negative social impacts through the decommissioning of the Cooke Operations and the rehabilitation of several aspects of the environment that were impacted upon during the construction and operation of the Cooke Underground Operations. The main aim of the Project is to achieve a positive environmental impact. This notwithstanding, the Project should still achieve positive socio-economic impacts through the creation of economic opportunities through the decommissioning and rehabilitation activities undertaken in this Project. These opportunities will be temporary and will most likely not be widespread.

<sup>11</sup> This Local Municipality was established in 2016 when the Randfontein and Westonaria Local Municipalities were combined.

<sup>12</sup> 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) report undertaken in support of the BA process.

The second positive socio-economic impact resulting from the Project will be the availability of salvageable mine infrastructure and equipment which may be made available for auction. Should this occur, Sibanye could potentially support emerging local businesses through making the infrastructure and equipment available at lower costs.

Sibanye has appointed Digby Wells to undertake social closure planning studies, in line with the National Development Goals and the United Nations Sustainable Development Goals. Where the resultant social closure programs are implemented, Sibanye will achieve various positive socio-economic benefits in the community. At present, the proposed positive socio-economic benefits will consider reductions in unemployment and household poverty.

Based on 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, there are no envisaged impacts to the heritage resources from Project activities. Impacts and risks to unidentified heritage resources can be managed through the proposed recommendations; and
- The proposed Project will provide potential opportunities for local businesses to purchase infrastructure and equipment at reduced costs; and
- Although this is expected to comprise short term opportunities, the proposed Project is expected to contribute (directly or indirectly) to the employment of people in an area where unemployment is a challenge.

## 7 Impact Assessment

### 7.1 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.

One category of heritage resources was recorded during the field survey of the site-specific study area. The identified heritage resources comprise four burial grounds and graves, and

one additional potential burial ground. The assessment of the CS and Field Ratings demonstrated that the identified resources have a CS designation of very high. Table 7-1 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 Sections 7.2 and 7.3 below).

**Table 7-1: 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 <sup>13</sup>
BGG-001	Burial / grave	Burial Grounds & Graves	-	-	-	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 <sup>14</sup>	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 Conservation Management Plan.  A Grave Relocation Process (GRP) may be necessary should the project design not be changed.
BGG-002			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.						
BGG-003											
BGG-004											
Potential Graves											

<sup>13</sup> Please note: this recommended mitigation refers to the minimum mitigation requirements as encapsulated in the NHRA. Project-specific mitigation measures are presented in Section 7.2 and 7.3.

<sup>14</sup> The recommended field rating designates the level of governance associated with the resource. In this instance, the SAHRA Burial Grounds and Graves Unit is the designated competent authority responsible for the management of heritage resources contemplated in terms of Section 36 of the NHRA.

## 7.2 Decommissioning Phase

Table 7-2 presents the activities expected to occur during the Decommissioning Phase and the expected impacts to the cultural heritage landscape that may arise from these activities.

**Table 7-2: Interactions and Impacts of Activities in the Decommissioning Phase**

Interaction	Impact
Removal and decontamination of underground infrastructure containing hydrocarbons and other contaminants from the Cooke 3, 2 and 1 underground workings	<p>Digby Wells envisages no impact to the cultural heritage landscape, given the nature of the proposed activities and the location of identified heritage resources in relation to the proposed Project infrastructure.</p> <p>Should any infrastructure intended for demolition increase in age to older than 60 years during the Project lifecycle, the structure must be considered a heritage structure. Any alterations to these structures will be subject to a NHRA Section 34 permit application process.</p>
Refurbishment of plugs between Cooke 3 and Cooke 4 Shafts, as well as between Cooke 1 and Doornkop Mine	
Potential capping of the shaft barrel below the dolomitic aquifer, dependent on specialist studies regarding the groundwater quality	
Decommissioning of surface dams and rehabilitation of dam footprints	
Removal of settled solids from surface paddocks and mud ponds for processing through the Plant and/or disposal into the Pits	
Decommissioning and rehabilitation of concrete channels	
Decommissioning of shaft headgear and surface infrastructure	
Potential capping of shafts	
Sale of salvageable items	
Disposal of waste	

Digby Wells does not envisage any impact to the identified heritage resources from the above-mentioned activities and has therefore not assessed these impacts further in this report.

## 7.3 Final Rehabilitation and Closure Phase

Table 7-3 presents the activities expected to occur during the Decommissioning Phase and the expected impacts to the cultural heritage landscape that may arise from these activities.

**Table 7-3: Interactions and Impacts of Activities in the Closure Phase**

Interaction	Impact
Rewatering of underground workings	<p>Digby Wells envisages no impact to the cultural heritage landscape, given the nature of the proposed activities and the location of identified heritage resources in relation to the proposed Project infrastructure.</p> <p>Should any infrastructure intended for demolition increase in age to older than 60 years during the Project lifecycle, the structure must be considered a heritage structure. Any alterations to these structures will be subject to a NHRA Section 34 permit application process.</p>
Rehabilitation of surface paddocks and mud ponds	
Rehabilitation of Magazine Pan, an artificial pan used for water management	
Rehabilitation of infrastructure footprints	

Digby Wells does not envisage any impact to the identified heritage resources from the above-mentioned activities and has therefore not assessed these impacts further in this report.

## 7.4 Cumulative Impacts

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 Gauteng Province requires consideration to identify the possible in-combination effects of various impacts to known heritage resources. Table 7-4 presents a summary of the possible cumulative impacts of the Project.

**Table 7-4: Summary of Potential Cumulative Impacts**

Type	Cumulative Impact	Direction of Impact	Extent of Impact
Additive	The Project will have an additive effect on the historic landscape as it will contribute to the change from the an industrial, mining landscape through closure and removal of associated infrastructure, as well as when one considers the planned consolidation and reclamation operations within the site-specific study area.	Neutral	Local Study Area

## 7.5 Unplanned and Low Risk Events

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

Section 6.3 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 Sibanye knowingly does not take proactive management measures, potential risks to Sibanye may include litigation in terms of Section 51 of the NHRA and social or reputational repercussions. Table 7-5 presents a summary of the primary risks that may arise for Sibanye.

**Table 7-5: Identified Heritage Risks that may arise for Sibanye**

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 PHRA-G.	<ul style="list-style-type: none"> <li>• Fines;</li> <li>• Penalties;</li> <li>• Seizure of Equipment;</li> <li>• Compulsory Repair / Cease Work Orders; and</li> <li>• Imprisonment.</li> </ul>

If additional heritage resources are identified during decommissioning and dismantling of the proposed infrastructure and/or activities undertaken during the rehabilitation processes, potential risks to those heritage resources will need to be assessed. Table 7-6 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 7-6: Identified unplanned events and associated impacts**

Unplanned event	Potential impact	Mitigation / Management / Monitoring
Encountering unidentified in situ 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 11 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 in situ 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 decommissioning and rehabilitation and closure phases of the Project.		

## 8 Environmental Management Plan

Table 8-1 below summarises the outcomes of the HRM process that must be included in the Environmental Management Plan (EMP).



Table 8-1: Environmental Management Plan

Activity/ies	Potential Impacts	Aspects Affected	Phase	Mitigation Measure	Mitigation Type	Time period for implementation
<ul style="list-style-type: none"><li>All Activities outlined in and Table 7-3 above</li></ul>	Damage to or destruction of previously unidentified heritage resources.	Cultural Heritage	Decommissioning Closure	<ul style="list-style-type: none"><li>Develop and implement CFP.</li></ul>	<b>Control</b>	Before the commencement of the Project

## 9 Monitoring Programme

Section 11 includes recommended mitigation measures and management strategies. These recommendations do not include a monitoring programme.

## 10 Stakeholder Engagement Comments Received

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 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 BA 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 a Sibanye employee knowledgeable about the Project area and any heritage resources therein. An additional member of the community indicated the location of additional burial grounds, including the potential graves with no visible surface indicators. Neither of these informants were aware of any additional heritage resources not indicated in this report.

## 11 Recommendations

Based on the understanding of the Project, Digby Wells envisages no direct or indirect impacts against cultural heritage resources identified during the pre-disturbance survey. To avoid impacts to heritage resources afforded general protection under Section 34 of the NHRA, Sibanye must confirm the ages of all structures that will be impacted by Project activities before commencing with the Project. Should any structures be older than 60 years at the time of

alteration or demolition, these structures will be subject to a Section 34 permit application process.

Sibanye must develop a CFP which must be implemented prior to the commencement of the Project and submit this to the HRA for noting.

## **12 Reasoned Opinion Whether Project Should Proceed**

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.

## **13 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 12 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.

## 14 References

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## Appendix A: Specialist CV



Mr. Justin du Piesanie  
Divisional Manager  
Social and Heritage Services  
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. Subsequently, Digby Wells appointed me as the Heritage Unit Manager and 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
Matla Mine 1 GRP	Kriel, Mpumalanga, South Africa	2020	-	Grave Relocation		Exxaro Coal Mpumalanga (Pty) Ltd
Mafube RAP and GRP	Middelburg, Mpumalanga, South Africa	2019	-	Grave Relocation		Mafube Coal
SARAO SKA Project: Heritage Mitigations	Carnarvon, Northern Cape, South Africa	2019	-	Heritage Management and Mitigation	SARAO	
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 and	Sun International
Exxaro Matla HRM	Kriel, Mpumalanga, South Africa	2017	2019	Heritage Assessment and Conservation Management Plan	Impact and	Exxaro Coal Mpumalanga (Pty) Ltd

PROJECT	LOCATION	DATES	PROJECT TYPE	CLIENT
Exxaro Belfast GRP	Belfast, Mpumalanga, South Africa	2013 2019	Grave Relocation	Exxaro Coal Mpumalanga (Pty) Ltd
Eskom Northern KZN Strengthening	KwaZulu-Natal, South Africa	2016 2018	Heritage Impact Assessment	ILISO Consulting
Thabametsi GRP	Lephalale, Limpopo Province, South Africa	2017 2018	Grave Relocation	Exxaro Resources Ltd
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

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
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
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 EMP Update	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
Grootegeluk Amendment	Lephalale, Limpopo	2016	2016	Notification of Intent to Develop	Exxaro Coal Resources (Pty) Ltd

PROJECT	LOCATION	DATES		PROJECT TYPE		CLIENT
	Province, South Africa					
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 Province, South Africa	2016	2016	Phase 2 Mapping		Sun International
Gino's Building Section 34 Destruction Permit Application	Johannesburg, Gauteng, South Africa	2015	2016	Heritage Assessment and Section 34 Destruction Permit Application	Impact and 34 Permit	Bigen Africa Services (Pty) Ltd
EDC Block Refurbishment Project	Johannesburg, Gauteng, South Africa	2015	2016	Heritage Assessment and 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 Permit 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

PROJECT			LOCATION	DATES		PROJECT TYPE		CLIENT
Invula Project			Kriel, Mpumalanga, South Africa	2014	2015	Heritage Assessment	Impact	Ixia Coal
VMIC Project	Vanadium	EIA	Mokopane, Limpopo, South Africa	2014	2015	Heritage Assessment	Impact	VM Investment Company
Everest Project	North	Mining	Steelpoort, Mpumalanga, South Africa	2012	2015	Heritage Assessment	Impact	Aquarius Resources
Nzoro 2 Project	Hydro	Power	Oriente Province, Democratic Republic of Congo	2014	2014	Social consultation		Randgold Resources Limited
Eastern Project	Basin	AMD	Springs, Gauteng, South Africa	2014	2014	Heritage Assessment	Impact	AECOM
Soweto Reclamation Project	Cluster		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 Project	Extension: Weltevreden		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 Project	ESIA	Update	Oriente 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 Basic Assessment	Mooikraal	Basic	Sasolburg, Free State, South Africa	2014	2014	Heritage Assessment	Basic	Sasol Mining

PROJECT	LOCATION	DATES	PROJECT TYPE	CLIENT
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
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 Assessment Impact 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 Assessment Impact 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 Assessment Impact 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 Assessment Impact Aquarius Resources
Environmental Authorisation for the Gold One Geluksdal TSF and Pipeline	Gauteng, South Africa	2012	2012	Heritage Assessment Impact Gold One International
Platreef Burial Grounds and Graves Survey	Mokopane, Limpopo Province, South Africa	2012	2012	Burial Grounds and Graves Survey Platreef Resources

PROJECT		LOCATION	DATES		PROJECT TYPE	CLIENT
Resgen Coal Mine	Boikarabelo	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
Transnet NMPP Line		Kwa-Zulu Natal, South Africa	2010	2010	Heritage survey	Umlando Consultants
Archaeological Assessment – Witpoortjie Project	Impact	Johannesburg, Gauteng, South Africa	2010	2010	Archaeological Impact Assessment	ARM
Der Archaeological Excavations	Brochen	Steelpoort, Mpumalanga, South Africa	2010	2010	Phase 2 Excavations	Heritage Contracts Unit
De Booyesdal Archaeology Project	Brochen and	Steelpoort, Mpumalanga, South Africa	2010	2010	Site Mapping	Recording: Heritage Contracts Unit
Eskom Electricity Network	Thohoyandou Master	Limpopo Province, South Africa	2010	2010	Heritage Statement	Strategic Environmental Focus
Batlhako Expansion	Mine	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 LIA Shelter Project	Parys	Parys, Free State, South Africa	2009	2009	Phase 2 Mapping	University of the Witwatersrand
Archaeological Assessment Modderfontein Holdings	of AH	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

PROJECT	LOCATION	DATES	PROJECT TYPE	CLIENT
Eskom Thohoyandou SEA Project	Limpopo Province, South Africa	2008 2008	Heritage Statement	Eskom
Witbank Dam Archaeological Impact Assessment	Witbank, Mpumalanga, South Africa	2007 2007	Archaeological survey	ARM
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 Registration

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)



Miss Shannon Hardwick  
Heritage Resources Management Consultant  
Social and Heritage Services  
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
2019 to Present	Digby Wells Environmental	Heritage Resources Management Consultant
2017 to 2019	Digby Wells Environmental	Assistant Heritage Resources Management Consultant
2017 to 2017	Digby Wells Environmental	Social and Heritage Services Intern
2016 to 2017	Tarsus Academy	Facilitator
2011 to 2016	University of the Witwatersrand	Teaching Assistant
2011	University of the Witwatersrand	Collections Assistant

## 4 Experience

I 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. I am an archaeologist and obtained a Master of Science (MSc) degree from the University of the Witwatersrand in 2013, specialising in historical archaeobotany in the Limpopo Province. I am a published co-author of one paper in *Journal of Ethnobiology*.

Since joining Digby Wells, I have gained generalist experience through the compilation of various heritage assessments, including Notification of Intent to Develop (NIDs), Heritage Scoping Reports (HSRs), Heritage Impact Assessment (HIA) reports, Heritage Basic Assessment Reports (HBARs) and permit applications to undertake permitted activities in terms of Sections 34 and 35 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA). 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 for Projects in South Africa, Malawi, Mali and Sierra Leone. My fieldwork experience includes heritage pre-disturbance surveys in South Africa, Malawi and the Democratic Republic of the Congo and social fieldwork in Malawi.

I am a registered member of the Association of Southern African Professional Archaeologists (ASAPA) and the International Council on Monuments and Sites (ICOMOS).

## 5 Project Experience

My project experience is listed in the table below.

**Project Experience**

Project Title	Name of Client	Project Location	Date of Completion	Project / Experience Description
Environmental Authorisation for the Dagsoom Coal Mining Project near Ermelo, Mpumalanga Province	Dagsoom Coal Mining (Pty) Ltd	Ermelo, Mpumalanga Province	Ongoing	Heritage Impact Assessment
Regional Tailings Storage Facility Heritage Mitigations	Ergo Mining (Pty) Ltd	Randfontein, Gauteng	Ongoing	Section 34 Permit Application Process
Weltevreden Mine Environmental Authorisation, Water Use Licence and Mining Right Application Project	Mbuyelo Group (Pty) Ltd	Belfast, Mpumalanga	Ongoing	Heritage Impact Assessment

<b>Project Title</b>	<b>Name of Client</b>	<b>Project Location</b>	<b>Date of Completion</b>	<b>Project / Experience Description</b>
Environmental Authorisation for the proposed Lephalale Pipeline Project, Limpopo Province	MDT Environmental (Pty) Ltd	Lephalale, Limpopo Province	2019	Notification of Intent to Develop
Heritage Resources Management Process Update for the Exxaro Matla Mine	Exxaro Coal Mpumalanga (Pty) Ltd	Kriel, Mpumalanga Province	2019	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	Ongoing	Heritage Impact Assessment Project Management
Songwe Hills Rare Earth Elements Project	Mkango Resources Limited	Phalombe District, Malawi	Ongoing	Heritage Impact Assessment
Elandsfontein Colliery Burial Grounds and Graves Chance Finds	Anker Coal and Mineral Holdings SA (Pty) Ltd Elandsfontein Colliery (Pty) Ltd	Clewer, Emalahleni, Mpumalanga Province	December 2018	Site Inspection Project Management
Environmental Authorisation Process to Decommission a Conveyor Belt Servitude, Road and Quarry at Twistdraai East Colliery	Sasol Mining (Pty) Ltd	Secunda, Mpumalanga Province	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	Ongoing	Heritage Impact Assessment
Environmental Authorisation for the Nomalanga Estates Expansion Project, KwaZulu-Natal	Nomalanga Property Holdings (Pty) Ltd	Greytown, KwaZulu-Natal	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	Ongoing	Heritage Impact Assessment

<b>Project Title</b>	<b>Name of Client</b>	<b>Project Location</b>	<b>Date of Completion</b>	<b>Project / Experience Description</b>
Gorumbwa RAP Audit	Randgold Resources Limited	Kibali Sector, Democratic Republic of the Congo	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	November 2018	Notification of Intent to Develop
Basic Assessment and Regulation 31 Amendment / Consolidation for Sigma Colliery: Mooikraal and Sigma Colliery: 3 Shaft	Sasol Mining (Pty) Ltd	Sasolburg, Free State Province	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	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	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	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	Ongoing	Heritage Impact Assessment
Belfast Implementation Project	Exxaro Coal Mpumalanga (Pty) Ltd	Belfast, Mpumalanga Province	Ongoing	Section 34 Permit Application

<b>Project Title</b>	<b>Name of Client</b>	<b>Project Location</b>	<b>Date of Completion</b>	<b>Project / Experience Description</b>
Newcastle Landfill Project	GCS Water and Environmental Consultants	Newcastle, KwaZulu-Natal	March 2019	Heritage Impact Assessment
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	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	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	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	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	Fatal Flaw Analysis
Environmental Impact Assessment for the Blyvoor Gold Mining Project near Carletonville, Gauteng Province	Blyvoor Gold Capital (Pty) Ltd	Carletonville, Gauteng	Ongoing	Notification of Intent to Develop; Social Baseline



Project Title	Name of Client	Project Location	Date of Completion	Project / Experience Description
Heritage Resources Management Process for the Exxaro Matla Mine	Exxaro Coal Mpumalanga (Pty) Ltd	Kriel, Mpumalanga Province	October 2018	Heritage Impact Assessment
Liwonde Additional Studies	Mota-Engil Africa	Liwonde, Malawi	June 2018	Community Health, Safety and Security Management Plan
Environmental Impact Assessment for the Millsite TSF Complex	Sibanye-Stillwater	Randfontein, Gauteng	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	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	August 2017	Archaeological Phase 2 Mitigation
Environmental and Social Input for the Pre-Feasibility Study	Birimium Gold	Bougouni, Mali	October 2018	Pre-Feasibility Study; Heritage Impact Assessment

## 6 Professional Registration

Position	Professional Body	Member 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.



## Appendix B: HRM Methodology



DIGBY WELLS  
ENVIRONMENTAL

## Cultural Significance, Field Rating and Impact Assessment

### Methodology Statement

**Project Number:**

ZZZ9999

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

#### Revision History

<b>Name</b>	<b>Responsibility</b>	<b>Version</b>	<b>Date</b>
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

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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 significance<sup>1</sup> (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 tangible<sup>2</sup> and intangible<sup>3</sup> 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.

---

<sup>1</sup> 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.

<sup>2</sup> (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.

<sup>3</sup> 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**

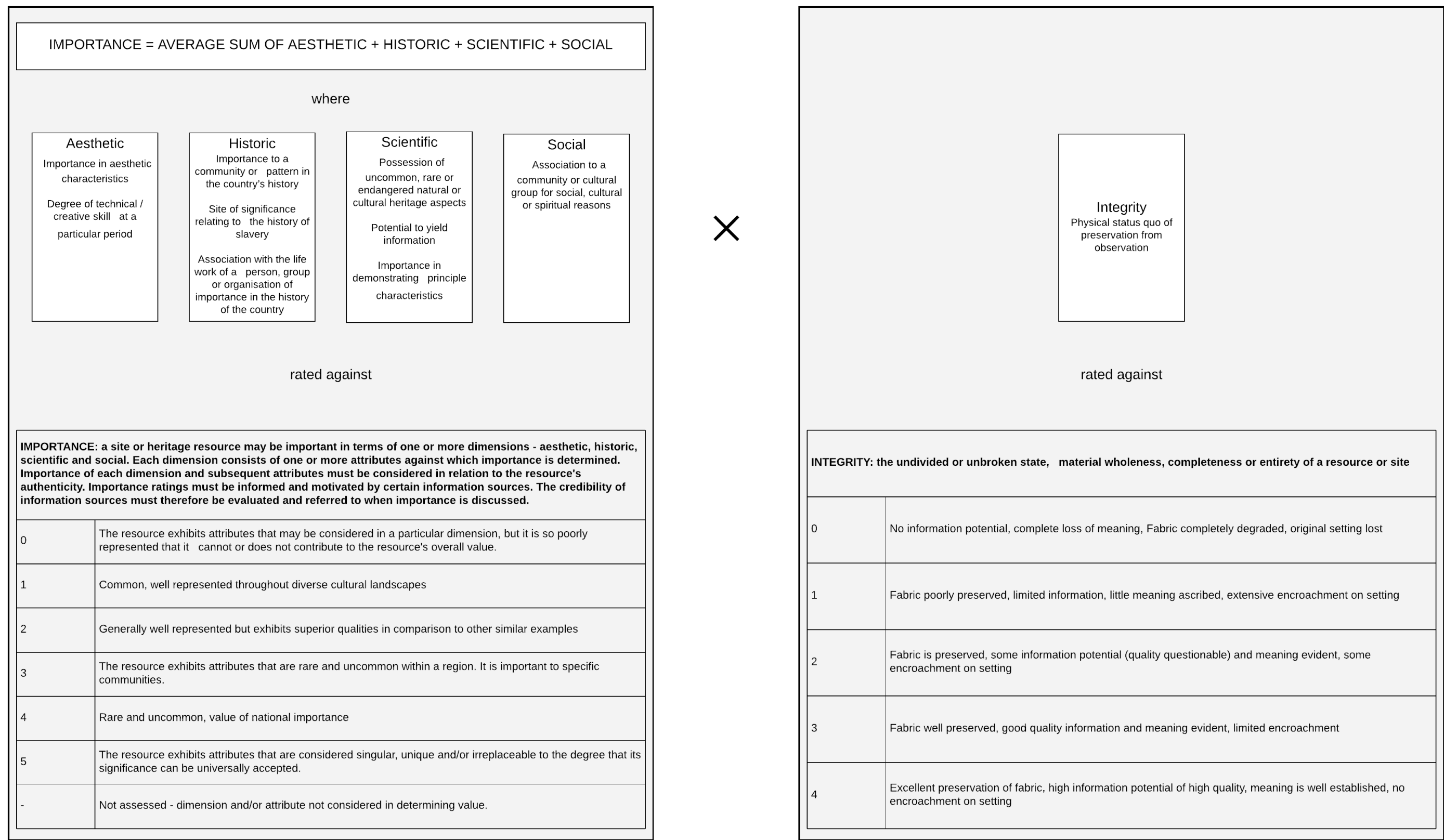


Figure 2-2: CS Determination Methodology

### 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.

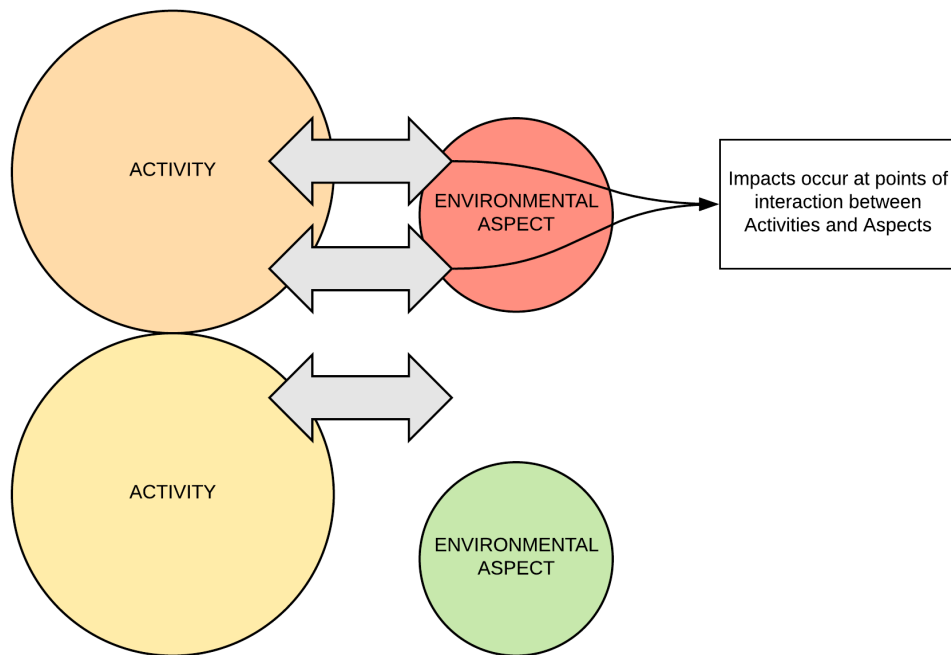
The following are terms and definitions applicable to the Environmental Impact Assessment (EIA) concept (ISO 14001):

- **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. <b>Example: Construction</b>	This refers to one or more of the activities that will be undertaken during the corresponding phase of the project. <b>Example: Topsoil clearing</b>	This identifies and considers the various aspects that will be affected by the project activity. <b>Example: Heritage, Biophysical, and Social</b>	This identifies and considers the interdependencies between the various aspects and how they may be impacted upon by the relevant activity. <b>Example: Removal of topsoil will impact on flora which may have heritage and social implications</b>	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. <b>Example: Physical alteration of the land</b>	Potential impacts are a culmination of the various categories evaluated as part of the impact assessment. <b>Example: Topsoil clearing will remove medicinal plants that will erode indigenous knowledge systems and cultural significance.</b>

**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	Exposure	Description	Intensity	Description	Probability	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	Exposure	Description	Intensity	Description	Probability	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																																								
Probability	Significance																																							
	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	
	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 <sup>4</sup>
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.

<sup>4</sup> 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 permits<sup>5</sup> 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.

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<sup>5</sup> 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.