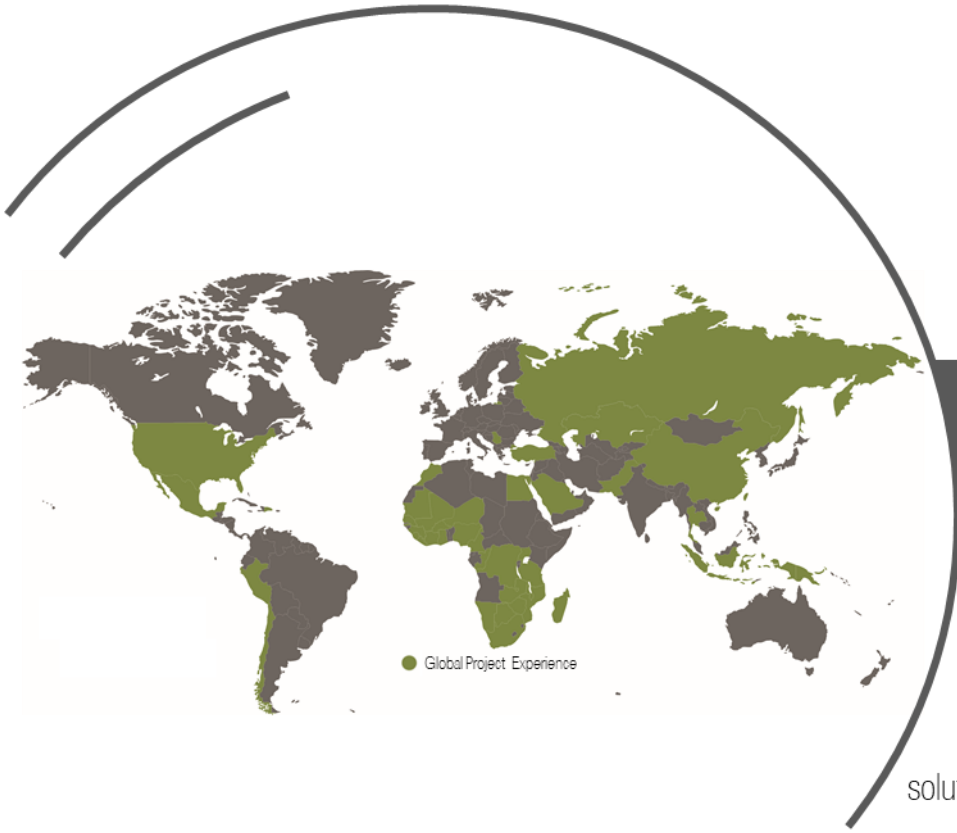

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Environmental Authorisation Process for the Lisbon Prospecting Right Application

Heritage Basic Assessment Report

Prepared for:
PalRho Exploration (Pty) Ltd

Project Number:
PAL6882

March 2021

Digby Wells and Associates
(South Africa) (Pty) Ltd
Company Registration: 2010/008577/07

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This document has been prepared by Digby Wells Environmental.

Report Type:	Heritage Basic Assessment Report
Project Name:	Environmental Authorisation Process for the Lisbon Prospecting Right Application
Project Code:	PAL6882

Name	Responsibility	Signature	Date
Shannon Hardwick HRM Consultant ASAPA Member: 451	Report Compilation		March 2021
Justin du Piesanie Divisional Manager: Social and Heritage Services ASAPA Member 270	Technical Review		
Claire Wannenburgh	Project Manager Review		

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DETAILS AND DECLARATION OF THE SPECIALIST

Digby Wells and Associates (South Africa) (Pty) Ltd

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Full name:	Shannon Hardwick
Title/ Position:	Heritage Resources Management Consultant
Qualification(s):	Master of Science (MSc) Archaeology
Experience (years):	3 years
Registration(s):	ASAPA, ICOMOS

I, Shannon Hardwick, declare that: –

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

Signature of the Specialist  *Date:* March 2021

Findings, recommendations and conclusions provided in this report are based on the best available scientific methods and the author's professional knowledge and information at the time of compilation. Digby Wells employees involved in the compilation of this report, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

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Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or make reference to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety.

EXECUTIVE SUMMARY

PalRho Exploration Pty (Ltd) (hereinafter PalRho), a subsidiary of Ivanhoe Mines Ltd. (Ivanhoe) intends to obtain a Prospecting Right in terms of Section 16 of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). PalRho intends to undertake prospecting activities on the farm Lisbon 288 KR (the Project).

The proposed Project triggers activities included in the Listed Activities in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982 of 4 December 2014, as amended) (EIA Regulations, 2014, as amended) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). To this end, Palhro appointed Digby Wells Environmental (hereinafter Digby Wells) to undertake the Basic Assessment (BA) required for Environmental Authorisation (EA).

This includes a specialist Heritage Resources Management (HRM) process in compliance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA). This document serves as the specialist Heritage Basic Assessment Report (HBAR) in support of the BA process for submission to the Heritage Resources Authorities (HRAs).

Digby Wells completed this heritage assessment at desktop level as access to the Project area could not be arranged within the regulatory timeframes within the BA process. As such, no heritage resources were identified within the proposed Project area. The proposed Project presents a risk of direct negative impact to heritage resources that may exist within the Project area and which have not been identified to date. The table below summarises the risk to these resources.

Summary of the potential risk to heritage resources

Unplanned event	Potential impact
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 *in situ* archaeological material during the implementation of the Project.	
Accidental exposure of *in situ* historical built environment sites during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 34 of the NHRA
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 construction phase of the Project.	

Considering the nature and the scope of the Project, Digby Wells recommends the following recommendations be implemented prior to the commencement of the Project:

- PalRho must appoint a suitably-qualified heritage specialist to undertake a pre-disturbance survey of the Project area to verify the presence or absence of heritage resources that may be impacted by the proposed Project and to inform the placement of the proposed boreholes;
- The results of the pre-disturbance survey and an updated assessment of the potential impacts to identified heritage resources must be submitted to the HRAs for adjudication. PalRho must receive Final Comment from the HRAs before the Project may commence and PalRho must comply with all HRA conditions during Project activities; and
- PalRho must develop and implement a CFP prior to the commencement of Project activities to mitigate against potential impacts to unidentified heritage resources. This CFP must be approved by the HRAs prior to implementation.

Where these recommendations are implemented, Digby Wells does not object to the Project going forward from a heritage perspective.

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ACRONYMS, ABBREVIATIONS AND DEFINITION

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

Abbreviation	Meaning
Kya	Thousand years ago
LED	Local Economic Development
LFC	Late Farming Community also known as Late Iron Age
LIHRA	Limpopo Heritage Resources Authority
LSA	Late Stone Age
MIA	Middle Iron Age
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MR	Mining Right
MRA	Mining Right Application or Mining Right Area (*as defined in the report*)
MSA	Middle Stone Age
MSc	Master of Science
Mya	Million years ago
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID	Notification of Intent to Develop
PalRho	PalRho Exploration Proprietary Limited
PHRA	Provincial Heritage Resources Authority
PRA	Prospecting Right Area
RoD	Record of Decision
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SCF	Statutory Comment Feedback
SEP	Stakeholder Engagement Process
SoW	Scope of Work
ToR	Terms of Reference
Wits	University of the Witwatersrand
Werf	A farmstead or multiple outbuildings associated with a farmhouse or agricultural activities. Plural: *werwe* (Afrikaans).

Refer to Appendix A for a Glossary of Terms.

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 iii-iv
An indication of the scope of, and the purpose for which, the report was prepared.	1(c)	-	1.1 1.2
Details of the person who prepared the report and their expertise to carry out the specialist study.	1(a)	-	1.3
Outlines the legislative framework relevant to the specialist heritage study.	-	-	3
Identifies the specific constraints and limitations of the HIA, including any assumptions made and any uncertainties or gaps in knowledge.	1(i)	-	4
Describes the methodology employed in the compilation of this HIA.	1(e)	-	5
An indication of the quality and age of base data used for the specialist report.	1(cA)	-	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)	-	5.5
Provides the baseline cultural landscape.	-	38(3)(a)	6
Motivates for the defined CS of the identified heritage resources and landscape.	-	38(3)(b)	7.1
A description of the potential impacts to heritage resources by project related activities, including: - Existing impacts on the site; - Possible risks to heritage resources; - Cumulative impacts of the proposed development; - Acceptable levels of change; and - Heritage-related risks to the project.	1(cB)	38(3)(c)-	7
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)	-	7

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)	6.5 12.1
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)	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)	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)		8
Any conditions for inclusion in the environmental authorisation.	1(l)		11
Any monitoring requirements for inclusion in the EMPr or environmental authorisation.	1(m)		9
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)	38(3)(g)	12
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)	13
Lists the source material used in the development of the report.	1(cA)	-	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)	-	N/A
Any other information requested by the competent authority.	1(q)	-	N/A

1. Introduction

PalRho Exploration Pty (Ltd) (hereinafter PalRho), a subsidiary of Ivanhoe Mines Ltd. (Ivanhoe) intends to obtain a Prospecting Right in terms of Section 16 of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). PalRho intends to undertake prospecting activities on three adjacent properties within the Limpopo Province; this application considers the prospecting activities on the farm Lisbon 288 KR (the Project).

The proposed Project triggers activities included in the Listed Activities in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982 of 4 December 2014, as amended) (EIA Regulations, 2014, as amended) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The Project therefore requires the completion of a Basic Assessment (BA) process to go ahead.

To this end, Palhro appointed Digby Wells Environmental (hereinafter Digby Wells) to undertake the BA process required for Environmental Authorisation (EA). This includes a specialist Heritage Resources Management (HRM) process in compliance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

This document serves as the specialist Heritage Basic Assessment Report (HBAR) in support of the BA process for submission to the Heritage Resources Authorities (HRAs). In this case, the applicable HRAs include the South African Heritage Resources Agency (SAHRA) and Limpopo Provincial Heritage Resources Authority (LIHRA).

1.1. Terms of Reference

PalRho appointed Digby Wells as the Independent Environmental Assessment Practitioner (EAP) to complete the BA process required for EA for the Project to go ahead. The BA process includes a HBAR in support of the BA process and in compliance with the NHRA.

1.2. Scope of Work

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

- Description of the predominant cultural landscape supported through primary and secondary data collection;
- Assessment of the Cultural Significance (CS) of the identified heritage resources;
- Identification of potential impacts to heritage resources based on the Project description and Project activities;
- 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 HBAR (as well as the BA Report and supporting specialist reports) to the HRAs for Statutory Comment as required under Section 38(8) of the NHRA.

1.3. Expertise of the Specialist

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

Table 1-1: Expertise of the Specialists

Team Member	Bio Sketch
Shannon Hardwick ASAPA Member: 451 ICOMOS Member 38048 Years' Experience: 3	Shannon joined the Digby Wells team in May 2017 as a Heritage Management Intern and has most recently been appointed as a Heritage Resources Management Consultant. Shannon is an archaeologist who obtained a Master of Science (MSc) degree from the University of the Witwatersrand in 2013, specialising in historical archaeobotany in the Limpopo Province. She is a published co-author of one paper in *Journal of Ethnobiology*. Since joining Digby Wells, Shannon has gained generalist experience through the compilation of various heritage assessments, including Heritage Scoping Reports (HSRs), HIAs, Heritage Basic Assessment Reports (HBARs) and Section 34 permit applications. Her other experience includes compiling a Community Health, Safety and Security Management Plan (CHSSMP) and various social baselines. Shannon's experience in the field includes pre-disturbance surveys in South Africa, Malawi and the Democratic Republic of the Congo and fieldwork in Malawi.
Justin du Piesanie ASAPA Member 270 ASAPA CRM Unit ICOMOS Member 14274 IAIAsa Member Years' Experience: 13	Justin is the Divisional Manager for Social and Heritage Services at Digby Wells. Justin joined the company in August 2011 as an archaeologist and was subsequently made HRM Manager in 2016 and Divisional Manager in 2018. He obtained his Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2008, specialising in the Southern African Iron Age. Justin also attended courses in architectural and urban conservation through the University of Cape Town's Faculty of Engineering and the Built Environment Continuing Professional Development Programme in 2013. Justin is a professional member of the Association of Southern African Professional Archaeologists (ASAPA) and accredited by the association's Cultural Resources Management (CRM) section. He is also a member of the International Council on Monuments and Sites (ICOMOS), an advisory body to the UNESCO World Heritage Convention. He has over 13 years combined experience in HRM in South Africa, including heritage assessments, archaeological mitigation, grave relocation, NHRA Section 34 application processes, and Conservation Management Plans (CMPs). Justin has gained further generalist experience since his appointment at Digby

Team Member	Bio Sketch
	Wells in Botswana, Burkina Faso, Cameroon, the Democratic Republic of Congo, Liberia, Malawi, Mali and Senegal on projects that have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage. Furthermore, Justin has acted as a technical expert reviewer of HRM projects undertaken in Cameroon, Malawi and Senegal. Justin's current focus at Digby Wells is to develop the HRM process as an integrated discipline following international HRM principles and standards. This approach aims to provide clients with comprehensive, project-specific solutions that promote ethical heritage management and assist in achieving strategic objectives.

2. Project Description

Plan 1 presents the regional setting within which the Project is located. The farm Lisbon 288 KR is approximately 10 km southwest of Mokopane in the Mogalakwena Local Municipality (MLM) of the Waterberg District Municipality (WDM) within the Limpopo Province. The Project area comprises 2 543 ha and includes the Portions 1, 4 and 6 to 19.

The minerals to be prospected for include chromium, cobalt, copper, fluorspar, gold, iridium, iron, nickel, phosphate ore, platinum and platinum group elements, palladium, rhodium, ruthenium, osmium, tin ore, vanadium, and Rare Earth Metals (including scandium).

Section 2.1 provides a summary of the proposed activities to be included in the prospecting for these minerals.

2.1. Proposed Infrastructure and Activities

PalRho will use invasive and non-invasive prospecting methods. The non-invasive methods will include:

- Capturing of all relevant geological data;
- A geophysical survey using digital data to confirm the locations of the proposed drilling activities and structures; and
- Analysis of the samples taken.

Invasive activities will include the drilling of multiple cores (approximately ten) to ascertain the stratigraphic sequence and reef horizons of the minerals and ore bodies. Each borehole will require the clearing of land covering approximately 20 m by 25 m.

PalRho will not construct any permanent infrastructure to undertake the prospecting activities. However, temporary tracks or access routes will be established between existing roads and the drilling sites and vegetation will be cleared for the drill rig.

PalRho must establish a borehole drilling plan prior to the commencement of the drilling programme. PalRho will confirm the exact location of the individual boreholes through a Stakeholder Engagement Process (SEP) and in consultation with the landowner or landowners. The borehole locations will consider potential environmental and heritage sensitivities and will be repositioned where necessary to avoid or minimise impacts to these landscapes.

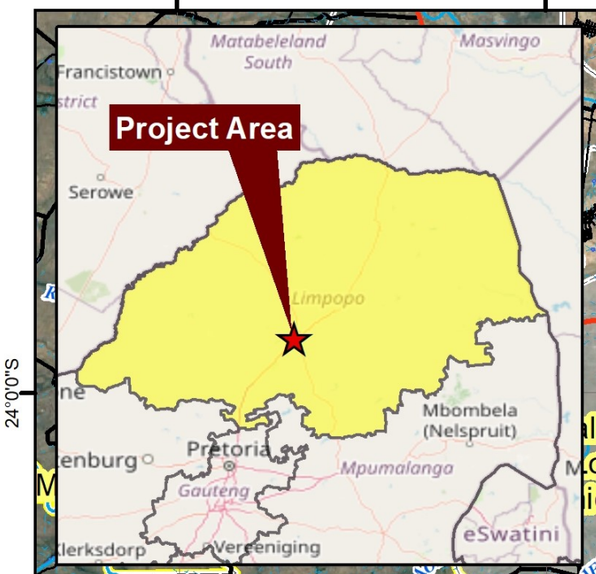
Plan 2 presents the proposed Project design and infrastructure layout. Table 2-1 presents an overview of the activities to be undertaken during the Project lifecycle.

Table 2-1: Project Phases and Associated Activities

Project Phase	Activities
Construction Phase	Establishment of temporary access routes or tracks between existing roads and drill locations
	Establishment of site and three sumps or trenches (per drilling site) to separate and store oil, sludge and water
	Clearing of vegetation for the drill rig
	Stockpiling of topsoil
Operational Phase	Drilling of approximately ten prospecting boreholes
	Handling of general and hazardous waste
	Use of heavy vehicles
	Maintenance of newly-established roads
Decommissioning Phase	Capping and marking of boreholes
	Removal of temporary infrastructure, decommissioning of camps and drilling equipment
	Backfilling of prospecting areas
	Natural revegetation or reseeding of indigenous vegetation

PalRho Prospecting Right Application

Regional Setting



Legend

- Secondary Town
- Other Town
- Settlement
- Railway Line
- National Route
- Main Road
- Secondary Road
- Street
- Non-Perennial River/Stream
- Perennial River/Stream
- Dam/Lake
- Reservoir/Water tank
- Marsh/Swamp
- Non-perennial pan
- Local Municipalities
- District Municipalities
- Municipal Wards
- Moorddrift 289
- Blinkwater 244
- Lisbon 288

DIGBY WELLS ENVIRONMENTAL

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E
Date: 16/02/2021
Ref #: PAL6882_10_PC

N

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Kilometres

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PalRho Prospecting Right Application

Lisbon 288 Drilling Locations

28°52'0"E 28°56'0"E 29°0'0"E

24°8'0"S 24°12'0"S 24°16'0"S

Lisbon 288 Prospecting Area

Mahwelereng

Mokopane

MOGALAKWENA

ROOISLOOT

NGWADITSE

DORPSRIVIER

N11 N1 R101 518 101

Legend

- Secondary Town
- Settlement

Prospecting Programme Phases

- Phase 1
- Phase 2
- Phase 3
- Railway Line
- National Route
- Main Road
- Secondary Road
- Street
- Non-Perennial River/Stream
- Perennial River/Stream
- Dam/Lake
- Reservoir/Water tank
- Marsh/Swamp
- Lisbon 288

DIGBY WELLS ENVIRONMENTAL

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E
Date: 16/02/2021
Ref #: PAL6882_08_PC

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Kilometres

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2.2. Alternatives Considered

As indicated in Section 2.1 above, the exact positioning (and the total number) of boreholes is flexible and can change to avoid or minimise potential impacts to the natural environment and should heritage resources occur in proximity to the borehole positions. The locations of the boreholes will be confirmed following the completion of the borehole drilling plan, which will occur following the approval of the Prospecting Right Application.

This HBAR will consider the 'no-go' alternative, which will occur should the Project not obtain approval or should the Project not go ahead for any reason. Should the Project not go forward, the potential environmental impacts associated with the Project will not occur. This includes the potential impacts to heritage resources described in Sections 7.2 to 7.4 below. However, the potential social benefits arising from the Project (summarised in Section 12.1) will also not occur.

3. Relevant Legislation, Standards and Guidelines

This section describes the national and regional legislative documents and policy documents that inform 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. 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 HRM process.

Table 3-1: Applicable Legislation considered in the HRM Process

Applicable legislation used to compile the report	Reference where applied
Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) 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 – i. Prevent pollution and ecological degradation; ii. Promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development	The HRM process was undertaken to identify heritage resources and determine heritage impacts associated with the Project. As part of the HRM process, applicable mitigation measures, monitoring plans and/or remediation were recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.

Applicable legislation used to compile the report	Reference where applied
National Environmental Management Act, 1998 (Act No. 107 of 1998) 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: *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.* 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.	The application process was undertaken in accordance with the principles of Section 24 of NEMA as well as with the EIA Regulations 2014 (as amended), promulgated in terms of NEMA.
GN R. 982: Environmental Impact Assessment Regulations, 2014 (as amended by GN R 326 of 7 April 2017) 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: • Regulation GN R. 327 (as amended) - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation and which must follow a basic assessment process. • Regulation GN R. 325(as amended) – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation and which must follow an environmental impact assessment process.	Refer to the BAR or the Notification of Intent to Develop (NID) for a full description of the Listed Activities triggered by the proposed Project. To comply with the regulations, an EIA process must be completed in support of the EA application. This HBAR report was completed to inform the BAR process to comply with Section 24 of the NEMA.

Applicable legislation used to compile the report	Reference where applied
• Regulation GN R. 324 (as amended)) – 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.	
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) 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: • 5. General principles for HRM • 6. Principles for management of heritage resources • 7. Heritage assessment criteria and grading • 38. Heritage resources management 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.	The HBAR report was compiled to comply with Section 5, 38(3), (4) and (8) of the NHRA. This report was submitted to the responsible HRAs, which in this instance is SAHRA and LIHRA.
NHRA Regulations, 2000 (GN R 548) 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: • II. Permit Applications and General Provisions for Permits; • III: Application for Permit: National Heritage Site, Provincial Heritage Site, Provisionally Protected Place or Structure older than 60 years; • IV: Application for Permit: Archaeological or Palaeontological or Meteorite;	The HRM process was undertaken with cognisance of the applicable regulations. The proposed mitigation strategies and management measures must comply with these requirements.

Applicable legislation used to compile the report	Reference where applied
• IX: Application for Permit: Burial Grounds and Graves; • X: Procedure for Consultation regarding Protected Area; • XI: Procedure for Consultation regarding Burial Grounds and Graves; and • XII: Discovery of Previously Unknown Graves.	
World Heritage Convention Act, 1999 (Act No. 49 of 1999) (WHCA) The WHCA incorporates the World Heritage Convention into South African law and makes provision for the enforcement and implementation of the Convention in the country. Chapter I of the Act outlines the Objectives and Principals of the Act and includes the criteria for identifying and nominating World Heritage Sites. Chapter IV of the Act sets out the requirements and considerations to be included in management plans related to World Heritage Sites.	The proposed Project is situated in proximity to a proclaimed World Heritage Site (refer to Section 6.1 for more details). This HBAR acknowledges the sensitivity of the heritage landscape within which the Project is located. Any recommendations included in this report must consider the principals of the WHCA.

Table 3-2: Applicable policies considered in the HRM process

Applicable policies used to compile the report	Reference where applied
SAHRA Archaeology, Palaeontology and Meteorites (APM) Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports (2007) The guidelines provide the minimum standards that must be adhered to for the compilation of a HIA (2007). Chapter II Section 7 outlines the minimum requirements for inclusion in the heritage assessment as follows: • Background information on the Project; • Background information on the cultural baseline; • Description of the properties or affected environs; • Description of identified sites or resources; • Recommended field rating of the identified sites to comply with Section 38 of the NHRA;	The HBAR report was compiled to adhere to the minimum standards as defined by Chapter II of the SAHRA Minimum Standards (2007).

Applicable policies used to compile the report	Reference where applied
• A statement of Cultural Significance in terms of Section 3(3) of the NHRA; and • Recommendations for mitigation or management of identified heritage resources.	

3.2. Regional Regulatory Context

The HRM process was completed to comply with the requirements of the South African national legislative framework as described above. Provincial legislation and municipal by-laws are applicable to graves and cemeteries and are considered in our recommendations where a Grave Relocation Process (GRP) may be required.

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
Digby Wells did not undertake a pre-disturbance survey to inform this assessment. At the time of the compilation of this report, PalRho was engaging with the landowners to inform them of the proposed Project and could not establish requirements for access to the properties within the regulated timeframes.	The cultural heritage baseline presented in Section 6.1 below is considered accurate but is not informed by in-field assessment of the Project area. No heritage resources have been identified within the Project area due to the lack of in-field assessment. PalRho must engage a suitably-qualified heritage specialist to inspect the areas to be impacted by the boreholes. This must be completed prior to the compilation of the borehole drilling plan. The results of the in-field assessment must be submitted to the HRAs for Statutory Comment. Final Comment must be received prior to the commencement of any drilling activities.
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 6.1 below is considered accurate but may not include new data or information which may not have been made available to the public.

Description	Consequence
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.

5. Methodology

The following section presents a summary of the methodologies employed in the HRM process. Appendix C includes a more detailed description of the HRM process methodologies.

5.1. Defining the Study Areas

Heritage resources do not exist in isolation to the greater natural and social environment, including the socio-cultural, socio-economic and socio-political environments. In addition, the NHRA requires the grading of heritage resources in terms of national, provincial and local concern based on their importance and consequent official (i.e., State) management effort required. The type and level of baseline information required to adequately predict heritage impacts varies between these categories. Digby Wells defined four nested study areas for the purposes of this study:

- The *site-specific* study area: the farm portions extent associated with the proposed boreholes and temporary infrastructure, including a 500 m buffer area. The site-specific study area may extend linearly, in which case the site-specific study area will include the linear development and a 200 m buffer on either side of the footprint;
- The *PR area*: the farm portions associated with the proposed PR Application;
- The *local study area*: the area most likely to be influenced by any changes to heritage resources in the Project area or where Project development could cause heritage impacts. Defined as the area bounded by the local municipality, in this instance MLM, with particular reference to the immediate surrounding properties and/or farms. The local study area was specifically examined to offer a backdrop to the socio-economic conditions within which the proposed development will occur. The local study area furthermore provided the local development and planning context that may contribute to cumulative impacts; and
- The *regional study area*: the area bounded by the district municipality, which here is the WDM. Where necessary, the regional study area may be extended outside the boundaries of the district municipality to include much wider regional expressions of specific types of heritage resources and historical events. The regional study area also

provided the regional development and planning context that may contribute to cumulative impacts.

5.2. Statement of Cultural Significance

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

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

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

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.

Category	Description
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: • Additive: the simple sum of all the effects, e.g., the reclamation of a historical Tailing Storage Facility (TSF) will minimise the sense of the historic mining landscape. • Synergistic: effects interact to produce a total effect greater than the sum of the individual effects, e.g., the removal of all historical TSFs will sterilise the historic mining landscape. • Time crowding: frequent, repetitive impacts on a particular resource at the same time, e.g., the effect of regular blasting activities on a nearby rock art site or protected historical building could be high. • Neutralizing: where the effects may counteract each other to reduce the overall effect, e.g., the effect of changes from a historic to modern mining landscape could reduce the overall impact on the sense-of-place of the study area. • 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.

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)	SAHRIS Palaeosensitivity Map (PSM)	
Statistics South Africa (2011)	Wazimap (2017)	
Cited Text		
Behrens & Swanepoel, 2008	Biemond, 2014	Bonner, 1983
Cawthorn, et al., 2006	Clark, 1982	Deacon & Deacon, 1999
Delius, 1983	Delius & Cope, 2007	Eastwood, et al., 2002
Environomics CC & NRM Consulting, 2010	Esterhuysen, 2003, 2006. 2007, 2010	Esterhuysen, et al., 2009
Esterhuysen & Smith, 2007	Groenewald & Groenewald, 2014	Hofmeyr, 1988, 1989
Huffman, 2004, 2007	Huffman & Van der Walt, 2011	Knight, et al., 2014
Martini, 2006	Mitchell, 2002	Mucina & Rutherford, 2010
Naidoo, 1987	Namono & Eastwood, 2005	Nel, 2012
Pistorius, 2002	Prins & Hall, 1994	Schapera, 1953
Sinclair, et al., 2003	Smith & van Schalkwyk, 2002	Smith & Zubieta, 2007
Smith & Ouzman, 2004	Tobias, 1945	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.**
538	648	0238 0710 048	2428	Potgietersrus	1965	National Geographical Institute

5.5. Primary Data Collection

Digby Wells did not undertake primary data collection to inform this assessment. At the time of compilation of this report, PalRho had engaged the affected landowner or landowners to inform them of the intended PR Application. During these engagements, it was not possible to confirm the requirements for access or to arrange for access during the regulatory timeframes.

5.6. Site Naming Convention

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., 1681/Site 1).

6. Findings and Discussion

This section presents a description of the cultural heritage baseline informed through primary and secondary data collection. The section also includes a summary of the developmental context within which the Project is located and presents the potential socio-economic benefits anticipated to arise from the Project. As required by Section 38(3)(d) of the NHRA, the socio-economic benefits are compared to the heritage impacts is considered in Section 12.1.

6.1. Cultural Heritage Baseline Description

The regional study area is underlain predominantly by the sediments of the Transvaal Supergroup and intrusive rocks of the Northern Limb of the Bushveld Complex. This limb is characterised by the mafic and ultramafic rocks of the Rustenburg Layered Suite overlying Archaean basement granites, gneiss and schist. The Rustenburg Layered Suite includes the Lower, Critical, Main and Upper Zones. The rocks of these layers are igneous in nature and are therefore generally devoid of fossils (Cawthorn, et al., 2006).

The Rustenburg Layered Suite is intruded by Bushveld granite sills, namely the Lebowa Granite Suite. The Bushveld Group dates to approximately 2 050 Ma and is represented within the Project area by the Nebo Granite, which is the final stratigraphic layer of this unit (Cawthorn, et al., 2006). Lithologies within the Bushveld Complex comprise intrusive igneous

rocks and are of zero or insignificant palaeontological sensitivity (SAHRA, 2013). As such, these features are not considered further in this assessment.

The Transvaal Supergroup is represented in the regional study area by the Pretoria Group. The Pretoria Group is considered to have high palaeosensitivity (Groenewald & Groenewald, 2014; SAHRA, 2013). Fossils associated with the Transvaal Supergroup include thick deposits of stromatolites and stromatolitic dolomite (Groenewald & Groenewald, 2014). Stromatolites are the ancient predecessors of modern algal mats. These features have been recorded in several layers of the Pretoria group and contribute significantly to the understanding of palaeoenvironments of Limpopo. There is potential for microfossils to occur within these layers, particularly within the Chuniespoort Group underlying the Pretoria Group.

The Chuniespoort Group includes the Malmani Subgroup. The Malmani Subgroup is significant in that these lithologies contain stromatolites and organic-walled microfossils representing the oldest fossil evidence of cyanobacteria. The dolomites of this subgroup are conducive to karst topography and associated cave formation and breccia (Groenewald & Groenewald, 2014).

Karst topography refers to landscapes formed through the dissolution of soluble rocks such as dolomite and limestone. These landscapes are characterised by underground drainage systems with sinkholes, dolines, and caves. Dissolution of the soluble rocks, such as the dolomites within the Malmani Subgroup, create voids (karst caves) that are filled with fine- to coarse-grained material, which may include breccia, sandstone and siltstone, during periodic flooding. The infill can include material from the surface, such as animal bone fragments, hominid remains and tools (Martini, 2006; Knight, et al., 2014, p. 8; Sinclair, et al., 2003).

The Waterberg Group overlies the Bushveld Complex. This group is comprised of sandstones and conglomerates with minor mudrocks deposited through braided stream environments, beach and tidal flats, marine shelves and lacustrine and aeolian environments (Groenewald & Groenewald, 2014). The Makgabeng Formation within the Waterberg Group includes some of the earliest known terrestrial cyanobacterial mats from playa deposits. These layers are of low palaeosensitivity.

Layers from the Transvaal Supergroup and the Malmani dolomites are not present within the Project area. Within the site-specific study area, the geology is dominated by Bushveld Granite, with Waterberg sediments present towards the west and mafic rock from the Bushveld Complex underlying the Nyl floodplain to the east.

The potential palaeontological sensitivities of the regional geological landscape notwithstanding, the cultural heritage baseline description considers the predominant landscape based on the identified heritage resource within the greater study area. Table 6-1 presents an overview of the broad timeframes for the major periods of the past in South Africa.

Table 6-1: Archaeological Periods in South Africa

The Stone Age	Earlier Stone Age (ESA)	2 mya to 250 thousand years ago (kya)
	Middle Stone Age (MSA)	250 kya to 20 kya
	Later Stone Age (LSA)	20 kya to 500 CE (Common Era[1])
Farming Communities	Early Farming communities (EFC)	500 to 1400 CE
	Late Farming Communities (LFC)	1100 to 1800 CE
Historical Period	-	1500 CE to 1850 (Behrens & Swanepoel, 2008)

Adapted from Esterhuysen & Smith (2007)

In total, 93 heritage resources were identified in the literature applicable to the regional, local and site-specific study areas. Figure 6-1 presents the breakdown of the identified heritage resources in terms of the archaeological periods.

The predominant tangible heritage resources recorded in the area under consideration are burial grounds and graves. This notwithstanding, archaeological resources affiliated with the MSA and the Farming Community, historical built environment resources and a Conservation Area[2] are present within the regional

The following section provides a brief description of these periods to provide context to the cultural heritage landscape.

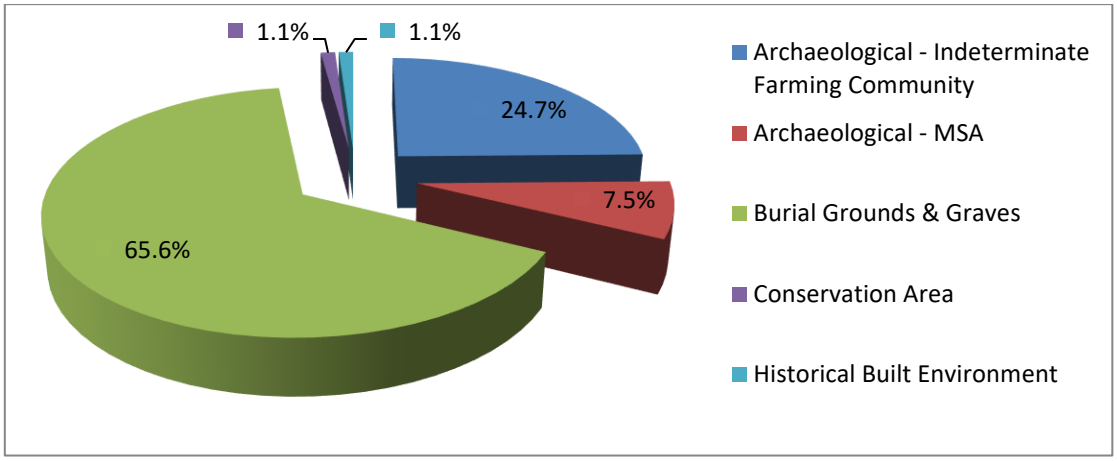

Figure 6-1: Heritage Resources Identified within the Regional Study Area

[1] 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).

[2] The Makapan Valley. This is described in more detail below.

The southern African Stone Age comprises three broad phases which are determined according to the various hominid species and the lithic tools and associated materials created by these hominid species through time. These phases are the ESA, MSA and LSA.

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. Archaeological evidence within the Limpopo Province suggests that hominids have inhabited the present-day province since the ESA.

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.* MSA artefacts are usually associated with water sources, for example pans and the Limpopo River. These finds are often not found *in situ* and therefore offer limited contextual information. Within the regional study area, the MSA is represented by isolated surface artefacts

The LSA dates from approximately 40 kya to the historical period. LSA lithics are specialised as specific tools each have specific uses (Mitchell, 2002). Assemblages from this period commonly include diagnostic tools such as scrapers and segments and may include bone points as well. As with the MSA artefacts, LSA artefacts are usually associated with water sources and are not usually found *in* situ.

The Fossil Sites of South Africa World Heritage Site (WHS), known colloquially as the Cradle of Humankind, is perhaps the most famous example of karst topography. 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.

The Fossil Sites of South Africa occurs within the Gauteng, Limpopo and North-West Provinces (UNESCO, 2018). Within the Limpopo Province, the WHS includes the Makapan Valley. This site covers approximately 2 200 ha and is located approximately 25 km from the Project area. The Cave of Hearths is the most prolific site in the region and archaeological investigations undertaken since the early 20th Century have produced artefacts representing all three phases of the Stone Age.

In southern Africa, the LSA is closely associated with hunter-gatherers. This period is further defined by evidence of ritual practices and complex societies (Deacon & Deacon, 1999). This is commonly expressed through rock art. Three rock art painting traditions occur within South Africa and are widely dispersed, although they are most notably recorded in the northern and eastern regions. Each of the traditions is associated with particular cultural groups, such as:

- Fine-line paintings: the first and oldest rock painting tradition, associated with autochthonous LSA hunter-gatherer groups. These paintings are usually made with red, white or black pigment, through the use of fine brushes, quills or sticks. Bichrome or polychrome paintings do occur, but these are rare. Subjects depicted in the paintings include realistic and proportionally correct animals, such as antelope, human figures and symbolic beings (Eastwood, et al., 2002);
- Finger paintings: associated with the later arrival of pastoralists; the tradition extends in linear bands following the proposed migration routes pastoralists may have followed from southern Angola and western Zambia to the southern Cape (Smith & Zubieta, 2007). The tradition was initially identified by Ben Smith and Sven Ouzman. (Smith & Ouzman, 2004) It is characterised by predominantly finger-painted geometric images, which are composed of circles, finger lines, finger dots and handprints, mostly painted in red pigment but also in red and white and occasionally only in white (Eastwood, et al., 2002; Smith & Zubieta, 2007); and
- Finger paintings: associated with a much later, possibly historical, farming communities. These paintings are commonly referred to as “Late White” and the art comprises images painted using the finger and thick white clay-based pigments. The images include stylised human and animal figures and geometric forms. These images are predominantly found in the northern parts of South Africa, particularly Limpopo Province (Prins & Hall, 1994; Smith & van Schalkwyk, 2002; Smith & Ouzman, 2004; Namono & Eastwood, 2005).

Hunter-gatherers were later followed by the various peoples of the Farming Community period. This time is characterised by the movements of Bantu-speaking agro-pastoralists moving into southern Africa and is divided into an early and late phase (EFC and LFC).

EFC and LFC sites can be identified through secondary tangible surface indicators, such as ceramics and evidence for the domestication of animals (such as faunal remains or dung deposits). Farming Community sites can include potsherds (*fragments of pottery*). Ceramic classification is commonly used by archaeologists to establish relative cultural-historical temporal sequences within southern African Farming Communities. In this way, relative dates can be assigned to sites, as well as inferring tenuous cultural similarities or associations. The predominant ceramics reported in the regional study area include several facies dating from the 14th century to the 1800s (Huffman, 2007).

Besides ceramics, the LFC can be identified through evidence for temporary or permanent settlement. This includes cattle posts which have been identified along the escarpment and settlements that were briefly occupied and which have been identified close to the workable soils along the Limpopo River (Huffman & Van der Walt, 2011). Ethnographic evidence suggests that the cattle posts may be associated with users of the *Letsibogo* ceramics; these users may have been the baKaa (Schapera, 1953; Huffman, 2007; Huffman & Van der Walt, 2011; Biemond, 2014). The *Letsibogo* ceramics are characterised by lines of punctates

separated by red and black zones (Huffman, 2007; Huffman & Van der Walt, 2011; Biemond, 2014). These ceramics date between 1500 CE and 1700 CE.

Within the regional study area, the Farming Community period is represented by isolated surface artefacts, stonewalling and one low-density surface scatter (Higgit, et al., 2013; Du Piesanie, et al., 2016).

The historical period[3] 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.

Within the regional cultural landscape, the LFC transition to the Historical Period is characterised by the emergence of large agricultural settlements associated with the baTswana. Archaeological excavations within the regional study area indicate that the baTswana occupation of the area may have been brief (Nel, 2012). As demonstrated in the history of the baKwena, periods of political turbulence caused disruptions during the 18th and 19th centuries (Schapera, 1953). It is these disruptions that are suggested to be the cause of the ephemeral remains of the archaeological sites (Nel, 2012).

The LFC-Historical Period transition is further characterised by the movements of LFC Nguni-speaking groups entering the region in the 17th Century CE. These migrant groups became what today is termed the Ndebele, divided into the Southern and Northern Ndebele. Most of the Ndebele are believed to have left Kwa-Zulu Natal between 1630 – 1670 CE (Esterhuysen, 2007) and the migration routes are thought to be associated with two groups, namely the Musi (ancestral Southern Ndebele Ndzundza, Manala and Kekana) and the Hlubi (ancestral Northern Ndebele Langa).

Much of the history of these Ndebele groups is accessible through oral history (Huffman, 2004). However, 17th and 18th century oral histories that have been collected do not necessarily provide coherent descriptions of events that led to the current populace and political environment (Delius, 1983). Missionary documents from the 19th century provide only a slightly more lucid record of the movements and fission of various chiefdoms (Esterhuysen, 2003).

Oral histories suggest that the Kekana trace their ancestry to the split of the chieftaincy after the death of Madidzi. A succession dispute between the two sons resulted in the chiefdom being divided into the Lidwaba and Gegana. The Gegana relocated their chiefdom to Muledlana near present day Zebediela (Esterhuysen, 2003). After a few generations, the lineage was disrupted again when Tjhumana passed away some time in the 18th century. Again, sons Mugombane I (Kxhaba) and Kxhumbha rivalled for the chieftaincy resulting in a

[3] 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).

split. Mugombane I was defeated by his brother and moved to the area just outside present day Mokopane in what has become known as the Makapan Valley.

The Langa first entered the regional study area toward the end of the 17th century, settling between the Matlotlo Mountains, the Sandsloot River in the south and Mogalakwena River to the west (Esterhuysen, 2003; Pistorius, 2002). They were led by Podile and settled at Bosega to the east of present-day Polokwane. From there they moved to Thaba Tsweu (Witkoppen Mountain). The numerous hills within the region are known to contain several historic Langa settlements, including Segopa, Magope, Fothane, Matlhogo and Ditlotswane.

Adding further to the instability in the region, European settlers, traders, missionaries and travellers moving into the interior further added to instability and resulting power struggles. Groups of Afrikaaners initiated a move from the Cape to the interior to establish an independent state in approximately 1835, in reaction to increased British liberalism and the abolishment of slavery and pass laws. The migration of these *Voortrekkers* is commonly referred to as the Great Trek (or *Groot Trek*) and it started with the first group, the Robert Schoon Party, in 1836 (Delius & Cope, 2007).

The *Voortrekkers*, now Boers, arrived at Louis Trichardt in 1837, marking the first contact between the Boers and Ndebele (Naidoo, 1987). The influx of this new group into the region coupled with the constant threat of the Pedi to the east required the establishment of strong socio-economic alliances to ensure the survival of the Kekana, and expand economic interests (Esterhuysen, 2006).

A significant historical event occurred, and was captured in written and oral records, at Historic Cave within the Makapan Valley in 1854. Tensions between the Boers and the Ndebele Groups developed Ndebele chiefdoms over land, labour and allegations of Boer slaving and were exacerbated in the 1850s after the establishment of Pietpotgietersrust[4] (Tobias, 1945; Bonner, 1983; Hofmeyr, 1988; Hofmeyr, 1989; Esterhuysen, et al., 2009; Esterhuysen, 2010).

In September 1854, the Kekana and Langa undertook a series of events killing Boers (Naidoo, 1987; Hofmeyr, 1989). This prompted Boer retaliation and reinforcements were sent from Rustenburg and the Soutpansberg (Esterhuysen, 2007). By the time the reinforcements had arrived, Mugombane I and his followers had retreated into Historic Cave, and the Langa had retreated to the hills in the north. The Boers discovered the Kekana seeking refuge in Historic Cave and laid siege to the cave. In the absence of water supplies, over 3 000 members of the Kekana died through dehydration or were captured or killed trying to escape the cave in search of water. The remaining Kekana surrendered and, on 21 November 1854, the Boers took control of the cave.

The first Potgietersus Platinum Mine was established in the 1920s near the town of Potgietersrus (now known as Mokopane) (Environomics CC & NRM Consulting, 2010). The Platreef was mined until the 1930s, when the platinum industry collapsed. This industry only boomed again during the latter half of the 1900s.

[4] Later renamed Potgietersrust and now known as Mokopane

The built environment sites within the regional study area include historical farmsteads (Higgit, et al., 2013). Other historical built environment resources include farmhouses and churches. The historical sites include surveyor posts and middens. Burial grounds and graves within the regional study area range in size from a single grave to burial grounds of fewer than 50 graves (Higgit, et al., 2013; Du Piesanie, et al., 2016). The size of some of the burial grounds were not determined in the field.

6.2. Results from the Pre-disturbance Survey

Digby Wells did not undertake primary data collection to inform this assessment. At the time of compilation of this report, PalRho had engaged the affected landowner or landowners to inform them of the intended PR Application. During these engagements, it was not possible to confirm the requirements for access or to arrange for access during the regulatory timeframes.

6.3. Existing Environment

The current state of the environment was not verified through any in-field inspection of the Project area. Table 6-2 presents a summary of the natural environment within which the Project is located.

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

Biome	Bio-region	Vegetation Type
Savanna	Central Bushveld	Waterberg Mountain Bushveld (SVcb 17) This vegetation type is characterised by rugged mountains with vegetation grading from bushveld on the higher slopes (which in turn grades to Gm 29) through broad-leaved deciduous bushveld on rocky mid- and foot-slopes to savanna on the lower-lying valleys and deeper sands on plateaus. This unit is associated with the lithologies of the Kransberg Subgroup and the Swaershoek Formation of the Nylstroom Subgroup, all within the Mokolian Waterberg Group. This unit is considered least threatened an approximately 3% has been transformed, mainly due to cultivation. Within the area associated with this vegetation type, population density is low. The carrying capacity for domestic stock is low, especially during the dry season. Within this type, erosion is generally very low to low.

Biome	Bio-region	Vegetation Type
		Makhado Sweet Bushveld (SVcb 20) Vegetation in this type is characterised by short and shrubby bushveld occurring on slightly to moderately undulating plains with some hills. This vegetation occurs on the gneisses and migmatites of the Hout River Gneiss, the potassium-deficient gneisses of the Goudplaats Gneiss and the sandstones and mudstones of the Matlabas Subgroup of the Mokolian Waterberg Group. This vegetation type is considered vulnerable and approximately 27% has been transformed. Cultivation is the main factor in this transformation, but urban and built-up areas have also contributed to this transformation. The southwestern half of the area associated with this unit is characterised by densely-populated rural communities. Erosion in this unit ranges from low to high.
Grassland	Mesic Highveld Grassland	Waterberg-Magaliesberg Summit Sourveld (Gm 29) This vegetation unit is characterised by higher slopes, summit positions (including crests), steep rocky scarps and cliff faces covered with grassland dominated by wiry tussock grasses. Patches of open savannoid vegetation and open shrubland are common and typical of this type. Succulents occur in the abundant rocky sheets on exposed mountain tops abundant within the unit. These sheets also support sparse grassland and herbland. This vegetation is underlain by the coarse, clastic sedimentary sandstone, quartzite, conglomerate or shale of the Kransberg Subgroup within the Waterberg Group. This vegetation type is considered least threatened as a large part is statutorily or privately conserved, and a small area has been transformed. Erosion is low to very low.

Adapted from Mucina & Rutherford (2010)

6.4. Results of Historical Layering

Figure 6-2 presents the site-specific study area as of 1965. The historical imagery illustrates a landscape that is mostly undisturbed and is characterised by the flora expected of this region. There are some cultivated fields present and other visible anthropogenic disturbance includes roads. No structures are visible in the historical imagery, however, there does exist the potential for structures over the age of 60 years to be present within the site-specific study area. Where such structures are located within the Project area, there is a strong possibility for graves to occur.

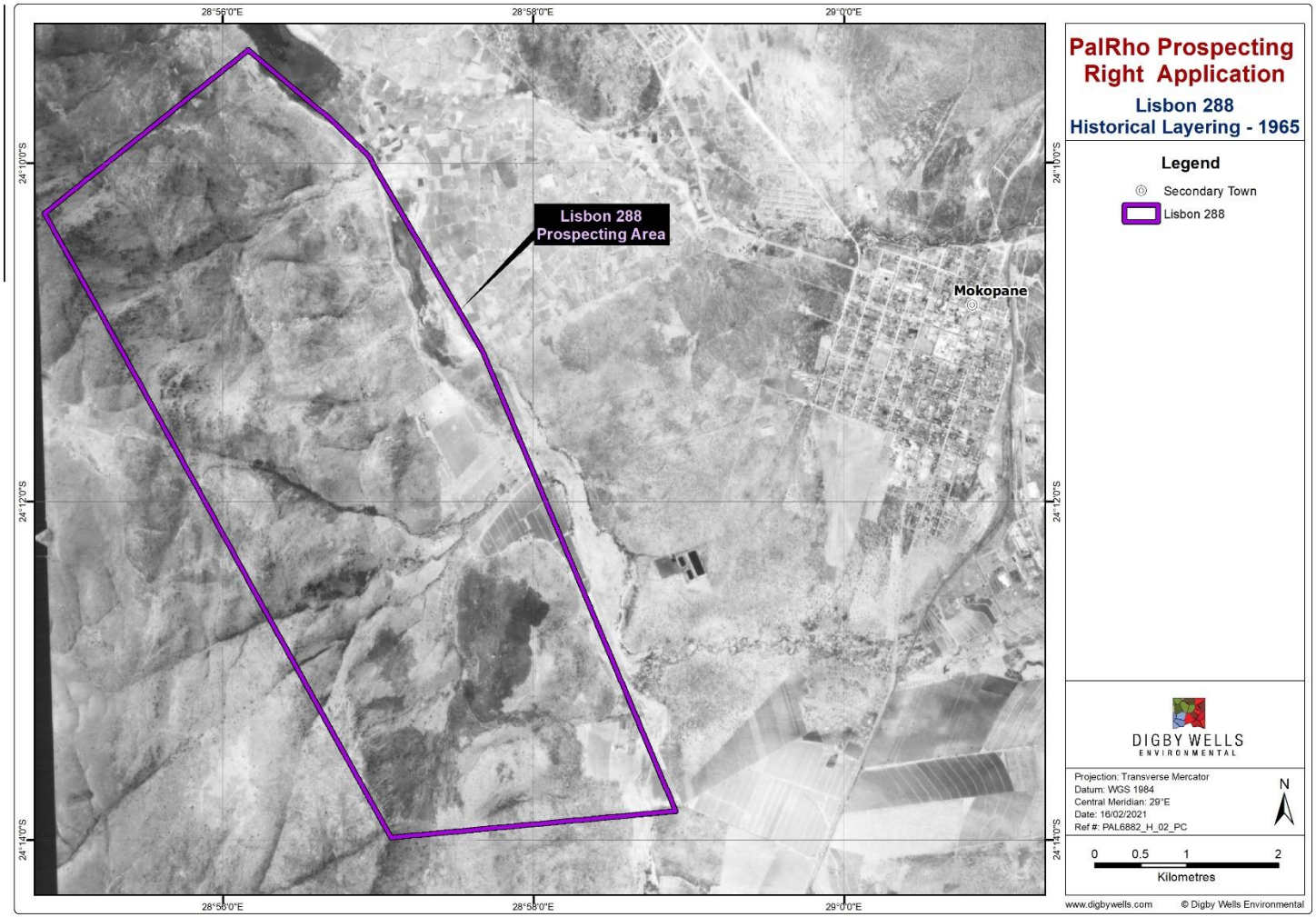

Figure 6-2: Historical Layering showing the Project area in 1965

6.5. Socio-economic Setting

This section provides a brief overview of the socio-economic context within which the Project is located to enable an assessment of the potential social benefits arising from the Project and to compare identified benefits again the heritage impacts (refer to Section 12.1) in compliance with the requirements of Section 38(3)(d) of the NHRA. This section is informed by data from Wazimap[5] (2017) and the Integrated Development Plan (IDP) for the WDM (2019)[6].

As of the 2011 Census, the Limpopo province included a population of 5 404 868 people, which accounts for approximately 10.4% of the South African population (Wazimap, 2017). The Limpopo Province is the fifth largest province in terms of population size and land size. The province includes five district municipalities, of which the WDM is the smallest in terms of population size. The WDM includes a population of 679 336 or approximately 12.6% of the provincial population. The district municipality includes five local municipalities. MLM is the largest of these in terms of population size, which includes 304 586 people or 44.8% of the population of WDM.

MLM includes 32 wards. The proposed Project is located in Ward 16, which has a population of 7 910 residents. This ward is rural in nature and it avoids the major urban settlements of Mokopane and surrounding settlements. The ward includes smaller settlements and a chrome mine, but is predominantly made of farming land, including cultivated fields and game farms or game lodges.

Table 6-3 presents an overview of the employment status within the regional study area.

Table 6-3: Employment Status of the Populations within the Regional Study Area

Statistics (Census 2011)	Ward 16		MLM		WDM	
	No.	%	No.	%	No.	%
Total Population	7 910	-	304 586	-	679 336	-
Working Age (18-64)	4 947	62.5	155 429	51	397 331	58.5
Employed	2 867	53.2	46 504	26.2	167 809	38.5
Discouraged Work Seeker	240	4.5	9 972	5.6	16 259	3.7
Unemployed	598	11.1	31 270	17.6	65 612	15
Other not economically active	1 688	31.2	89 874	50.6	187 181	42.8

Adapted from Wazimap (2017)

The key sectors contributing to the WDM economy include agriculture, manufacture, mining and tourism (WDM, 2019). Minerals mined within the WDM include chrome, coal, iron nickel, platinum, tin, and tungsten. The Waterberg field contains an estimated 76 billion tons of coal,

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

[6] Neither the final nor the draft IDP for 2020/2021 was available at the time of compilation of this report.

which is more than 40% of the national coal reserve. Mining contributes 47.4% of the WDM GDP and the district produces the most platinum within the Limpopo Province. The WDM and contributes the most in terms of GDP to the national mining sector. Mining within the WDM centres around Mokopane, Lephalale and the Northam-Thabazimbi area.

7. Impact Assessment

This section presents a description of the CS of identified heritage resources informed through primary and secondary data collection. The CS of the heritage resources informs the minimum required mitigation encapsulated in the NHRA and the SAHRA Minimum Standards.

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.

No heritage resources were identified within the Project area and therefore Digby Wells did not complete any CS assessment.

7.2. Construction Phase

Table 7-1 presents the activities expected to occur during the Construction Phase and the expected impacts to the cultural heritage landscape that may arise from these activities.

Table 7-1: Interactions and Impacts of Construction Phase Activities

Interaction	Impact
Establishment of temporary access routes or tracks between existing roads and drill locations	Digby Wells does not foresee any impact to the cultural heritage landscape, given the nature of the proposed activities and their flexibility in terms of their location.
Establishment of site and contractors camp and three sumps or trenches to separate and store oil, sludge and water	
Clearing of vegetation for the drill rig	
Stockpiling of topsoil	

Digby Wells does not foresee any impact to the identified heritage resources from the above-mentioned activities at this time, but this must be confirmed through in-field assessment. Digby Wells has therefore not assessed these impacts further in this report.

7.3. Operational Phase

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

Table 7-2: Interactions and Impacts of Operational Phase Activities

Interaction	Impact
Drilling of approximately ten prospecting boreholes	Digby Wells does not foresee any impact to the cultural heritage landscape, given the nature of the proposed activities and the consideration of the heritage landscape in the placement of the drilling sites and associated infrastructure.
Utilisation of portable toilet facilities	
Handling of general and hazardous waste	
Use of heavy vehicles	
Maintenance of newly-established roads	

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. Where applicable, the mitigation measures implemented in the construction phase must continue into this phase.

7.4. Decommissioning 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 Decommissioning Phase Activities

Interaction	Impact
Concurrent rehabilitation: mined-out areas will be backfilled with stockpiled topsoil and waste material from the screening plant.	Digby Wells envisages no impact to the cultural heritage landscape, given the nature of the proposed activities and the temporary nature of the proposed infrastructure.
Backfilled material will be levelled and contoured to avoid ponding of water.	
Revegetation: either naturally or through use of an indigenous seed mix where vegetation is not suitably established.	

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. Where any structures within the PR area are older than 60 years old, or where structures age

beyond 60 years during the Project lifecycle, such structures must not be destroyed or altered without the correct permit issued in terms of Section 34 of the NHRA.

7.5. 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 Limpopo 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, Space-crowding	The proposed Project will add to the existing mining landscape and detract from the archaeological and historical landscape. The local study area is increasingly associated with mining activities which are encroaching on the known archaeological heritage resources and the World Heritage Site buffer.	Negative	Local

7.6. 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* PalRho in terms of implementation of the Project. These two aspects are discussed separately.

Given the nature of heritage resources (such as archaeological artefacts) to occur at subsurface levels, unidentified heritage resources may be encountered during Project-related activities, even where the landscape has been assessed in-field. If heritage resources are subsequently identified, and where PalRho knowingly does not take proactive management measures, potential risks to PalRho 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 PalRho.

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

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 LIHRA 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 LIHRA.	• Fines; • Penalties; • Seizure of Equipment; • Compulsory Repair / Cease Work Orders; and • Imprisonment.

If additional heritage resources are identified during the implementation of Project-related activities (with specific reference to the clearing of land and vegetation, topsoil stockpiling and the drilling of the borehole), 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 Strategy
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 CFP 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 *in situ* 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 implementation of the Project.		

8. Environmental Management Programme

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

Table 8-1: Heritage Input into the Environmental Management Programme

Activity/ies	Potential Impacts	Aspects Affected	Phase	Mitigation Measure	Mitigation Type	Time period for implementation
• Construction activities as described in Table 2-1	Damage to or destruction of heritage resources *in situ*	Cultural Heritage	Construction	• PalRho must appoint a suitably qualified heritage specialist to undertake an in-field assessment the Project area to inform the placement of the proposed boreholes; and • Where any heritage resources are identified through the in-field assessment, impacts to these resources must assessed and the results of this assessment must be submitted to the HRAs for Statutory Comment	***Manage***	Prior to the compilation of the borehole drilling plan
• Construction and operation activities as described in Table 2-1	Damage to or destruction of previously unidentified heritage resources.	Cultural Heritage	Construction and operation	• Develop and implement CFP.	***Control***	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. Consultation and Results from Stakeholder Engagement

The Public Participation Process (PPP) required in terms of the NEMA as a component of the BA process has not been completed to date, as this report will be made available to the public as part of this process. This consultation process affords Interested and Affected Parties (I&APs) opportunities to engage in the BA process.

The objectives of the PPP or 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.

No formal consultation was undertaken as part of this assessment, as the PPP will be completed as a process separate to the heritage specialist assessment. Should any I&AP comments be submitted in relevance to heritage resources during the PPP, these will be considered in the final HBAR or BAR.

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. No such informal consultation was undertaken as part of this assessment as no primary data was collected.

11. Recommendations

Considering the nature and the scope of the Project, Digby Wells recommends the following recommendations be implemented prior to the commencement of the Project:

- PalRho must appoint a suitably-qualified heritage specialist to undertake a pre-disturbance survey of the Project area to verify the presence or absence of heritage resources that may be impacted by the proposed Project and to inform the placement of the proposed boreholes;

- The results of the pre-disturbance survey and an updated assessment of the potential impacts to identified heritage resources must be submitted to the HRAs for adjudication. PalRho must receive Final Comment from the HRAs before the Project may commence and PalRho must comply with all HRA conditions during Project activities; and
- PalRho must develop and implement a CFP prior to the commencement of Project activities to mitigate against potential impacts to unidentified heritage resources. This CFP must be approved by the HRAs prior to implementation.

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 in Section 11 above are adopted.

12.1. Socio-economic Benefits versus Heritage Impacts

Based on a review of the applicable planning documents and available socio-economic data detailed in Section 6.5 above, the potential socio-economic benefits that will arise from the Project outweigh the identified risks and impacts to the known heritage resources within the site-specific study area. This statement is supported by the potential for the identified impacts to heritage resources to be mitigated through the recommendations included in Section 11.

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 6 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.

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DIGBY WELLS
ENVIRONMENTAL

Appendix A: Glossary of Terms

GLOSSARY OF TERMS

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

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

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

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

Term	Definition
Living / intangible heritage	The intangible aspects of inherited culture that could include cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems, the holistic approach to nature, society and social relationships.
Management	In relation to heritage resources, includes the conservation, presentation and improvement of a place protected in terms of the NHRA.
Middle Stone Age	The South African MSA dates from ~300 Kya to c. 30 Kya. This period is associated with the changing behavioural patterns and the emergence of modern cognitive abilities in early *Homo sapiens species.* The lithic industries that characterise the MSA are typically more complex tools with diagnostic identifiers, including convergent flake scars, multi-faceted platforms, retouch and backing. Assemblages are characterised as refined lithic technologies such as prepared core techniques, retouched blades and points manufactured from good quality raw material.
National estate	The national estate as defined in Section 3 of the NHRA, i.e. heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations. The national estate may include: Places, buildings, structures and equipment of cultural significance. Places to which oral traditions are attached or which are associated with living heritage. Historical settlements and townscapes. Landscapes and natural features of cultural significance. Geological sites of scientific or cultural importance. Archaeological and palaeontological sites. Graves and burial grounds, including ancestral graves, royal graves and graves of traditional leaders, graves of victims of conflict, graves of individuals designated by the Minister by notice in the Gazette, historical graves and cemeteries, and other human remains which are not covered in terms of the National Health Act, 2003. Sites of significance relating to the history of slavery in South Africa. Movable objects, including objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; objects to which oral traditions are attached or which are associated with living heritage; ethnographic art and objects; military objects; objects of decorative or fine art; objects of scientific or technological interest. Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

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

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

DIGBY WELLS
ENVIRONMENTAL

Appendix B: Specialist CV

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
Weltervreden Mine Environmental Authorisation, Water Use Licence and Mining Right Application Project	Mbuyelo Group (Pty) Ltd	Belfast, Mpumalanga	Ongoing	Heritage Impact Assessment

Project Title	Name of Client	Project Location	Date of Completion	Project / Experience Description
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

Project Title	Name of Client	Project Location	Date of Completion	Project / Experience Description
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

Project Title	Name of Client	Project Location	Date of Completion	Project / Experience Description
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.

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
LLWDP-II HRM Process	Lesotho	2020	-	Heritage Impact Assessment	Lesotho Lowlands Water Development Project II
Ergo City Deep Heritage Mitigations	Johannesburg, Gauteng, South Africa	2020	-	Heritage Impact Assessment, Rescue Permit Application and Monitoring	Ergo (Pty) Ltd
Marshall Street Barracks Archaeological Monitoring	Johannesburg, Gauteng, South Africa	2020	-	Archaeological Monitoring	GVK-Siya Zama Construction
Exxaro Belfast Site Inspection	Belfast, Mpumalanga, South Africa	2020	2020	Site Inspection	Exxaro Coal Mpumalanga (Pty) Ltd
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	Orientale Province, Democratic Republic of Congo	2019	2019	Heritage Impact Assessment	Barrick Gold Corporation
Ergo City Deep HSMP	Johannesburg, Gauteng, South Africa	2019	2019	Heritage Site Management Plan	Ergo (Pty) Ltd
Ergo RTSF Section 34 Process	Westonaria, Gauteng, South Africa	2019	-	Section 34 Destruction Permit Applications	Ergo (Pty) Ltd

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
Twyfelaar EIA	Ermelo, Mpumalanga, South Africa	2019	2019	Heritage Impact Assessment	Dagsoom Coal Mining (Pty) Ltd
Sasol River Diversion	Sasolburg, Free State, South Africa	2019	2019	Heritage Impact Assessment	Sasol Mining
Sun City EIA and CMP	Pilanesberg, North-West Province, South Africa	2018	2019	Heritage Impact Assessment and Conservation Management Plan	Sun International
Exxaro Matla HRM	Kriel, Mpumalanga, South Africa	2017	2019	Heritage Impact Assessment and Conservation Management Plan	Exxaro Coal Mpumalanga (Pty) Ltd
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
Grootegeluk 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

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
Lanxess Chrome Mine Archaeological Mitigation	Rustenburg, North West Province, South Africa	2017	2017	Phase 2 Excavations	Lanxess Chrome Mine (Pty) Ltd
Tharisa Apollo EIA Project	KwaZulu-Natal, South Africa	2017	2017	Heritage Impact Assessment	GCS (Pty) Ltd
Queen Street Section 34 Process	Germiston, Johannesburg, Gauteng, South Africa	2017	2017	Section 34 Destruction Permit Applications	IDC Architects
Goulamina EIA Project	Goulamina, Sikasso Region, Mali	2017	2017	Heritage Impact Assessment	Birimian Limited
Zuurfontein Residential Establishment Project	Ekurhuleni, Gauteng, South Africa	2017	2017	Notification of Intent to Develop	Shuma Africa Projects
Kibali Grave Relocation Training and Implementation	Orientale 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

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
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 Province, South Africa	2016	2016	Notification of Intent to Develop	Exxaro Coal Resources (Pty) Ltd
Garsfontein Township Development	Pretoria, Gauteng, South Africa	2016	2016	Notification of Intent to Develop	Leungo Construction Enterprises
Louis Botha Phase 2	Johannesburg, Gauteng, South Africa	2016	2016	Phase 2 Excavations	Royal Haskoning DHV
Sun City Heritage Mapping	Pilanesberg, North-West 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 Impact Assessment and Section 34 Destruction Permit Application	Bigen Africa Services (Pty) Ltd
EDC Block Refurbishment Project	Johannesburg, Gauteng, South Africa	2015	2016	Heritage Impact Assessment and Section 34 Permit Application	Bigen Africa Services (Pty) Ltd
Namane IPP and Transmission Line EIA	Steenbokpan, Limpopo Province, South Africa	2015	2016	Heritage Impact Assessment	Namane Resources (Pty) Ltd

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
Temo Coal Road Diversion and Rail Loop EIA	Steenbokpan, Limpopo Province, South Africa	2015	2016	Heritage Impact Assessment	Namane Resources (Pty) Ltd
Sibanye WRTRP	Gauteng, South Africa	2014	2016	Heritage Impact Assessment	Sibanye Stillwater
NTEM Iron Ore Mine and Pipeline Project	Cameroon	2014	2016	Technical Review	IMIC plc
NLGM Constructed Wetlands Project	Liberia	2015	2015	Heritage Impact Assessment	Aureus Mining
ERPM Section 34 Destruction Permits Applications	Johannesburg, Gauteng, South Africa	2015	2015	Section 34 Destruction Permit Applications	Ergo (Pty) Ltd
JMEP II EIA	Botswana	2015	2015	Heritage Impact Assessment	Jindal
Oakleaf ESIA Project	Bronkhorstspruit, Gauteng, South Africa	2014	2015	Heritage Impact Assessment	Oakleaf Investment Holdings
Imvula Project	Kriel, Mpumalanga, South Africa	2014	2015	Heritage Impact Assessment	Ixia Coal
VMIC Vanadium EIA Project	Mokopane, Limpopo, South Africa	2014	2015	Heritage Impact Assessment	VM Investment Company
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012	2015	Heritage Impact Assessment	Aquarius Resources
Nzoro 2 Hydro Power Project	Orientale Province, Democratic Republic of Congo	2014	2014	Social consultation	Randgold Resources Limited
Eastern Basin AMD Project	Springs, Gauteng, South Africa	2014	2014	Heritage Impact Assessment	AECOM
Soweto Cluster Reclamation Project	Soweto, Gauteng, South Africa	2014	2014	Heritage Impact Assessment	Ergo (Pty) Ltd
Klipspruit South Project	Ogies, Mpumalanga, South Africa	2014	2014	Heritage Impact Assessment	BHP Billiton

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
Klipspruit Extension: Weltevreden Project	Ogies, Mpumalanga, South Africa	2014	2014	Heritage Impact Assessment	BHP Billiton
Ergo Rondebult Pipeline Basic Assessment	Johannesburg, South Africa	2014	2014	Heritage Basic Assessment	Ergo (Pty) Ltd
Kibali ESIA Update Project	Orientale Province, Democratic Republic of Congo	2014	2014	Heritage Impact Assessment	Randgold Resources Limited
GoldOne EMP Consolidation	Westonaria, Gauteng, South Africa	2014	2014	Gap analysis	Gold One International
Yzermite PIA	Wakkerstroom , Mpumalanga, South Africa	2014	2014	Palaeontological Impact Assessment	EcoPartners
Sasol Mooikraal Basic Assessment	Sasolburg, Free State, South Africa	2014	2014	Heritage Basic Assessment	Sasol Mining
Rea Vaya Phase II C Project	Johannesburg, Gauteng, South Africa	2014	2014	Heritage Impact Assessment	ILISO Consulting
New Liberty Gold Project	Liberia	2013	2014	Grave Relocation	Aureus Mining
Putu Iron Ore Mine Project	Petroken, Liberia	2013	2014	Heritage Impact Assessment	Atkins Limited
Sasol Twistdraai Project	Secunda, Mpumalanga, South Africa	2013	2014	Notification of Intent to Develop	ERM Southern Africa
Kibali Gold Hydro-Power Project	Orientale Province, Democratic Republic of Congo	2012	2014	Heritage Impact Assessment	Randgold Resources Limited
SEGA Gold Mining Project	Burkina Faso	2013	2013	Technical Reviewer	Cluff Gold PLC
Consbrey and Harwar Collieries Project	Breyton, Mpumalanga, South Africa	2013	2013	Heritage Impact Assessment	Msobo Coal
Falea Uranium Mine Environmental Assessment	Falea, Mali	2013	2013	Heritage Scoping	Rockgate Capital

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
Daleside Acetylene Gas Production Facility	Gauteng, South Africa	2013	2013	Heritage Impact Assessment	ERM Southern Africa
SEGA Gold Mining Project	Burkina Faso	2012	2013	Socio Economic and Asset Survey	Cluff Gold PLC
Kibali Gold Project Grave Relocation Plan	Orientale Province, Democratic Republic of Congo	2011	2013	Grave Relocation	Randgold Resources Limited
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012	2012	Heritage Impact Assessment	Aquarius Resources
Environmental Authorisation for the Gold One Geluksdal TSF and Pipeline	Gauteng, South Africa	2012	2012	Heritage Impact Assessment	Gold One International
Platreef Burial Grounds and Graves Survey	Mokopane, Limpopo Province, South Africa	2012	2012	Burial Grounds and Graves Survey	Platreef Resources
Resgen Boikarabelo Coal Mine	Limpopo Province, South Africa	2012	2012	Phase 2 Excavations	Resources Generation
Bokoni Platinum Road Watching Brief	Burgersfort, Limpopo Province, South Africa	2012	2012	Watching Brief	Bokoni Platinum Mine
Transnet NMPP Line	Kwa-Zulu Natal, South Africa	2010	2010	Heritage survey	Umlando Consultants
Archaeological Impact Assessment – Witpoortjie Project	Johannesburg, Gauteng, South Africa	2010	2010	Archaeological Impact Assessment	ARM
Der Brochen Archaeological Excavations	Steelpoort, Mpumalanga, South Africa	2010	2010	Phase 2 Excavations	Heritage Contracts Unit
De Brochen and Booysendal Archaeology Project	Steelpoort, Mpumalanga, South Africa	2010	2010	Site Recording: Mapping	Heritage Contracts Unit
Eskom Thohoyandou Electricity Master Network	Limpopo Province, South Africa	2010	2010	Heritage Statement	Strategic Environmental Focus

PROJECT	LOCATION	DATES		PROJECT TYPE	CLIENT
Batlhako Mine Expansion	North-West Province, South Africa	2010	2010	Phase 2 Mapping	Heritage Contracts Unit
Wenzelrust Excavations	Shoshanguve, Gauteng, South Africa	2009	2009	Phase 2 Excavations	Heritage Contracts Unit
University of the Witwatersrand Parys LIA Shelter Project	Parys, Free State, South Africa	2009	2009	Phase 2 Mapping	University of the Witwatersrand
Archaeological Assessment of Modderfontein AH Holdings	Johannesburg, Gauteng, South Africa	2008	2008	Heritage Basic Assessment	ARM
Heritage Assessment of Rhino Mines	Thabazimbi, Limpopo Province, South Africa	2008	2008	Heritage Impact Assessment	Rhino Mines
Cronimet Project	Thabazimbi, Limpopo Province, South Africa	2008	2008	Archaeological surveys	Cronimet
Eskom Thohoyandou SEA Project	Limpopo Province, South Africa	2008	2008	Heritage Statement	Eskom
Witbank Dam Archaeological 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 Recording: Mapping	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);	270

Position	Professional Body	Registration Number
	ASAPA Cultural Resources Management (CRM) section	
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)

Appendix C: HRM Assessment Methodology

DIGBY WELLS
ENVIRONMENTAL

Cultural Significance, Field Rating and Impact Assessment

Methodology Statement

Project Number:

ZZZ9999

Prepared for:

Internal Document

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This document has been prepared by Digby Wells Environmental.

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

Revision History

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

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

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1 Introduction

Cultural heritage resources are intrinsic to the history and beliefs of communities. They characterise community identity and cultures, are finite, non-renewable and irreplaceable. Considering the innate value of cultural heritage resources, Heritage Resources Management (HRM) acknowledges that these have lasting worth as evidence of the origins of life, humanity and society. It is incumbent of the assessor to determine the cultural significance[1] (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[2] and intangible[3] cultural heritage resources within the defined area of influence.

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

2 Evaluation of Cultural Significance and Field Ratings

2.1 Cultural Significance Determination

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

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

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

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

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

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

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

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

2.2 Field Rating Determination

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

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

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

Field Rating = Average Sum of Aesthetic + Historic + Scientific + Social

rated against

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

Figure 2-1: Field Ratings Methodology

IMPORTANCE = AVERAGE SUM OF AESTHETIC + HISTORIC + SCIENTIFIC + SOCIAL

where

Aesthetic
Importance in aesthetic characteristics

Degree of technical / creative skill at a particular period

Historic
Importance to a community or pattern in the country's history

Site of significance relating to the history of slavery

Association with the life work of a person, group or organisation of importance in the history of the country

Scientific
Possession of uncommon, rare or endangered natural or cultural heritage aspects

Potential to yield information

Importance in demonstrating principle characteristics

Social
Association to a community or cultural group for social, cultural or spiritual reasons

rated against

IMPORTANCE: a site or heritage resource may be important in terms of one or more dimensions - aesthetic, historic, scientific and social. Each dimension consists of one or more attributes against which importance is determined. Importance of each dimension and subsequent attributes must be considered in relation to the resource's authenticity. Importance ratings must be informed and motivated by certain information sources. The credibility of information sources must therefore be evaluated and referred to when importance is discussed.	
0	The resource exhibits attributes that may be considered in a particular dimension, but it is so poorly represented that it cannot or does not contribute to the resource's overall value.
1	Common, well represented throughout diverse cultural landscapes
2	Generally well represented but exhibits superior qualities in comparison to other similar examples
3	The resource exhibits attributes that are rare and uncommon within a region. It is important to specific communities.
4	Rare and uncommon, value of national importance
5	The resource exhibits attributes that are considered singular, unique and/or irreplaceable to the degree that its significance can be universally accepted.
-	Not assessed - dimension and/or attribute not considered in determining value.

×

Integrity
Physical status quo of preservation from observation

rated against

INTEGRITY: the undivided or unbroken state, material wholeness, completeness or entirety of a resource or site	
0	No information potential, complete loss of meaning, Fabric completely degraded, original setting lost
1	Fabric poorly preserved, limited information, little meaning ascribed, extensive encroachment on setting
2	Fabric is preserved, some information potential (quality questionable) and meaning evident, some encroachment on setting
3	Fabric well preserved, good quality information and meaning evident, limited encroachment
4	Excellent preservation of fabric, high information potential of high quality, meaning is well established, no encroachment on setting

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.

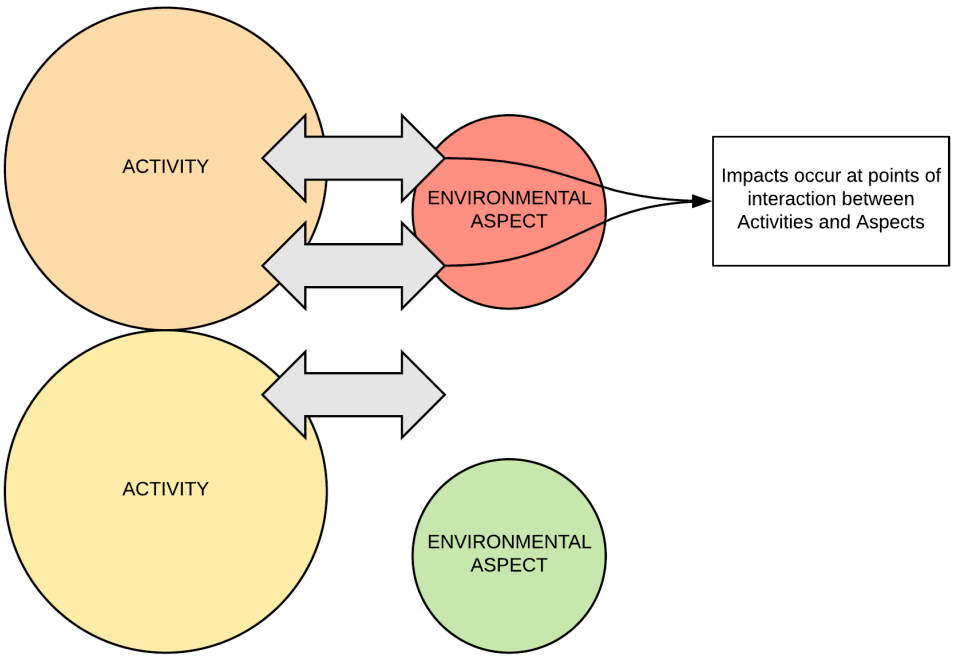

Figure 3-1: Graphical Representation of Impact Assessment Concept

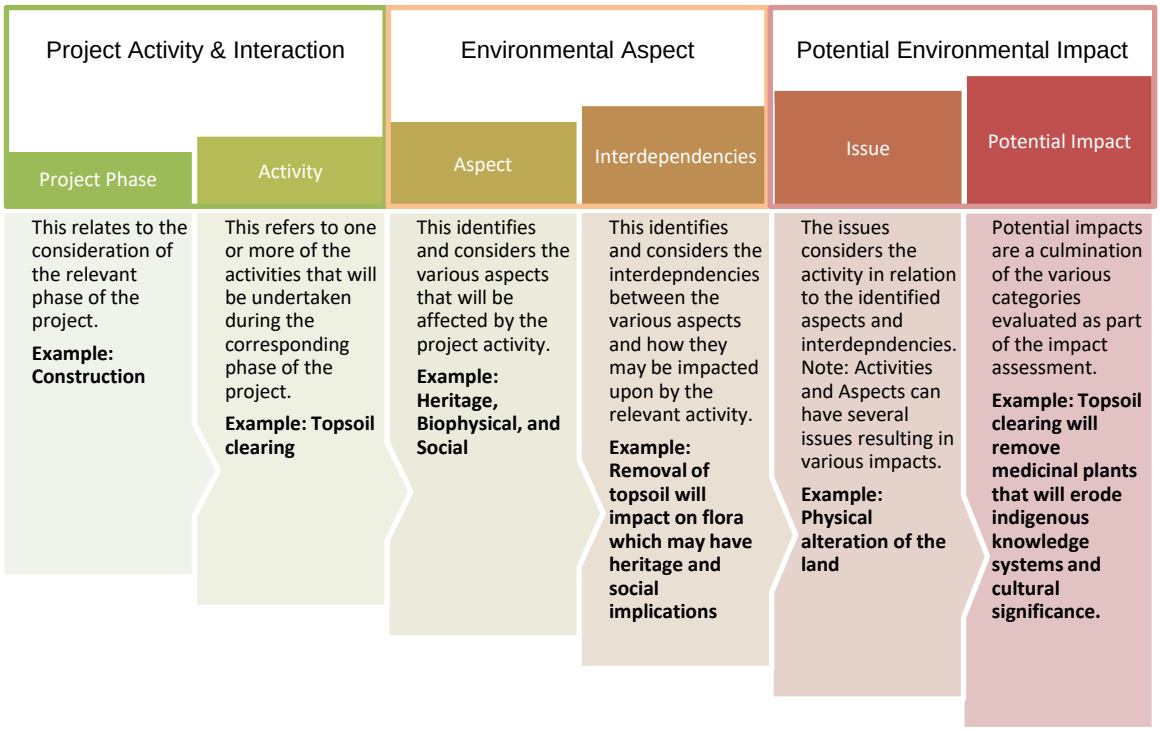

Figure 3-2: Example of how Potential Impacts are considered

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

Significance

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

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

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

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

[4] Based on minimum requirements encapsulated in guidelines developed by SAHRA

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

- Intensive detailed recording of sites through various non-intrusive techniques to create a documentary record of the site – "preservation by record"; and
- Intrusive recording and sampling such as shovel test pits (STPs) and excavations, relocation (usually burial grounds and graves, but certain types of sites may be relocated), restoration and alteration. Any form of intrusive mitigation is normally a regulated permitted activity for which permits[5] need to be issued by the Heritage Resource Authorities (HRAs). Such mitigation may result in a reassessment of the value of a cultural heritage resource that could require conservation measures to be implemented. Alternatively, an application for a destruction permit may be made if the resource has been sufficiently sampled.

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

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

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