

# DIGBY WELLS

## ENVIRONMENTAL

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**SAHRIS Case ID: 10016**

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## Application for a Mining Right and Environmental Authorisation of the proposed Palmietkuilen Mine, Gauteng Province

### Heritage Impact Assessment

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#### Project Number:

CNC4065

#### Prepared for:

Canyon Resources (Pty) Ltd

October 2016

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<b>Project Name:</b>	<b>Application for a Mining Right and Environmental Authorisation of the proposed Palmietkuilen Mine, Gauteng Province</b>
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## DECLARATION OF INDEPENDENCE

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I, Justin du Piesanie as duly authorised representative of Digby Wells and Associates (South Africa) (Pty) Ltd., hereby confirm my independence (as well as that of Digby Wells and Associates (South Africa) (Pty) Ltd.) and declare that neither I nor Digby Wells and Associates (South Africa) (Pty) Ltd. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of Canyon Resources (Pty) Ltd, other than fair remuneration for work performed, specifically in connection with the Heritage Resources Management (HRM) Process for the Mining Right Application and Environmental Authorisation of the proposed Palmietkuilen Mine, located near Springs, Gauteng Province.



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## EXECUTIVE SUMMARY

Digby Wells Environmental (hereinafter Digby Wells) was appointed by Canyon Resources (Pty) Ltd (hereinafter Canyon Coal) to undertake the necessary environmental and social studies required for Environmental Authorisation (EA) of the proposed Palmietkuilen Mining Project (*the Project*) near Springs in the Gauteng Province.

The Project will entail the establishment of a new open pit coal mine and supporting infrastructure. Proposed mining methods include bench and strip mining techniques. Drilling and blasting will be employed to remove overburden or bedrock and expose the coal seams.

This HIA was completed by Digby Wells as part of the EA process of the Project to promote compliance with Section 38(8) of the National Heritage Resources Act, 1999 (Act no. 25 of 1999) (NHRA) and Section 24 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). This assessment considered the cultural landscape identified, the distribution of known heritage resources, the designated Cultural Significance (CS) and the potential of heritage resources to be impacted upon by project related activities.

Within the local study area, a total of 158 heritage resources were identified ranging from the Late Farming Community (LFC) through to historical period. Of these, seven occur within the site-specific study area. These consist of the following:

Heritage resources	Number of identified heritage resource
<b>Burial Grounds &amp; Graves</b>	<b>3</b>
BGG-001	1
BGG-002	1
Palmietkuil South War Cemetery Memorial	1
<b>Historical Built Environment</b>	<b>5</b>
Ste-001	1
Ste-007	1
Wf-008	1
Wf-009	1
Wf-045	1
<b>Grand Total</b>	<b>8</b>

The identified historical built environment resources were determined to have a negligible CS designation and were excluded from the impact assessment. The motivation for the exclusion from further assessment was based on the definitions as presented in the SAHRA Minimum Standards (SAHRA, 2007). The exclusion of the historic built environment does not, however, preclude permitting requirements in terms of Section 34 of the NHRA where structures will be altered, damaged or destroyed. These requirements are specifically in reference to structures associated with Wf-008 and Wf-009 within the development footprint that will be impacted upon by project related activities.

Two gravesites, BGG-001 and BGG-002 are situated within the development footprint and will be directly impacted upon by project related activities during construction and operational phases. The operational phase of the Project presents the greatest likelihood for direct negative impacts on the burial grounds BGG-001 and BGG-002 to manifest. Based on the location of these resources, the identified direct impacts include loss of access to the sites and the eventual destruction of the burial grounds and graves during years 40 – 45 of the LoM.

A summary of the impact assessment is presented in the following table:

Code	Impact	Pre-mitigation:						Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
BGG	Direct impact to burial grounds and graves	Project Life	National	High - negative	Highly detrimental	Highly probable	Moderate - negative	Immediate	Very limited	High - negative	Slightly detrimental	Highly unlikely	Negligible - negative
	Direct impact to burial grounds and graves	Permanent	National	Extremely high - negative	Extremely detrimental	Certain	Major - negative	Beyond project life	Limited	Extremely high - negative	Highly detrimental	Highly probable	Moderate - negative

Where *in situ* conservation of the burial grounds and graves is implemented during the construction and operational phase, the graves will be directly impacted through the loss of access and degradation of the intrinsic value of the graves. In this instance, a Burial Grounds and Graves Consultation (BGGC) process in accordance with Chapter XI of the Regulations to the Act, aimed at identifying *bona fide* Next-of-Kin (NoK), must be undertaken to reach agreement on the continued conservation of the burial grounds, and access to the site to minimise the identified impact.

To avoid the identified direct impact during years 40 – 45 of the operational phase of the Project, recommended project related mitigations include the amendment of the infrastructure design to exclude the identified burial grounds from the development footprint that will allow for the *in situ* conservation of the graves. Where the recommended project design amendment is not feasible, and EA and a mining right for the Project is granted, a BGGC and Grave Relocation Plan (GRP) must be undertaken in accordance with the requirements of Chapters XI and IX of the Regulations to the Act.

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## LIST OF ACRONYMS

<b>Abbreviation</b>	<b>Meaning</b>
<b>ASAPA</b>	Association of Southern African Professional Archaeologists
<b>BA</b>	Bachelor of Arts
<b>BID</b>	Background Information Document
<b>BSc</b>	Bachelor of Science
<b>c.</b>	circa, meaning approximately
<b>CE</b>	Common Era
<b>CFP</b>	Chance Find Protocol
<b>CMP</b>	Conservation Management Plan
<b>CRR</b>	Comments and Response Report
<b>CS</b>	Cultural Significance
<b>Digby Wells</b>	Digby Wells Environmental
<b>EA</b>	Environmental Authorisation
<b>EAP</b>	Environmental Assessment Practitioner
<b>EFC</b>	Early Farming Community (also known as Early Iron Age)
<b>EIA</b>	Environmental Impact Assessment
<b>EMP</b>	Environmental Management Plan
<b>ESA</b>	Early Stone Age
<b>GIS</b>	Geographical Information System
<b>GN R</b>	Government Notice Regulation
<b>GPS</b>	Global Positioning System
<b>HIA</b>	Heritage Impact Assessment
<b>Hons</b>	Honours degree
<b>HRAs</b>	Heritage Resources Authorities
<b>HRM</b>	Heritage Resources Management
<b>HSR</b>	Heritage Scoping Report
<b>ICOMOS</b>	International Council on Monuments and Sites
<b>Kya</b>	Thousand years ago
<b>LED</b>	Local Economic Development
<b>LFC</b>	Late Farming Community also known as Late Iron Age
<b>LSA</b>	Late Stone Age

<b>Abbreviation</b>	<b>Meaning</b>
<b>MIA</b>	Middle Iron Age
<b>MPRDA</b>	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
<b>MSA</b>	Middle Stone Age
<b>MSc</b>	Master of Science
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No. 107 of 1998)
<b>NHRA</b>	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
<b>NID</b>	Notification of Intent to Develop
<b>PHRA-G</b>	Provincial Heritage Resources Authority of Gauteng
<b>RoD</b>	Record of Decision
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SAHRIS</b>	South African Heritage Resources Information System
<b>SCF</b>	Statutory Comment Feedback
<b>SEP</b>	Stakeholder Engagement Process
<b>SoW</b>	Scope of Work
<b>ToR</b>	Terms of Reference
<b>UP</b>	University of Pretoria
<b>Wits</b>	University of the Witwatersrand

## GLOSSARY

Term	Definition
<b>Alter</b>	Any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or other decoration or any other means.
<b>Archaeological</b>	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.
<b>Archaeologist</b>	A trained professional who uses scientific methods to excavate record and study archaeological sites and deposits.
<b>Artefact</b>	Any object manufactured or modified by human beings.
<b>Ceramic (syn. pottery)</b>	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.
<b>Ceramic facies / facies</b>	Subgroups of a primary ceramic tradition or sequence. Typically used in ceramic analyses. Various facies are attributed to different temporal periods based on 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.
<b>Ceramic tradition</b>	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.
<b>Ceramic classification</b>	Ceramic classification is universally 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. Huffman (1970) postulated that the migration of farming communities could be recognised via a technique of 'ceramic seriation'. Ceramic seriation is based on the premise that certain styles of ceramics,

Term	Definition
	<p>including vessel shape and decorative motifs, follow each other chronologically, and can be attributed to certain archaeological ‘cultures’ (Huffman, 1970; 1980).</p> <p>Huffman (1970) and Phillipson (1977) demonstrated that Bantu-speaking groups may have migrated southwards in three ‘streams’ from a possible central homeland, over different periods (See Figure 6 4). These streams are generally associated with diverse Eastern Bantu-speaking societies and various farming community periods. Although these hypotheses have since undergone meaningful reviews and received significant opposition, a general consensus remains that ceramic seriation can be used to reconstruct population movements.</p>
<b>Compulsory repair order</b>	<p>A heritage resources authority may serve on the owner of a heritage site an order to repair or maintain such site, to the satisfaction of the heritage resources authority, within a reasonable period of time as specified in the order where the heritage resources authority considers that such site:</p> <ul style="list-style-type: none"> <li>▪ Has been allowed to fall into disrepair for the purpose of effecting or enabling its destruction or demolition, enabling the development of the designated land, or enabling the development of any land adjoining the designated land.</li> <li>▪ Is neglected to such an extent that it will lose its potential for conservation.</li> </ul>
<b>Conservation</b>	<p>In relation to heritage resources includes the protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance.</p>
<b>Cultural significance (CS)</b>	<p>The aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. A heritage may have cultural significance or other special value because of its:</p> <ul style="list-style-type: none"> <li>▪ Importance in the community, or pattern of South Africa’s history.</li> <li>▪ Possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage</li> <li>▪ Potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage.</li> <li>▪ Importance in demonstrating the principal characteristics of a particular class of South Africa’s natural or cultural places or objects.</li> <li>▪ Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.</li> <li>▪ Importance in demonstrating a high degree of creative or technical achievement at a particular period.</li> <li>▪ Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.</li> </ul>

Term	Definition
	<ul style="list-style-type: none"> <li>▪ Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.</li> <li>▪ Significance relating to the history of slavery in South Africa.</li> </ul>
<b>Development</b>	<p>Any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including:</p> <ul style="list-style-type: none"> <li>▪ Construction, alteration, demolition, removal or change of use of a place or a structure at a place.</li> <li>▪ Carrying out any works on or over or under a place.</li> <li>▪ Subdivision or consolidation of land comprising, a place, including the structures or airspace of a place.</li> <li>▪ Constructing or putting up for display signs or hoardings.</li> <li>▪ Any change to the natural or existing condition or topography of land.</li> <li>▪ Any removal or destruction of trees, or removal of vegetation or topsoil.</li> </ul>
<b>Early Farming Community/ies</b>	<p>The first Farming Communities (also known as Early Iron Age) that appear in the southern archaeological record during the early first millennium CE. The EFC period is generally dated from c. 200 CE to 1000 CE.</p>
<b>Early Stone Age</b>	<p>The South African ESA dates from ~3 Mya to c. 250 Kya. This period is associated with later <i>Australopithecus</i> and early <i>Homo</i> species. The lithic industries that characterise the ESA include Oldowan and Early Acheulian, typically as simple core tools, choppers handaxes and cleavers.</p>
<b>Excavation</b>	<p>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.</p>
<b>Farming Community/ies</b>	<p>Term signifying the appearance in the southern African archaeological of Bantu-speaking agricultural based societies from the early first millennium CE. The term replaces the <i>Iron Age</i> as a more accurate description for groups who practiced agriculture and animal husbandry, extensive manufacture and use of ceramics, and metalworking. The Farming Community period is divided into an Early and Late phase. The use of Later Farming Communities especially removes the artificial boundary between archaeology and history.</p>
<b>Field Rating</b>	<p>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:</p>

Term	Definition
	<ul style="list-style-type: none"> <li>▪ Grade I: Heritage resources with qualities so exceptional that they are of special national significance.</li> <li>▪ 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.</li> <li>▪ Grade III: Other heritage resources worthy of conservation.</li> <li>▪ General Protected: i.e. generally protected in terms of Sections 33 to 37 of the NHRA.</li> </ul>
<b>General protection</b>	<p>General protections are afforded to:</p> <ul style="list-style-type: none"> <li>▪ Objects protected in terms of laws of foreign states.</li> <li>▪ Structures older than 60 years.</li> <li>▪ Archaeological and palaeontological sites and material and meteorites.</li> <li>▪ Burial grounds and graves.</li> <li>▪ Public monuments and memorials.</li> </ul>
<b>Grave</b>	<p>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.</p>
<b>Heritage Impact Assessment (HIA)</b>	<p>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.</p>
<b>Heritage resource</b>	<p>Any place or object of cultural significance.</p>
<b>Heritage resources management</b>	<p>Process required when development is intended categorised as:</p> <ul style="list-style-type: none"> <li>▪ Any linear development exceeding 300m in length.</li> <li>▪ Construction of a bridge or similar structure exceeding 50 m in length.</li> <li>▪ 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.</li> <li>▪ Re-zoning of a site exceeding one hectare in extent.</li> </ul>

Term	Definition
	<ul style="list-style-type: none"> <li>▪ Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.</li> </ul>
<b>Heritage site</b>	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.
<b>Late Farming Community/ies</b>	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.
<b>Late Stone Age</b>	The South African LSA dates from ~30 Kya. This period is associated with modern <i>Homo sapiens sapiens</i> and the complex hunter-gatherer societies, ancestral to the Bushmen / San and Khoi. The LSA lithic assemblage contains microlithic technology and composite tools such as arrows commonly produced from fine-grained cryptocrystalline, quartz and chert. The LSA is also associated with archaeological rock art including both paintings and engravings.
<b>Living / intangible heritage</b>	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.
<b>Management</b>	In relation to heritage resources, includes the conservation, presentation and improvement of a place protected in terms of the NHRA.
<b>Middle Stone Age</b>	The South African MSA dates from ~300 Kya to c. 30 Kya. This period is associated with the changing behavioural patterns and the emergence of modern cognitive abilities in early <i>Homo sapiens species</i> . The lithic industries that characterise the MSA are typically more complex tools with diagnostic identifiers, including convergent flake scars, multi-faceted platforms, retouch and backing. Assemblages are characterised as refined lithic technologies such as prepared core techniques, retouched blades and points manufactured from good quality raw material.
<b>National estate</b>	<p>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:</p> <ul style="list-style-type: none"> <li>▪ Places, buildings, structures and equipment of cultural significance.</li> <li>▪ Places to which oral traditions are attached or which are associated with living heritage.</li> </ul>





Term	Definition
	<ul style="list-style-type: none"> <li>▪ Historical settlements and townscapes.</li> <li>▪ Landscapes and natural features of cultural significance.</li> <li>▪ Geological sites of scientific or cultural importance.</li> <li>▪ Archaeological and palaeontological sites.</li> <li>▪ 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 (Act No. 61 of 2003).</li> <li>▪ Sites of significance relating to the history of slavery in South Africa.</li> <li>▪ 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.</li> <li>▪ 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).</li> </ul>
<b>Object</b>	Any movable property of cultural significance which may be protected in terms of any provisions of this Act, including: any archaeological artefact; palaeontological and rare geological specimens; meteorites; and other objects referred to in Section 3 of the NHRA.
<b>Pedestrian survey</b>	A method of examining a site in which surveyors, spaced at regular intervals, systematically walk over the area being investigated.
<b>Phase 1 Archaeological Impact Assessment (AIA)</b>	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.
<b>Phase 2 Archaeological Impact Assessment (AIA)</b>	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.

Term	Definition
<b>Phase 3 Management Plan / Conservation Management Plan (CMP)</b>	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).
<b>Place</b>	A place includes: a site, area or region; a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure; a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures; an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.
<b>Pre-disturbance survey (syn. reconnaissance)</b>	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.
<b>Presentation</b>	In relation to a heritage resource, site or place includes: the exhibition or display of; the provision of access and guidance to; the provision, publication or display of information in relation to; and performances or oral presentations related to, heritage resources protected in terms of the NHRA.
<b>Provisional protection</b>	A protected area or heritage resource provisionally protected by SAHRA or a provincial heritage resources authority by a notice in the Gazette or Provincial Gazette.
<b>Reconnaissance</b>	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

<b>Term</b>	<b>Definition</b>
	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).
<b>Site</b>	Any area of land, including land covered by water, and including any structures or objects thereon.
<b>Stop work order</b>	An order served on a person by the Minister on advice of SAHRA or MEC to immediately cease all work in and around a heritage site for a period not exceeding 10 years. The order attaches to land is binding on the current owner and any future owner.
<b>Structure</b>	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.
<b>Tangible heritage</b>	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.

## 1 Introduction

Digby Wells Environmental (hereinafter Digby Wells) was appointed by Canyon Resources (Pty) Ltd (hereinafter Canyon Coal) to undertake the necessary environmental and social studies required for Environmental Authorisation (EA) of the proposed Palmietkuilen Mining Project (*the Project*) near Springs in the Gauteng Province.

In terms of the requirements of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) as amended, a Mining Right Application (MRA) must be submitted to the Department of Mineral Resources (DMR) for the Project. In support of the MRA, an Environmental Impact Assessment (EIA) process must be undertaken in accordance with the new EIA Regulations, 2014 (GN R 982) promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended. Digby Wells has completed the Scoping Report and submitted a Notification of Intent to Develop (NID) and Heritage Scoping Report (HSR) to the South African Heritage Resources Agency (SAHRA) and Provincial Heritage Resources Authority of Gauteng (PHRA-G) for Statutory Comment as required under Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)<sup>1</sup>.

This report constitutes the Heritage Impact Assessment (HIA) to inform the EIA and EMP completed in terms of the NEMA.

### 1.1 Project background<sup>2</sup>

Canyon Coal is a subsidiary of the Canyon Group of companies and functions as the operational division. Pandospan (Pty) Ltd (hereinafter Pandospan) forms part of the Canyon Group. In June 2016, Pandospan concluded a contract with Anglo Operations Ltd (hereinafter AOL) for the acquisition of a Prospecting Right (DMR Ref: GP 30/5/1/1/2 (201/10026) PR) on Portions 1, 2, 4, 9, 13 and 19 of Palmietkuilen 241 IR. These properties comprise the Project, in the Sedibeng District Municipality of the Gauteng Province.

The current EA process and associated enviro-legal applications of the Project are being completed by Digby Wells, and managed by Pandospan (*i.e. Canyon Coal*) on behalf of AOL as the applicant.

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<sup>1</sup> Submission of the NID and HSR was completed via the South African Heritage Resources Information System (SAHRIS) to SAHRA and a case reference (Case ID:10016) was generated. The NID and HSR can be located at the following link: <http://www.sahra.org.za/sahris/cases/palmietkuilen-241-ir-mining-right-application>

<sup>2</sup> A detailed project description, including definitions and the relevant regulatory framework is provided in the HSR and EIA. This is not repeated here for the sake of brevity. This section provides an abbreviated description of the Project to provide the reader with the relevant context of the proposed development.

## 1.2 Project description

The Project will entail the establishment of a new open pit coal mine and supporting infrastructure. Proposed mining methods include bench and strip mining techniques. Drilling and blasting will be employed to remove overburden or bedrock and expose the coal seams.

Extracted coal will be transported via haul roads and stored on a Run of Mine (RoM) stockpile area. It is proposed that the coal be transported to the processing plant via conveyor for beneficiation, after which the coal product will be stored prior to distribution.

From the processing plant, the coal product is proposed to be transported to the Welgedacht siding for distribution via rail or directly via truck to the relevant markets. A temporary discard dump containing one year's capacity will be constructed to store discard before being either reworked or backfilled into mined out areas.

Proposed supporting infrastructure is summarised in Table 1-1:

**Table 1-1: Supporting infrastructure for the Project**

Component	Details
Stockpile areas	Topsoil, sub-soil and overburden for rehabilitation
	RoM stockpile
	Product stockpile
Process Plant	Screening and crushing
	Washing and processing
Water supply and management	Slurry dam
	Pollution control dam (PCD)
Power supply	Substation
	Diesel generators
	Solar power generation ( <i>under investigation</i> )
Waste management	Sewage treatment plant
Access and site roads	Existing road network
Workshop Area	Contractors' yard
	Offices
	Laboratory

Component	Details
	Wash bays
	Storage facilities
	Workshop
Hazardous storage	Diesel storage tanks

### 1.3 Listed and specified activities<sup>3</sup>

The EIA Regulations (2014) stipulate various activities and thresholds that, if exceeded, require proponents to undertake an EA process for a proposed project. For this Project, Listed Activities encapsulated under Government Notice Regulations (GN R) 983 and 984 apply.

The regulatory HRM process is in turn required when thresholds contained in in Section 38(1) of the NHRA are exceeded, as well as in terms of Section 38(8) of the NHRA when impact assessments are required as part of EAs.

A summary of the Listed Activities in terms of the NEMA, NEM: WA and NHRA applicable to the Project is presented in Table 1-2.

**Table 1-2: Identified Listed Activities in terms of the NEMA, NEM: WA and NHRA applicable to the Project**

Listed Activity No.	NHRA Trigger	Description	Expected duration/phase
<b>Listing Notice 1: GN R 983</b>			
X – 9 (i) and /or (ii)	38(1)(a)	Water pipelines. The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or (b) where such development will occur within an urban area.	Construction & Operation

<sup>3</sup> Listed activities refer to activities and their applicable thresholds contained in the EIA Regulations, 2014. Specified activities refer to activities that are specific to the Project.



Listed Activity No.	NHRA Trigger	Description	Expected duration/phase
X – 10 (i) or (ii)	38(1)(a)	<p>Process water, waste water, return water pipelines</p> <p>The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes –</p> <p>(i) with an internal diameter of 0,36 metres or more; or</p> <p>(ii) with a peak throughput of 120 litres per second or more;</p> <p>excluding where-</p> <p>(a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or</p> <p>(b) where such development will occur within an urban area.</p>	Construction & Operation
X – 12 (xii)	38(1)(c)(i)	<p>Development of open pit and topsoil dump</p> <p>The development of infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs-</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse</p>	Operation
X – 13	38(1)(c)(i)	<p>Pollution control dam</p> <p>The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50,000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.</p>	Construction & Operation
X – 19	38(8)	<p>Mining through wetlands / pans</p> <p>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from-</p> <p>(i) a watercourse;</p> <p>(ii) the seashore; or</p> <p>(iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater but excluding where such infilling, depositing, dredging, excavation, removal or moving-</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.</p>	Operation



Listed Activity No.	NHRA Trigger	Description	Expected duration/phase
X –24 (ii)	38(1)(a)	Roads on site The development of- (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding- (a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or (b) roads where the entire road falls within an urban area.	Construction & Operation
<b>Listing Notice 2: GN R 984</b>			
X – 4	38(8)	Diesel storage, explosives magazine The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.	Operation
X – 6	38(8)	Water Use Licence The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.	Operation
X –15	38(1)(c)(i)	Site establishment and vegetation removal. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Construction & Operation
X – 17	38(8)	Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Pre-construction
<b>Waste Activities – GN R 921</b>			
Category B 4 (1)	38(8)	The storage of hazardous waste in lagoons excluding storage of effluent, wastewater or sewage. (Slurry dam)	Operation
Category B 4 (10)	38(1)(c)(i)	The construction of a facility for a waste management activity listed in Category B of this Schedule	Construction



Listed Activity No.	NHRA Trigger	Description	Expected duration/phase
Category B 4 (11)	38(1)(c)(i)	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	Operation

The Project specific activities that were assessed as part of the compilation of this HIA are summarised in Table 1-3.

**Table 1-3: Specified activities for the Project**

Project Phase	Activity
Construction	Site establishment
	Site clearing, including removal of topsoil and vegetation
	Construction of mine related infrastructure, including haul roads, pipes and dams
	Construction of washing plant
	Relocation of infrastructure
	Blasting and development of initial box-cut, including stock piling
	Temporary storage of hazardous products, i.e. fuel, explosives, waste, sewage
Operational	Stripping of topsoil and soft overburden
	Removal of overburden, including drilling and blasting
	Loading, hauling and stockpiling of overburden
	Drilling and blasting
	Load, haul and stockpiling of RoM coal
	Use and maintenance of haul roads
	On-site water use and storage
	Storage, handling and treatment of hazardous products and waste
Decommissioning and closure	Demolition and removal of all infrastructure
	Rehabilitation

Project Phase	Activity
	Environmental monitoring of decommissioning activities
	Storage, handling and treatment of hazardous products and waste
	Post-closure monitoring and rehabilitation

## 1.4 Terms of Reference

The Terms of Reference (ToR) for the specialist heritage study was to conduct a Heritage Resources Management (HRM) Process in support of the EA applications applicable to the MRA. The HRM Process is being completed in accordance with Section 38 of the NHRA.

## 1.5 Scope of Work

The Scope of Work (SoW) that was completed for the HIA to comply with Section 38(3) of the NHRA and the ToR included:

- Assessment of Cultural Significance (CS) of identified heritage resources;
- Identification of potential impacts to heritage resources based on Project activities;
- Recommend feasible management or mitigation measures to avoid and/or reduce negative impacts and enhance positive ones;
- Submission of the HIA report to the SAHRA and PHRA-G for Statutory Comment as required under Section 38(8) of the NHRA.

## 1.6 Expertise of the specialists

The relevant expertise of the specialist involved in the HRM process is summarised in Table 1-4.

**Table 1-4: Expertise of specialists<sup>4</sup>**

<p><b>Justin du Piesanie</b>            ASAPA Member 270            ICOMOS Member            14274            IAIAAsa Member</p>	<p>Justin holds the position of Heritage Resources Management Unit Manager at Digby Wells. 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</p>
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<sup>4</sup> Please refer to Appendix A for the Curriculum Vitae of the relevant specialists.



	has over 10 years combined experience in HRM in South Africa, including heritage assessments, archaeological mitigation and grave relocation. Justin has gained further generalist experience since his appointment at Digby Wells in Botswana, Burkina Faso, the Democratic Republic of Congo, Liberia and Mali on projects that have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage.
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## 1.7 Structure of the HIA report

The remainder of the report is structured as follows, with references to the relevant information required in terms of Section 38(3) of the NHRA:

**Table 1-5: Structure of the report**

Chapter	Description	NHRA information requirements
2	Outlines the aims and objectives of the specialist heritage study.	-
3	Describes the methodology employed in the compilation of this HIA.	-
4	Identifies the specific constraints and limitations of the HIA.	-
5	Provides an update of the baseline cultural landscape.	38(3)(a)
6	Outlines identified impacts and assess the intensity of predicted heritage impacts.	38(3)(c)
7	Categorises cumulative impacts on the cultural landscape that may manifest due to various existing and proposed developments in the local study area.	38(3)(c)
8	Highlights potential unplanned events and low risks that may manifest as potential future impacts.	38(3)(c)
9	Considers the real and potential sensitivities of the cultural landscape in relation to the various alternatives under consideration in this assessment.	38(3)(b) 38(3)(f)
10	Examines the identified heritage impacts against the sustainable socio-economic benefits of the Project.	38(3)(d)
11	Provides a summary of the heritage inputs into the EMP.	38(3)(f) 38(3)(g)
12	Summarises the Stakeholder Engagement Process (SEP) that has taken place to date with specific reference to the heritage.	38(3)(e)
13	Collates the most salient points of the heritage assessment and concludes with the specific outcomes and recommendations of the study.	38(3)(f) 38(3)(g)
14	Lists the source material used in the development of the report.	-

## 2 Aims and objectives

The primary aim of this HIA report was to furnish the responsible Heritage Resources Authorities (HRAs), in this instance SAHRA and PHRA-G, with details regarding the location, nature and extent of the Project, and the possible impacts to the identified heritage resources. The specific objectives of the HIA report in terms of Section 38(4) of the NHRA were to enable SAHRA and PHRA-G to:

**Table 2-1: Objectives to the HIA relative to the requirements of Section 38(4)**

Objectives	NHRA requirements
Timeously decide, in consultation with the proponent, i.e. Canyon, whether or not the Project may proceed;	38(4)(a)
Stipulate any limitations or conditions to be applied to the Project;	38(4)(b)
Determine what general protections apply in terms of the NHRA, and what formal protections may be consequently applied;	38(4)(c)
Determine if any compensatory action is required in respect of any heritage resources damaged or destroyed as a result of the Project; and	38(4)(d)
Determine the need to appoint specialists as a condition of approval of the Project.	38(4)(e)

## 3 Methodology<sup>5</sup>

This section describes the various activities completed to compile the HIA report.

- Defining of the study areas under consideration;
- Data collection to inform the assessment;
- Determining the CS and Field Ratings of identified heritage resources;
- Assessing the risk and potential impacts to identified heritage resources based on the specified activities of the Project; and
- Decisive consideration of management and mitigation measures in relation to prescribed minimum standards.

<sup>5</sup> Detailed HRM methodological descriptions are provided in Appendix B

### 3.1 Defining study areas<sup>6</sup>

For the purposes of this study, four ‘concentric’ study areas were defined to enable CS to be determined that will inform predicted impacts and guide appropriate management measures. The defined study areas are:

- A **primary study area** that comprises the Project’s physical development footprint. It is anticipated that this is where heritage impacts are most probable;
- A **site-specific study area**, which comprises the Project boundary, including any exclusion zones, servitudes and other operational boundaries;
- A **local study area**, which comprises the applicable local municipality and includes the land and properties adjacent to and surrounding the Project area; and
- A **regional study area**, which comprises the district municipality. Where necessary, the regional study area was extended outside the boundaries of the district municipality to include much wider regional expressions of specific types of heritage resources and historical events. In this instance, the Project lies on the provincial boundary between Gauteng and Mpumalanga Provinces, and considers the wider regional expressions of heritage resources and historical events to define the cultural landscape.

### 3.2 Data collection

#### 3.2.1 Secondary data collection

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

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

Repositories that were surveyed included the SAHRIS, online / electronic journals and platforms, and certain internet sources<sup>7</sup>.

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<sup>6</sup> The various study areas were defined and motivated within the HSR. This section provides an abridged summary of the defined study areas.

<sup>7</sup> A comprehensive reference list is provided as part of the HSR under Section 15. Information sources used in the compilation of this report are appropriately referenced under Section 14.

### 3.2.2 Primary data collection

Primary data was collected by Justin du Piesanie through a pre-disturbance survey of the site-specific study area on 11 August 2016. The survey was non-intrusive (i.e. no sampling was undertaken) with the objectives to:

- Visually record the current state of the cultural landscape;
- Ground-truth certain heritage resources and sites identified through the literature; and
- Record a representative sample of visible tangible heritage resources present within the site-specific and local study areas.

Anthropogenic activities has greatly altered the landscape over time. The main activities that caused the changes are agriculture related, with several agricultural fields established prior to the 1950s covering approximately 68% of the project area (*roughly 2 315 ha*).

Additionally, approximately 600 ha within the site-specific study area are associated with Vertic soils (EA)<sup>8</sup> commonly identified with wetlands. Based on this understanding of the site-specific study area, the pre-disturbance survey was primarily vehicular based, with undisturbed areas or noted points of interest, including pans, subject to pedestrian survey.

Identified heritage resources were recorded as waypoints using handheld GPS and documented through written and photographic records. The survey was recorded as track logs.

## 3.3 Developing Cultural Significance and Field Ratings

### 3.3.1 Cultural Significance

CS was determined based on identified resources' importance or contribution to four broad value categories: aesthetic, historical, scientific and social values. These categories summarised the CS and other values described in Section 3(3) of the NHRA. The resources' importance or contributions to these values were considered in terms of associative (qualitative) and / or rarity (quantitative) attributes, based on collected data. The results were collated into the cultural heritage baseline profile reported on in the HSR and the updated baseline in Section 5 below.

The integrity or condition of resources further influenced the CS. Integrity is largely determined based on resources' current, observed state of conservation, as well as notable changes made to it over the years.

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<sup>8</sup> Vertic soils are a strongly developed blocky structure with a high clay content and high plasticity index that results in a very sticky consistency when wet (South African Sugar Association, 1999). These soils are generally not conducive to agriculture or habitation (Madikizela, pers. comm).

### 3.3.2 Field Ratings

Field ratings assist the responsible heritage resources authority to grade heritage resources into national (Grade I), provincial (Grade II) or local (Grade III) categories, and are required under Chapter II Section 7(J) of the SAHRA Archaeology, Palaeontology and Meteorites (APM) Guidelines.

Field ratings considered the assigned CS and the level of official management required or the local competency of heritage authorities<sup>9</sup>.

### 3.4 Impact assessment

Impacts on heritage resources can broadly be divided into three categories – direct, indirect and cumulative<sup>10</sup>. The assessment of predicted heritage impacts were done by assigning numerical values to the significance of the identified impacts.

The assessment of impacts inherently considered the CS and field ratings. Consequences of potential heritage impacts were weighted against parameters of intensity, spatial scale and duration. To identify the significance of the impact, the consequence was measured against the probability of the impact occurring.

The magnitude of the potential impact was applied to both pre- and post-mitigation scenarios with the aim of removing all negative impacts on heritage resources, and enhancing positive ones.

### 3.5 Risk versus impact

Risk is defined as potential consequence(s) of an interaction combined with its likelihood. Should a risk eventuate, it will manifest as an impact. These concepts are often misconstrued and lead to disproportionate amounts of effort spent on assessing minor risks with potentially insignificant impacts, at the cost of overlooking more important ones.

Broad mitigation and monitoring measures were provided for low risks and unplanned events<sup>11</sup>, however, they **were not assessed in detail** (i.e., with impact significance ratings). In general, monitoring is an accepted form of mitigation for low risks.

### 3.6 Management and mitigation measures

Recommended management and mitigation measures are guided by the General Principles encapsulated in the NHRA, and the SAHRA Minimum Standards (SAHRA, 2007). Minimum required mitigation measures are intrinsically based on the CS of heritage resources and the

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<sup>9</sup> Currently the PHRA-G is only competent to manage and issue permits on NHRA Section 34 heritage resources, and no local (i.e. local government) competency exists within the province. All decisions relating to archaeology, palaeontology and burial grounds and graves therefore fall under the ambit of SAHRA.

<sup>10</sup> Detailed definitions of the types of impacts are presented under Section 6.3 of the HSR and not repeated here for the sake of brevity.

<sup>11</sup> Refer to Section 8 for an assessment of unplanned events and low risks.

intensity of predicted impacts on such resources. Mitigation measures are grouped into two types:

- Project-related mitigation - requires changes or amendments to project design, planning and siting of infrastructure; and
- Mitigation of heritage resources - where project-related mitigation will not sufficiently reduce or remove impacts, resources need to be mitigated to ensure that they are fully recorded, documented and researched before any negative change occurs.

## 4 Constraints and limitations

The identified constraints and limitations in the compilation of this report include:

- Desktop findings are based on available research from credible sources listed in the body of this report and cited in Section 14. Whilst every attempt to obtain the latest available information was made, reviewed literature does not represent an exhaustive list of information sources for the study area;
- Many tangible heritage resources, specifically archaeological resources, commonly occur below the visible surface, and may not be adequately recorded, documented and assessed without intrusive and destructive methods. Therefore, the literature that was reviewed, and especially existing HIA reports, are in themselves limited to surface observations; and
- The prolific extent of the agrarian activities in the site-specific study area may have resulted in the removal or covering of surface indicators of previously exposed heritage resources.

## 5 Updated baseline cultural landscape<sup>12</sup>

The updated baseline cultural landscape considered the predominant landscape based on the identified heritage resources within the local and site-specific study area only. Secondary and primary data collection results demonstrate that the principal tangible cultural landscape is associated with the historical period, identified by the historic built environment in the form of homesteads / werfs and burial grounds.

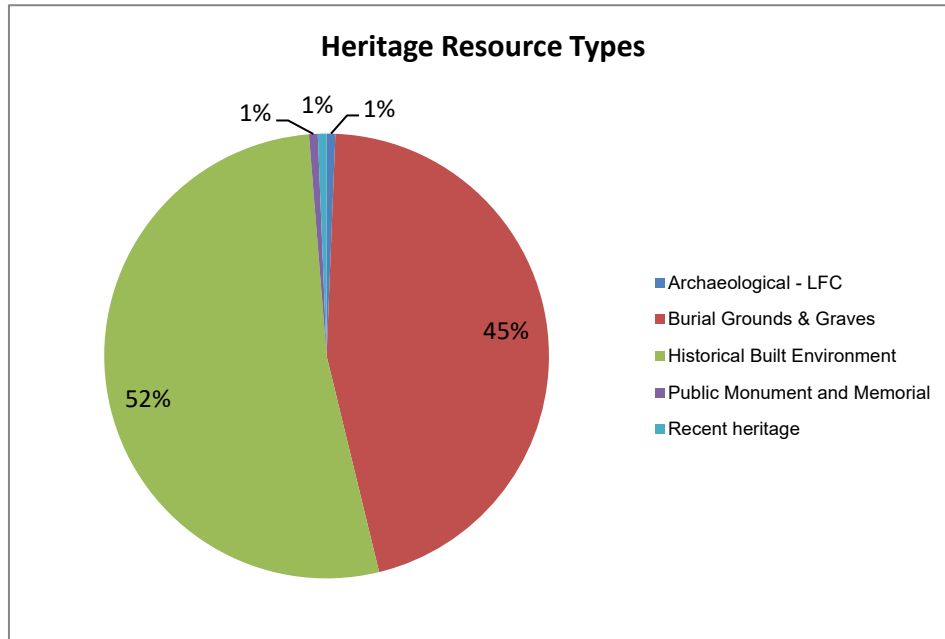
**Table 5-1: Identified heritage resource types in the local and site-specific study area**

Heritage Resource Types	Number Identified
Archaeological – Late Farming Community	1
Burial Grounds & Graves	72
Historical Built Environment	83
Public Monument and Memorial	1

<sup>12</sup> A detailed description of the cultural heritage baseline is presented in Section 8 in the HSR and is not repeated here. The updated baseline presents a brief summary of the most pertinent points contained within the baseline description relevant to the assessment of potential impacts to heritage resources.



Recent heritage	1
<b>Grand Total</b>	<b>158</b>



**Figure 5-1: Categories of identified heritage resources in the local and site-specific study area**



**Figure 5-2: Examples of the current state of the cultural landscape, and burial grounds within the site-specific study area**

Historically, *Voortrekkers* moved into the region, which they perceived as void of indigenous populations, and established settlements. These settlements were characterised by an agrarian cultivation and stock farming-based economy (The Voortrekkers, 2014). Small towns developed from these settlements, usually established on parts of the larger farms to serve the administrative needs of the *Voortrekker* communities. Limited infrastructure was constructed, such as wagon roads and river crossings. Typical vernacular architecture developed, typified by square houses surrounded by a porch and several outbuildings.

Gold was discovered in this region on the farm Geduld 134, adjacent to the site-specific study area (*then known as Palmietfontein 61*). This discovery culminated in the establishment of the town of Springs in 1904.

With the onset of World War II, the gold compounds associated with the Grootvlei Proprietary Mine Limited were taken over by the Union Defence Force (UDF) and used as the main training centre for black soldiers (Monama, 2014; Commonwealth War Graves Commission, n.d.). It has been reported that the training centre provided propaganda course for blacks to avert boredom among the troops and enable them to influence non-enlisted blacks about the implications of the war for South Africa and the black population in particular (Monama, 2014). As part of this complex, the Palmietkuil South War Cemetery Memorial was established, containing 217 Commonwealth burials of the Second World War (Commonwealth War Graves Commission, n.d.).

A survey of historical aerial imagery completed as part of the HSR confirmed the identified historic agrarian landscape of the site-specific study area. In addition, several small areas of industrialisation associated with mining and urban development were also noted.

## 6 Impact assessment

This section presents the assessment of the CS of and potential impacts to identified heritage resources within the site-specific study area based on the specified project activities presented in Table 1-3 for the following:

- Use of opencast mining methods;
- Transportation of the coal via trucks to the Welgedacht Siding; and
- Use of Portion 2 and 19 of the Farm Palmietkuilen 241 IR for the placement of infrastructure.

The identified heritage resources within the site-specific study area include the following:

**Table 6-1: Identified heritage resources in the site-specific study area<sup>13</sup>**

Identified Heritage Resources	No.
<b>Burial Grounds &amp; Graves</b>	<b>3</b>
BGG-001 Local cemetery comprising more than 150 graves of local community members, most likely associated with farm labourers	1
BGG-002 Local cemetery comprising more than 60 graves of local community members, most likely associated with farm labourers	1
5158/S36-003 Palmietkuil South War Cemetery Memorial – 217 Commonwealth war graves	1
<b>Historical Built Environment</b>	<b>5</b>
Ste-001 Eskom sub-station complex and associated infrastructure	1
Ste-007 Ruins of historic structure	1
Wf-008 Farm labourer complex – comprising several structures	1
Wf-009 Farmstead – werf comprising farmhouse and outbuildings	1
Wf-045 Ruins of historic structures	1
<b>Grand Total</b>	<b>8</b>

## 6.1 Cultural Significance

Two heritage resource categories were identified within the site-specific study area. These comprised:

- Historical built structures, complexes or werfs; and
- Burial grounds and graves, including the Palmietkuil South War Cemetery Memorial.

The CS of identified heritage resources were determined through the methodology presented in Section 3.3.1 above to assist in providing appropriate management and mitigation measures in accordance with the published SAHRA minimum standards.

The assessment of the CS and Field Ratings demonstrated that the identified heritage resources categories range from very high to negligible. The motivation and assessment for the assigned ratings is summarised in Table 6-2.

<sup>13</sup> Detailed plans indicating the distribution of identified heritage resources are available in Appendix C

**Table 6-2: CS assessment for identified heritage resources**

Resource ID	Aesthetic	Historic	Scientific	Social	INTEGRITY	Designation	Recommended Field Rating
Historical Built Structures Ste-001 Ste-007 Wf-008 Wf-009 Wf-045	1 Historical built structures within the site specific study area were considered as representing common aesthetic attributes that were well represented throughout various landscapes. Better examples are known to occur.	1 The historic use of the identified historic built structures are common and well represented within the landscape	1 No evidence of unique characteristics of the structures was recorded during the pre-disturbance survey. These structures will provide limited information.	3 The historic built environment will be considered as important to the history of the local study area, especially for specific communities within the region. No association with important events or people have been attributed to the identified structures.	2 Structures identified were either in a state of decay or have been encroached upon where the fabric is poorly preserved. The meaning of these structures, however, remains evident.	Negligible (3)	General Protection IV C
Burial Grounds and Graves BGG-001 BGG-002	- Burial grounds and graves were not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA	- Burial grounds and graves were not assessed against historic criteria as defined in Section 3(3) of the NHRA	- Burial grounds and graves were not assessed against scientific criteria as defined in Section 3(3) of the NHRA	5 Burial grounds and graves have specific connections to communities or groups for spiritual reasons. This was raised by Thabo Sibeko as part of the public comments (cf. Table 12-2). The significance is universally accepted	4 The integrity of burial grounds is considered to be excellent with both tangible and intangible fabric preserved.	Very High (20)	Grade I

Resource ID	Aesthetic	Historic	Scientific	Social	INTEGRITY	Designation	Recommended Field Rating
Palmietkuil South War Cemetery Memorial 5158/S36-003	5 The memorial demonstrates importance in aesthetic characteristics for a particular period in time that can be universally considered significant	5 The memorial and graves are associated with groups of importance in the history of the country that are considered singular and unique.	4 The memorial can contribute to the academic research in terms of the role of the black population in World War II. This is considered rare, uncommon and of national value.	5 Burial grounds and graves have specific connections to communities or groups for spiritual reasons. The significance is universally accepted	4 The integrity of the public monument and memorial and the associated graves is considered to be excellent with both tangible and intangible fabric preserved.	Very High (19)	

## 6.2 Heritage Impact Assessment

This section considers the potential impacts to heritage resources as presented in Table 6-1 that may result due to project related activities summarised in Table 6-3, assuming the preferred mining method will be open pit. Heritage resources with negligible CS have been excluded from additional assessment as these resources have been sufficiently recorded and require no further mitigation<sup>14</sup> based on the definitions as presented in the SAHRA Minimum Standards (SAHRA, 2007).

This section therefore considers the potential impacts to the identified burial grounds and graves within the site-specific study area, including the identified Palmietkuil South War Cemetery Memorial in proximity to the Project. The construction phase commonly presents the greatest likelihood for direct negative impacts on heritage resources. Burial grounds BGG-001 and BGG-002, however, occur within the planned Year 40 – 45 Life of Mine (LoM) area, where project related activities associated with the development footprint of the open pit will only realise well into the operational period.

For the sake of brevity, identified impacts that will occur during both the construction and operational phases have been considered together. Direct impacts to BGG-001 and BGG-002 during the operational phase specifically, are discussed separately.

The *potential* impacts to *unidentified* heritage resources are considered under Section 8 below.

**Table 6-3: Specified project activities considered in the assessment of potential impacts**

Project Phase	Activity
Construction	Blasting and development of initial box-cut, including stock piling
Operational	Stripping of topsoil and soft overburden
	Removal of overburden, including drilling and blasting
	Drilling and blasting
Decommissioning and closure	Demolition and removal of all infrastructure

<sup>14</sup> This excludes any permitting requirements that may be applicable to heritage resources afforded general protection in terms of Section 34 of the NHRA, specifically in reference to structures associated with Wf-008 and Wf-009 within the development footprint.

## 6.2.1 Construction and operational phase

### 6.2.1.1 Applicable specified project activities assessed

Construction and operational activities that will have a direct negative impact on burial grounds BGG-001 and BGG-002, when conserved *in situ*, will include

- Blasting and development of the initial box-cut, including stock piling; and
- Drilling and blasting.

### 6.2.1.2 Impact description

The identified burial grounds and graves are located within the proposed open pit infrastructure, expected to be directly impacted during years 40 – 45 of the LoM. Conservation of the burial grounds and graves *in situ* prior to this period however, will result in impacts to the burial grounds that will manifest as changes to the intangible integrity of the resources, i.e. loss of access resulting in degradation of the intrinsic CS of the graves.

### 6.2.1.3 Management objectives

The management objectives for the identified potential impacts to heritage resources are to mitigate through a Burial Grounds and Graves Consultation (BGGC) process in accordance with Section 36 of the NHRA and Chapter IX of the Regulations to the Act, and development of a Conservation Management Plan (CMP).

### 6.2.1.4 Management actions and targets

For heritage resources with high CS, the project design must aim to avoid change to a resource, promote at least partial conservation, and included within a CMP. Where *in situ* is possible, a BGGC process must be undertaken aimed at identifying *bona fide* NoK and affected communities, and reach agreement on the future of and access<sup>15</sup> to the graves.

### 6.2.1.5 Impact ratings

The ratings for pre- and post-mitigation scenarios for the identified impacts to burial grounds and graves are summarised in tables below:

**Table 6-4: Summary of direct impact to burial grounds and graves, i.e. loss of access**

IMPACT DESCRIPTION: Direct impact to burial grounds and graves				
Dimension	Rating	Motivation		
<b>PRE-MITIGATION</b>				
Duration	Project Life (5)	Where conserved <i>in situ</i> , loss of access will continue throughout the project life	Consequence: Highly	Significance: Moderate - negative (-96)

<sup>15</sup> Access to the burial grounds and graves during construction and operational phases will create health and safety risks to visitors to the sites that can pose social and litigation risks. While not specifically considered in this report, the potential health and safety risks should form part of the proposed CMP.



Extent	National (6)	Unmitigated alteration of the current <i>status quo</i> of the identified burial grounds will have repercussions to NoK and the reputation of Pandospan. Additionally, unmitigated changes to graves will result in the involvement of local, provincial and national authorities, as well as potentially national media attention.	detrimental (-16)	
Intensity x type of impact	High - negative (-5)	This will be a minor change to a heritage resource with very high CS		
Probability	Highly probable (6)	In the event of in situ conservation, identified impacts will occur if unmitigated		
<b>MITIGATION:</b>				
In the event of <i>in situ</i> conservation, complete a BGGC process in accordance with Section 36 of the NHRA and Chapter IX of the Regulations to the Act to reach agreement with <i>bona fide</i> NoK on access and conservation of the burial grounds and graves.				
<b>POST-MITIGATION</b>				
Duration	Immediate (1)	The implementation of proposed mitigation measures will result in short term access restrictions to comply with health and safety requirements during certain activities.	Consequence: Slightly detrimental (-7)	Significance: Negligible - negative (-7)
Extent	Very limited (1)	The impacts will be limited to BGG-001 and BGG-002		
Intensity x type of impact	High - negative (-5)	The intensity is considered a minor change to a heritage resource with very high CS		
Probability	Highly unlikely (1)	The implementation of the proposed BGGC and access to the burial grounds will reduce the consequence of restricted access.		

This assessment of *in situ* conservation of BGG-001 and BGG-002 notwithstanding, the identified Palmietkuil South War Cemetery Memorial located on the western extent of the project area is considered here briefly in reference to the assessed activities presented in Table 6-3.

The Palmietkuil South War Cemetery Memorial (5158/S36-003) comprises 217 Commonwealth war graves affiliated with soldiers who perished in World War II and a monument in their honour. The site is situated approximately 4.6 km from the open pit in which blasting activities will be undertaken. Conventionally, potential impacts as a result of blasting



and vibrations decrease significantly outside of a 500 m buffer. Based on this understanding, no impacts to the Palmietkuil South War Cemetery Memorial are envisaged during the operational phase of the Project.

## **6.2.2 Operational phase**

### **6.2.2.1 Applicable specified project activities assessed**

Operational activities that will have a direct negative impact on burial grounds BGG-001 and BGG-002 include:

- Stripping of topsoil and soft overburden;
- Removal of overburden, including drilling and blasting; and
- Drilling and blasting.

### **6.2.2.2 Impact description**

The identified burial grounds and graves are located within the proposed open pit infrastructure and will be directly impacted on. The identified impacts to the burial grounds will manifest as changes to the physical and intangible integrity of the resources, i.e. destruction.

### **6.2.2.3 Management objectives**

The management objectives for the identified potential impacts to heritage resources are:

- To avoid through project related mitigation measures to reduce the intensity of negative impacts in accordance with requirements contained in the SAHRA Minimum Standards<sup>16</sup>; or
- To mitigate heritage resources through permitted processes (such as grave relocations), where project related mitigation is not possible or feasible.

### **6.2.2.4 Management actions and targets**

For heritage resources with high CS, the project design must aim to avoid change to a resource, promote at least partial conservation, and included within a Conservation Management Plan (CMP).

The identified burial grounds and graves occur within the proposed open pit location. The positioning of this infrastructure is limited by the location of the mineral resource intended for exploitation. Project related mitigation measures would include the amendment of the design to exclude the burial grounds BGG-001 and BGG-002 and remove identified negative impacts.

Where amendment of the open pit design is not economically viable, and EA for open pit mining is granted, the identified burial grounds and graves will need to be mitigated through a

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<sup>16</sup> It must be noted that these minimum standards serve as a guide, and the recommendations provided in this HIA are project specific.

BGGC process and Grave Relocation Plan (GRP<sup>17</sup>). These must be undertaken in accordance with the requirements of Chapters XI and IX of the NHRA Regulations (GN R 548). The BGGC and GRP processes are aimed at identifying *bona fide* Next-of-Kin (NoK) and affected communities, and reach agreement on the future of the graves and the requirements for relocation.

### 6.2.2.5 Impact ratings

The ratings for pre- and post-mitigation scenarios for the identified impacts to burial grounds and graves are summarised in tables below:

**Table 6-5: Summary of direct impact to burial grounds and graves, i.e. destruction**

IMPACT DESCRIPTION: Direct impact to burial grounds and graves				
Dimension	Rating	Motivation		
<b>PRE-MITIGATION</b>				
Duration	Permanent (7)	The destruction of burial grounds and graves through operational activities will be permanent	Consequence: Extremely detrimental (-20)	Significance: Major - negative (-140)
Extent	National (6)	Unmitigated alteration of the current <i>status quo</i> of the identified burial grounds will have repercussions to NoK and the reputation of Pandospan. Additionally, unmitigated changes to graves will result in the involvement of local, provincial and national authorities, as well as potentially national media attention.		
Intensity x type of impact	Extremely high – negative (-7)	This will be a major change to a heritage resource with very high CS		
Probability	Certain (7)	Without appropriate mitigation, the identified impacts will manifest		
<b>MITIGATION:</b>				
Redesign of the proposed open pit should be considered to exclude and conserve the identified burial grounds and graves <i>in situ</i> . Where this is possible, a BGGC must be completed to reach agreement with <i>bona fide</i> NoK with regards to access and conservation of the burial grounds and graves. The assessor is aware, however, that the location of the open pit is limited by the resource, and redesign of may not be economically viable. Where redesign is not feasible, complete a BGGC and GRP as regulated by Section 36 of the NHRA and Chapters XI and IX of the Regulations to the Act must be implemented to identify as far as possible <i>bona fide</i> NoK to consult and reach agreement as to the appropriate management of the burial grounds through a required GRP.				
<b>POST-MITIGATION</b>				

<sup>17</sup> The implementation of a GRP is also considered a direct negative impact to burial grounds and graves as this activity permanently alters the *status quo* of the resource, and directly affects intangible aspects associated with the location of the burial ground.

IMPACT DESCRIPTION: Direct impact to burial grounds and graves				
Dimension	Rating	Motivation		
Duration	Beyond project life (6)	The relocation of the burial grounds will result in an immediate change to the burial grounds and graves, the effects of which, such as social issues, may extend beyond the life of the project.	Consequence: Moderately detrimental (-15)	Significance: Moderate - negative (-90)
Extent	Limited (2)	The extent of the impact will be limited to burial grounds and graves within the project boundaries and the identified NoK		
Intensity x type of impact	Extremely high - negative (-7)	The mitigation will result in a major change to a heritage resource with very high significance. Grave relocation is inherently negative, as the physical and social contexts of graves are destroyed through the act of exhumation and relocation.		
Probability	Highly probable (6)	It is probable that mitigation measures will reduce the consequence of the identified impact.		

### 6.2.3 Decommissioning and closure

Although no impacts during the decommissioning and closure phase of the Project have been identified, Canyon Coal should be cognisant that if, at the time of decommissioning and closure any infrastructure is older than 60 years, it will be subject to permitting requirements as required under Section 34 of the NHRA and Chapter III of the NHRA Regulations.

## 7 Cumulative impacts on the cultural landscape

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

It has been demonstrated that the cultural landscape of the local study area is associated with the historical period identified predominantly through the historic built environment and burial grounds and graves. To assess the potential cumulative impacts of the Project, consideration of the existing developments in the greater surrounding area must be given.





**Figure 7-1: Current industrial mining landscape surrounding the Project**

The landscape, while originally associated with a historic agrarian landscape, has over time amalgamated into a hybridised mining, urban and agricultural landscape. The proposed Project will contribute to the surrounding industrialised mining landscape through the removal of the predominant intensive agriculture landscape within the site-specific study area. This cumulative impact is described as additive as the total number of development activities that will occur within the area under consideration will increase.

In conjunction with the additive impacts, the potential synergistic effects of the interaction between various activities from the surrounding operations, as well as the frequency and repetition of these activities may result in cumulative impacts to identified heritage resources in proximity to all the operations. These may include the compromising of the physical integrity of the historic built environment, and the existing Palmietkuil South War Cemetery Memorial.

A summary of the potential cumulative impacts on the cultural landscape and heritage resources is presented in Table 7-1.

**Table 7-1: Identified potential cumulative impacts**

Cumulative impact	Description	Extent
Additive	The Project will have an additive effect on the cultural landscape as it will contribute to the change from an historical, agricultural landscape with archaeological components into an industrialised mining landscape associated with several operations to the west of the site-specific study area.	Local study area
Synergistic Time crowding	The synergistic effects of the Project and other operations in proximity, and repetitive impacts on archaeological resources may manifest as regular blasting activities that threaten the physical integrity historic built environment.	Site-specific study area

## 8 Low risk and unplanned events

Certain project activities may represent low risks to heritage resources or cause unplanned events. Low risks, where identified, can be monitored to gauge if the baseline changes and mitigation is required. Unplanned events are events that can occur on any project and cannot be monitored, but can, however, be planned for to reduce the severity of potential impacts if and where they occur.

Information on the potential impacts of these events and management plans are summarised in Table 8-1.

**Table 8-1: Summary of potential unplanned events, potential impacts, and proposed mitigation and management**

Unplanned event	Potential impact	Mitigation / Management / Monitoring
Accidental exposure of previously unidentified heritage resources during the construction of the Project.	Damage or destruction of heritage resources generally protected under Section 35 of the NHRA	Project specific Chance Find Protocols (CFPs) must be developed and included in the EMP as a condition of authorisation.  The CFPs must clearly describe the type of heritage resources that may occur within the site specific project area, the protocol to follow in the event of accidental exposure of previously unidentified heritage resources, and the appropriate management measures and reporting structures to be adhered to.
Accidental exposure of human remains during the construction phase of the Project.	Damage or destruction of heritage resources generally protected under Section 36 of the NHRA	The CFPs must be defined and established prior to the construction phase of the proposed Project.

**Table 8-2: Summary of low risk events, potential impacts, and proposed mitigation and management**

Low risk	Potential impact	Mitigation / Management / Monitoring
Blasting	Blasting will create vibrations that may compromise the integrity of Palmietkuil South War Cemetery Memorial protected under Sections 36 of the NHRA, and the Commonwealth War Graves Act (Act No. 8 of 1992) <sup>18</sup> .	A Heritage Site Management Plan (HSMP) must be developed to monitor and gauge any potential negative impact to the public monument and memorial during the construction and operational phases of the Project. This should include as a minimum:
	Blasting will create vibrations that may result in the collapse of voids associated with the Malmani Dolomites that could result in subsidence or destruction of the Public Monument and Memorial protected under Sections 36 of the NHRA, and the Commonwealth War Graves Act (Act No. 8 of 1992)	<ul style="list-style-type: none"> <li>■ A detailed baseline record of the condition of the Palmietkuil South War Cemetery Memorial;</li> <li>■ A roles and responsibility matrix; and</li> <li>■ A monitoring process and schedule.</li> </ul> <p>The HSMP must be defined and established prior to the pre-construction phase of the proposed Project.</p>

## 9 Sensitivity analysis and consideration of alternatives

As demonstrated in the HSR and this report, the cultural environment is predominantly associated with a historic agrarian landscape identified through tangible remains of the historic built environment (i.e. werfs) and burial grounds. These heritage resource types are fairly well distributed throughout the landscape.

This section of the report provides a consideration of the identified alternatives as required in terms of the EIA Regulations (2014) against the identified heritage sensitivities. The identified alternatives considered in this HSR included the following:

- Use of Portions 1, 2, 4, 9, 13 and 19 of Palmietkuilen 241 IR for infrastructure placement (Option 2) versus (vs.) only the use of Portions 2 and 19 (Option 1);

<sup>18</sup> The objective of the Act is to prohibit the desecration, damaging or destruction of Commonwealth war graves; to regulate the disinterment, removal, reinternment or cremation of Commonwealth war burials and the removal, alteration, repair or maintenance of Commonwealth war graves; and to provide for matters connected therewith. Section 2 specifically states that no person shall desecrate, damage or destroy a Commonwealth war grave. Section 3(1) states no owner of land on which a Commonwealth war grave is situated, and no local authority or other body in control of any burial place may (a) disinter, remove, reinter or cremate a Commonwealth war burial; or (b) remove or alter a Commonwealth war grave unless such owner, local authority or body has at least three months before intended action contemplated notified the Commission in writing per registered mail of such action. Section 6(1)(a) states any person who contravenes or fails to comply with any provisions of this Act shall be guilty of an offense and liable on conviction to a fine or to imprisonment for a period not exceeding 12 months.



- Coal transport via a conveyor system (Option 2) vs. the proposed hauling via road to the Welgedacht Siding (Option 1);
- Underground mining methods (Option 2) vs. the proposed open pit bench and strip mining (Option 1); and
- A no-go alternative.

The suitability of the various alternatives considered was subjected to a multi-criteria decision analysis (MCDA) utilising a simple linear additive evaluation model. In this instance, the suitability was considered against the following criteria:

- Criteria 1: The level of existing anthropogenic disturbance of the various primary study areas that will reduce the likelihood of identifying *in situ* heritage resources;
- Criteria 2: Potential for occurrence of unidentified heritage resources, both on the surface and at sub-surface levels, in the primary study area that may be impacted upon;
- Criteria 3: If heritage resources occur within or in proximity to the primary and may be impacted upon; and
- Criteria 4: The potential that permitting requirements may be applicable if EA of the development footprint is approved.

These criteria were rated on a scale from 1 (unsuitable) to 5 (most suitable) to quantifiably compare the suitability of the various alternatives. Once the ratings were determined against the criteria above, these were calculated to determine the overall suitability ranking of the proposed infrastructures. The results of this assessment are presented in the narrative below.

**Table 9-1: Comparison of the alternate infrastructure placement options**

Criteria	Option 1 – Use of Portions 2 and 19 of Palmietkuilen 241 IR Negligible	Option 2 – Use of Portions 1, 2, 4, 9, 13 and 19 of Palmietkuilen 241 IR Unsuitable
1.	4 – Suitable The site-specific study area has been largely disturbed through anthropogenic activities through time. These are predominantly recorded as agrarian, i.e. established historic and recent agricultural fields and werfs. These features have removed all trace surface evidence of heritage resources. This notwithstanding, possible sub-surface heritage resources may still occur.	2 – Less suitable The use of several portions of the Farm Palmietkuilen 241 IR increases the potential of previously undisturbed areas being impacted upon, and in turn resulting in potential impacts to a larger number of identified and unidentified heritage resources.

Criteria	Option 1 – Use of Portions 2 and 19 of Palmietkuilen 241 IR Negligible	Option 2 – Use of Portions 1, 2, 4, 9, 13 and 19 of Palmietkuilen 241 IR Unsuitable
2.	2 – Less suitable Portion 2 and 19 of Palmietkuilen 241 IR contains a portion of land that is known to have a higher potential to contain archaeological features, such as water courses and riparian features.	1 – Unsuitable The use of several portions of the Farm Palmietkuilen 241 IR increases the potential of previously undisturbed areas being impacted upon, and in turn resulting in potential impacts to a larger number of identified and unidentified heritage resources. This includes identified natural water courses and riparian features identified on Portions 2 and 19.
3.	4 – Suitable Less known / identified heritage resources occur to the east of the site-specific study area, reducing the number of resources that occur in proximity to the proposed infrastructure placement associated with Option 1	1 – Unsuitable A greater number of heritage resources occur to the west of the site-specific project area, increasing the number of heritage resources in proximity to alternate infrastructure placement and potential for impacts to occur.
4.	1 – Unsuitable Heritage permitting requirements will be triggered based on the identified heritage resources within the site-specific study area	1 – Unsuitable Heritage permitting requirements will be triggered based on the identified heritage resources within the site-specific study area

**Table 9-2: Comparison of the alternate coal transport options**

Criteria	Option 1 – hauling via road to the Welgedacht Siding Suitable	Option 2 – Coal transport via a conveyor system to the Welgedacht Siding Negligible
1.	5 – Most suitable Several roads are established within and surrounding the site-specific study area that will decrease the likelihood of impacting upon previously undisturbed areas, identified and previously unidentified heritage resources.	2 – Less suitable The establishment of a conveyor system outside of existing access routes / roads increases the potential to impact upon previously undisturbed areas, identified and previously unidentified heritage resources.
2.	5 – Most suitable Recent activities, such as modern roads, have either removed tangible surface traces of heritage resources, or the heritage resources themselves. If established roads / access routes are utilised, known heritage resources can be managed through a CMP, and the potential for accidental exposure of previously unidentified heritage resources is reduced.	2 – Less suitable The establishment of a conveyor system outside of existing access routes / roads increases the potential to impact upon previously undisturbed areas, identified and previously unidentified heritage resources.



Criteria	Option 1 – hauling via road to the Welgedacht Siding Suitable	Option 2 – Coal transport via a conveyor system to the Welgedacht Siding Negligible
3.	2 – Less suitable Heritage resources are known to occur in proximity to established roads / access routes that may increase the potential of direct and indirect impacts to these resources manifesting during the Project life.	4 – Suitable The establishment of a conveyor system can be routed to avoid previously undisturbed areas and known heritage resources to remove the potential of negative impacts to heritage resources manifesting during the Project life.
4.	4 – Suitable The use of established roads / access routes decreases the potential for heritage permitting requirements.	2 – Less suitable The establishment of a conveyor system outside of established routes may require heritage permitting in terms of Section 34, 35 and 36 of the NHRA.

**Table 9-3: Comparison of the alternate mining method options**

Criteria	Option 1 – Open cast pit mining Less suitable	Option 2 – Underground mining Most suitable
1.	1 – Unsuitable The proposed location of the open cast pit has been heavily disturbed through anthropogenic activities through time. The establishment will, however, contribute to the level of disturbance and change the current status quo.	5 – Most suitable The proposed location of the open cast pit has been heavily disturbed through anthropogenic activities through time. The use of underground mining activities to exploit the coal resources will, however, maintain the current status quo.
2.	2 – Less suitable Mining activities increase the potential to accidentally expose sub-surface features or resources previously unidentified.	5 – Most suitable Underground mining methodologies decrease the potential for the accidental exposure, damage and / or destruction of previously unidentified heritage resources.
3.	2 – Less suitable Heritage resources have been recorded within the development footprint of the proposed open cast pit.	5 – Most suitable While heritage resources have been identified within the coal resource footprint, underground mining methods will facilitate the <i>in situ</i> preservation of identified heritage resources.
4.	1 – Unsuitable Heritage permitted requirements in terms of Section 34 and 36 of the NHRA will be applicable.	5 – Most suitable Underground mining methods reduce the potential for heritage permitted activities.

The analysis of the suitability of the various alternative options under consideration indicates, from a heritage perspective, that the following options are preferred:

- Infrastructure placement limited to Portions 2 and 19 of Palmietkuilen 241 IR;

- The use of existing roads / access routes to transport the coal to the Welgedacht Siding; and
- Use of underground mining methods<sup>19</sup>.

The final alternative considered for the proposed Project is the 'no-go' option, where the development is not undertaken, and the current *status quo* remains intact. At this stage, however, the envisaged economic benefits of the proposed development, including the potential increased skills development, job opportunities, practical use of coal for electricity production into the national grid, and the potential economic development, are high.

## 10 Heritage impacts versus sustainable socio-economic benefits

Through the implementation of the Project, revenue generated will be subject to various royalties and taxes that will contribute to the construction and maintenance of infrastructure, implementation of development strategies and projects, and rendering of services as outlined in the Sedibeng District Municipality Integrated Development Plan (Sedibeng District Municipality, 2016). Furthermore, the proposed project has the potential to create local employment opportunities that will likely improve income stability and quality of life for those individuals who will benefit from employment.

Nationally, there is a strategic directive on increased energy security that will contribute towards socio-economic and sustainable growth objectives of the country. The implementation of this Project will contribute to this national strategic objective.

Based on this understanding, the potential socio-economic benefits that may derive from the proposed Project are greater than the significance of the potential heritage impacts. This assumption is based on the following reasoning:

- The project will contribute to the economic development of the region and potentially create employment opportunities;
- The identified direct impacts to the burial grounds and graves can be mitigated through the proposed interventions; and
- The potential low risk of impacts to the Palmietkuil South War Cemetery Memorial is negligible and will be mitigated through the implementation of a HSMP.

Additionally, through the proposed interventions, not only will the identified impacts be mitigated, but continuous management and conservation of these resources will be promoted during and beyond the life of the Project.

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<sup>19</sup> Underground mining methods have been considered as an alternative to comply with the requirements of Section 38(3)(b) and (f). The author acknowledges that this options however, is economically unfeasible for the Proponent.

## 11 Environmental Management Plan

The objective of an EMP is to present mitigation to (a) manage undue or reasonably avoidable adverse impacts associated with the development of a project and (b) enhance potential positives.

The key objectives of EMPs are to give S.M.A.R.T.<sup>20</sup> mitigation measures to:

- Identify the actual environmental, socio-economic and public health impacts of the project and check if the observed impacts are within the levels predicted in the EIA;
- Determine that mitigation measures or other conditions attached to project approval (e.g. by legislation) are properly implemented and work effectively;
- Adapt the measures and conditions attached to project approval in the light of new information or take action to manage unanticipated impacts if necessary;
- Provide an auditable management plan that can follow the Deming Cycle<sup>21</sup>;
- Gauge if predicted benefits of the project are being achieved and maximized; and
- Gain information for improving similar projects and EIA practice in the future.

The EMP must consider each activity and its potential (significant) impacts during the construction, operational, decommissioning and post closure phases.

### 11.1 Project Activities with Potential Significant Impacts

Project activities that may impact upon heritage resources include:

- Stripping of topsoil and soft overburden;
- Removal of overburden, including drilling and blasting; and
- Drilling and blasting.

These are summarised in Table 11-1:

**Table 11-1: Potential significant project impacts**

Activities	Potential significant project impacts
Blasting and development of initial box-cut	Loss of access to burial grounds and degradation on intrinsic value

<sup>20</sup> S.M.A.R.T refers to specific, measurable, attainable, realistic and timely mitigation measures.

<sup>21</sup> The Deming cycle refers to a four-part management method that promotes continuous improvement. The Deming cycle is made up of:

Plan: Choose a process and set objectives

Do: Implement the plan and begin collecting data on the results

Check/Study: Analyse the results using statistical methods

Act: Decide what changes to make in order to improve the process

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Activities	Potential significant project impacts
Stripping of topsoil and soft overburden	Destruction of burial grounds and graves
Removal of overburden, including drilling and blasting	
Drilling and blasting	

## 11.2 Summary of Mitigation and Management

This section provides a summary of the project activities relevant to this study, the environmental aspect and impacts on the receiving environment. Information on the recommended mitigation, relevant legal requirements, recommended management plans and timing of implementation is presented in Table 11-2 and Table 11-3.

**Table 11-2: Mitigation and management plan**

Activities	Potential Impact	Size and scale of disturbance	Aspects Affected	Phase	Mitigation Type/Measures	Compliance with standards/Standard to be achieved	Time period for Implementation
Blasting and development of initial box-cut	Loss of access to burial grounds and graves	~3 500 ha	Heritage	Construction and Operation	Reduce through the completion of a BGGC process and compilation / implementation of a CMP	NHRA Section 36 Chapters XI and IX of the NHRA Regulations	Pre-construction
Stripping of topsoil and overburden	Destruction of burial grounds and graves		Heritage	Operation	Avoid through amendment of the infrastructure design. Where not feasible, a BGGC and GRP must be completed	NHRA Section 36 Chapters XI and IX of the NHRA Regulations	
Removal of overburden, including drilling and blasting							
Drilling and blasting							

**Table 11-3: Prescribed environmental management standards, practice, guideline, policy or law**

Applicable Standard, Practice, Guideline, Policy or Law		
Title	Description of Requirements	Relevance to Project
<b>Legislation (National, Provincial, Local)</b>		
The National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Heritage resources within the Project development footprint are protected under Section 36 of the NHRA, and may not be impacted upon without the approval and necessary permits issued by SAHRA	Heritage resources protected under Section 36 have been identified.
Regulations to the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (GN R 548) (SAHRA Regulations)	Provisions for the procedure for consultation regarding burial grounds and graves are contained in Chapter XI. Where required, the application for relocation of graves is regulated by Chapter IX.	Burial grounds and graves have been identified within the site-specific study area. Agreement on the conservation and / or relocation of the graves must be reached in accordance with the regulations to ensure compliance with the legislative framework.
Commonwealth War Graves Act (Act No. 8 of 1992)	Commonwealth war graves are protected under the Commonwealth War Graves Act (Act No. 8 of 1992).	The Palmietkuil South War Cemetery Memorial is situated on the periphery of the Project boundary and may be indirectly impacted upon by the Project.
<b>Applicable Guideline/Standards</b>		
SAHRA Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports	The guidelines provide the minimum standards for recommended mitigation under Section 7(1)(L)(d).	Specialist recommendations were considered against the minimum standards provided.

### 11.3 Monitoring Plan

Project specific CFPs must be developed for the Project. The purpose of the CFPs is to establish procedures that aim to minimise damage and destruction to any heritage resources that may be accidentally exposed during the course of development activities.

The CFPs must clearly describe the type of heritage resources that may occur within the site specific project area, the protocol to follow in the event of accidental exposure of previously unidentified heritage resources, and the appropriate management measures and reporting structures to be adhered to. The CFP at a minimum should include the following:

- Definitions as defined by Section 2 and 38(1) of the NHRA;
- Procedures that detail the following:
  - How to spot a chance find;
  - Steps to be undertaken when a chance find is made;
  - Internal reporting structures;
  - Recording of chance finds; and
  - Legal processes and requirements.

The CFPs must be defined and established as a condition of authorisation prior to the pre-construction phase of the proposed Project.

A HSMP must be developed to monitor and gauge any potential negative impact to identified Palmietkuil South War Cemetery Memorial during the construction and operational phases of the Project.

The HSMP must at a minimum include:

- A detailed baseline record of the condition of identified heritage resources;
- Established a roles and responsibilities matrix;
- Established a monitoring process and schedule; and
- Define the project specific management and monitoring protocol.

The HSMP must be defined and established prior to the pre-construction phase of the proposed Project. A summary of the proposed monitoring plan is presented in Table 11-4.

**Table 11-4: Monitoring plan**

<b>Activities</b>	<b>Impacts requiring monitoring programmes</b>	<b>Functional requirements for monitoring</b>	<b>Roles and responsibilities (For the execution of the monitoring programmes)</b>	<b>Monitoring and reporting frequency and time periods for implementing impact management actions</b>
Blasting	Loss of integrity of surface dressing of Palmietkuil South War Cemetery Memorial	Baseline condition recording Monitoring after blasting activities	To be developed as part of the HSMP	After blasting activities Quarterly
	Loss of integrity of Palmietkuil South War Cemetery Memorial	Reporting on possible manifestation of negative impacts Implementation of mitigation measures to reduce impacts		

## 12 Consultation

The consultation process afforded Interested and Affected Parties (I&APs) opportunities engage in the EA process. The objectives of the Stakeholder Engagement Process (SEP) included 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.

A summary of the SEP undertaken during the Scoping Phase of the Project is presented in

**Table 12-1: SEP Scoping Phase activities**

Activity	Details
Identification of stakeholders	A stakeholder database was developed which includes I&APs from various sectors of society, including directly affected and adjacent landowners, in and around the proposed project area.
Distribution of announcement letter and Background Information Document (BID)	A BID, announcement letter with Registration and Comment Form was emailed and posted to stakeholders on <b>11 August 2016</b> .
	An NID was submitted to SAHRA and PRHA-G on <b>18 August 2016</b> . This was available at the following link: <a href="http://www.sahra.org.za/sahris/cases/palmietkuilen-241-ir-mining-right-application">http://www.sahra.org.za/sahris/cases/palmietkuilen-241-ir-mining-right-application</a>
Placing of newspaper advertisement	An English advert was placed in the Springs Advertiser on <b>12 August 2016</b> .
Putting up of site notices	English site notices were put up at the proposed project site, local libraries and municipal offices on <b>10 August 2016</b> at seven different locations around the Project site.



Activity	Details
Announcement of Scoping Report	<p>Announcement of availability of the Draft Scoping Report was emailed and posted to stakeholders together with the formal project announcement on <b>11 August 2016</b>. Copies of the Scoping Report were available at:</p> <ul style="list-style-type: none"> <li>▪ The Springs Public Library;</li> <li>▪ The Bakerton Public Library; and</li> <li>▪ The Heidelberg Public Library.</li> </ul> <p>A SMS was also sent to stakeholders on <b>11 August 2016</b> announcing availability of the Scoping Report.</p> <p>The Scoping Report was also available on <a href="http://www.digbywells.com">www.digbywells.com</a> (Public Documents) and was also available at the Public Meeting.</p> <p>(30-day comment period for the Scoping Report: 12 August 2016 to 12 September 2016)</p>
Stakeholder Meeting	A Public Meeting was held at the Stable Inn Conference Centre, Springs on <b>24 August 2016</b>
Obtained comments from stakeholders	Comments, issues of concern and suggestions received from stakeholders have been captured in the Comments and Response Report (CRR).

## 12.1 Comments and responses

On 8 September 2016 the SAHRA Archaeology, Palaeontology and Meteorites (APM) unit issued Statutory Comment to Digby Wells.

The SAHRA APM unit supported the recommendations that were contained in the HSR, including the granting of exemption from further palaeontological studies having to be conducted for the Project provided that a Fossil Chance Finds Procedure is included in the final EMP as a condition of authorisation.

Issues raised by stakeholders were captured in the CRR during the Scoping Phase of the Project. Comments with relevance to heritage only and the associated responses are presented in Table 12-2.

**Table 12-2: Comments and response with relevance to heritage**

Stakeholder		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant
Name of Individual	Consulted			
Thabo Sibeko	Written comment	29 August 2016	Grave sites are part of heritage and they have sentimental value for the people living around that area. Relocating the grave sites will be violation of custom practices and human rights; it will also be a harmful exercise, which will affect their loved ones emotionally, spiritually and mentally. Which area is the company planning to relocate the grave site?	The HIA provides an assessment of the potential impacts to both identified and unidentified burial grounds and graves in Section 6.2 and 8. Relevant to the identified potential impacts and low risks, appropriate management and mitigation measures were recommended. In the event that authorisation is received and a mining right is granted, proposed mitigation includes a burial grounds and graves consultation process (BGGC) and possible grave relocation process (GRP) informed by the requirements of Section 36 of the NHRA, Chapters XI and IX of the NHRA Regulations (GN R 548), the National Health Act, 2003 (Act No. 61 of 2003) (NHA) and applicable by-laws. A BGGC and GRP are permitted activities that can only be undertaken after the impact assessment phase of the Project. If required, a rigorous process of identification and consultation with Next-of-Kin will be undertaken to reach agreement on the management and future of the graves.

Stakeholder		Date of Comments Received	Issues Raised	EAPs Response to Issues as Mandated by the Applicant
Name of Individual	Consulted			
Mrs Hazel Morris	Written comment	31 August 2016	The Military graveyard will have to be relocated with full military honour.	The Palmietkuil South War Cemetery Memorial is located outside the western mining right boundary. No direct impacts to these graves and memorial are anticipated. Consideration of unplanned events or low risks to the graveyard and memorial is presented in Section 8. As a proactive measure, it was recommended that the Palmietkuil South War Cemetery Memorial be included in a CMP.
Mr Juan Maree	Telephone	19 September 2016	The Commonwealth War Graves are protected under the Commonwealth War Graves Act (Act No. 8 of 1992). This must be considered in the impact assessment report.	Thank you for your comment. The Commonwealth War Graves Act (Act No. 8 of 1992) is considered in Section 8 of the HIA.
			Previous prospecting activities to the north of the Palmietkuil South War Graves Memorial identified geological voids. There may be the potential for voids beneath the graves that could result in damage to the graves through sinkholes that must be considered in the assessment.	The potential for karst topography has been recorded and referenced in the Heritage Scoping Report under Section 8.1. The site is underlain by the Vryheid formation, unfortunately the depth of the Malmani Dolomites beneath site memorial cannot be determined without detailed drill records. The potential for collapse of voids, if any, will be considered as part of a HSMP recommended in Section 8 of the HIA.

### 13 Recommendations and conclusion

The HIA was completed by Digby Wells as part of the EA process of the Project to promote compliance with Section 38(8) of the NHRA and Section 24 of the NEMA. This assessment considered the cultural landscape identified, the distribution of known heritage resources, the designated CS and the potential of heritage resources to be impacted upon by project related activities.

Within the local study area, a total of 158 heritage resources were identified ranging from the LFC through to historical period. Of these, seven occur within the site-specific study area. These consist of the following:

**Table 13-1: Identified heritage resources in the development footprint and site-specific study area**

Heritage resources	Number of identified heritage resource
<b>Burial Grounds &amp; Graves</b>	<b>3</b>
BGG-001	1
BGG-002	1
Palmietkuil South War Cemetery Memorial	1
<b>Historical Built Environment</b>	<b>5</b>
Ste-001	1
Ste-007	1
Wf-008	1
Wf-009	1
Wf-045	1
<b>Grand Total</b>	<b>8</b>

The identified historical built environment resources were determined to have a negligible CS designation and were excluded from the impact assessment. The motivation for the exclusion from further assessment was based on the definitions as presented in the SAHRA Minimum Standards (SAHRA, 2007). The exclusion of the historic built environment does not, however, preclude permitting requirements in terms of Section 34 of the NHRA where structures will be altered, damaged or destroyed. These requirements are specifically in reference to structures associated with Wf-008 and Wf-009 within the development footprint that will be impacted upon by project related activities.

Two gravesites, BGG-001 and BGG-002 are situated within the development footprint and will be directly impact upon by project related activities during construction and operational phases. The operational phase of the Project presents the greatest likelihood for direct negative impacts on the burial grounds BGG-001 and BGG-002 to manifest. Based on the location of these resources, the identified direct impacts include the destruction of the burial grounds and graves during years 40 – 45 of the LoM.

Where *in situ* conservation of the burial grounds and graves is implemented during the construction and operational phase, the graves will be directly impacted through the loss of access and degradation of the intrinsic value of the graves. In this instance, a BGGC process in accordance with Chapter XI of the Regulations to the Act, aimed at identifying *bona fide* NoK, must be undertaken to reach agreement on the continued conservation of the burial grounds, and access to the site to minimise the identified impact.

To avoid the identified direct impact during years 40 – 45 of the operational phase of the Project, recommended project related mitigations include the amendment of the infrastructure design to exclude the identified burial grounds from the development footprint that will allow for the *in situ* conservation of the graves. Where the recommended project design amendment is not feasible, and EA and a mining right for the Project is granted, a BGGC and GRP must be undertaken in accordance with the requirements of Chapters XI and IX of the Regulations to the Act.



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## 14 References

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Heritage Impact Assessment

Application for a Mining Right and Environmental Authorisation of the proposed  
Palmietkuilen Mine, Gauteng Province

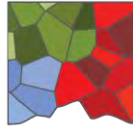
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## **Appendix A: Specialist CV**



# DIGBY WELLS

## ENVIRONMENTAL

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

## 1 Education

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

## 2 Language Skills

Language	Written	Spoken
English	Excellent	Excellent
Afrikaans	Proficient	Good



### 3 Employment

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

### 4 Experience

I joined the company in August 2011 as an archaeologist and was subsequently made unit manager in the Social and Heritage Services Department in 2016. 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, the Democratic Republic of Congo, Liberia and Mali 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. My 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.



## 5 Project Experience

Please see the following table for relevant project experience:

Project Title	Project Location	Date:	Description of the Project	Name of Client
Klipriviersberg Archaeological Survey	Meyersdal, Gauteng, South Africa	2005 2006	Archaeological surveys	ARM
Sun City Archaeological Site Mapping	Sun City, Pilanesberg, North West Province, South Africa	2006 2006	Phase 2 Mapping	Sun International
Witbank Dam Archaeological Impact Assessment	Witbank, Mpumalanga, South Africa	2007 2007	Archaeological survey	ARM
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
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
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 Booyensdal Archaeology Project	Steelpoort, Mpumalanga, South Africa	2010 2010	Phase 2 Mapping	Heritage Contracts Unit
Eskom Thohoyandou Electricity Master Network	Limpopo Province, South Africa	2010 2010	Heritage Statement	Strategic Environmental Focus
Bathhako Mine Expansion	North-West Province, South Africa	2010 2010	Phase 2 Mapping	Heritage Contracts Unit
Kibali Gold Project Grave Relocation Plan	Oriental Province, Democratic Republic of Congo	2011 2013	Grave Relocation	Randgold Resources
Kibali Gold Hydro-Power Project	Oriental Province, Democratic Republic of Congo	2012 2014	Heritage Impact Assessment	Randgold Resources
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012 2012	Heritage Impact Assessment	Aquarius Resources
Environmental Authorisation for the Gold One Geluksdal TSF and Pipeline	Gauteng, South Africa	2012 2012	Heritage Impact Assessment	Gold One International
Platreef Burial Grounds and Graves Survey	Mokopane, Limpopo Province, South Africa	2012 2012	Burial Grounds and Graves Survey	Platreef Resources
Resgen Boikarabelo Coal Mine	Limpopo Province, South Africa	2012 2012	Phase 2 Excavations	Resources Generation
Bokoni Platinum Road Watching Brief	Burgersfort, Limpopo Province, South Africa	2012 2012	Watching Brief	Bokoni Platinum Mine



Project Title	Project Location	Date:	Description of the Project	Name of Client
SEGA Gold Mining Project	Burkina Faso	2012 2013	Socio Economic and Asset Survey	Cluff Gold PLC
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
New Liberty Gold Project	Liberia	2013 2014	Grave Relocation	Aureus Mining
Falea Uranium Mine Environmental Assessment	Falea, Mali	2013 2013	Heritage Scoping	Rockgate Capital
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
Daleside Acetylene Gas Production Facility	Gauteng, South Africa	2013 2013	Heritage Impact Assessment	ERM Southern Africa
Nzoro 2 Hydro Power Project	Orientele Province, Democratic Republic of Congo	2014 2014	Social consultation	Randgold Resources
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
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	Orientele Province, Democratic Republic of Congo	2014 2014	Heritage Impact Assessment	Randgold Resources
GoldOne EMP Consolidation	Westonaria, Gauteng, South Africa	2014 2014	Gap analysis	Gold One International
Yzermite PIA	Wakkerstroom, Mpumalanga, South Africa	2014 2014	Palaeontological Assessment	EcoPartners
Sasol Mooikraal Basic Assessment	Sasolburg, Free State, South Africa	2014 2014	Heritage Basic Assessment	Sasol Mining
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012 2015	Heritage Impact Assessment	Aquarius Resources
Oakleaf ESIA Project	Bronkhorstspuit, Gauteng, South Africa	2014 2015	Heritage Impact Assessment	Oakleaf Investment Holdings
Rea Vaya Phase II C Project	Johannesburg, Gauteng, South Africa	2014 2014	Heritage Impact Assessment	ILISO Consulting
Imvula Project	Kriel, Mpumalanga, South Africa	2014 2015	Heritage Impact Assessment	Ixia Coal
Sibanye WRTRP	Gauteng, South Africa	2014 2016	Heritage Impact Assessment	Sibanye
VMIC Vanadium EIA Project	Mokopane, Limpopo, South Africa	2014 2015	Heritage Impact Assessment	VM Investment Company



Project Title	Project Location	Date:	Description of the Project	Name of Client
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
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
Temo Coal Road Diversion and Rail Loop EIA	Steenbokpan, Limpopo Province, South Africa	2015 2016	Heritage Impact Assessment	Namane Resources (Pty) Ltd
Groningen and Inhambane PRA	Limpopo Province, South Africa	2016 2016	Heritage Basic Assessment	Rustenburg Platinum Mines Limited
NTEM Iron Ore Mine and Pipeline Project	Cameroon	2014 2016	Technical Review	IMIC plc
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
Exxaro Belfast GRP	Belfast, Mpumalanga, South Africa	2013 2017	Grave Relocation	Exxaro
Grootvlei MRA	Springs, Gauteng, South Africa	2016 2016	Notification of Intent to Develop	Ergo (Pty) Ltd
Lambda EMP	Mpumalanga, South Africa	2016 2016	Palaeontological Impact Assessment	Eskom Holdings SOC Limited
Kilbarchan Basic Assessment and EMP	Newcastle, KwaZulu-Natal, South Africa	2016 2016	Heritage Basic Assessment	Eskom Holdings SOC Limited
Grootegeeluk Amendment	Lephalale, Limpopo Province, South Africa	2016 2016	Notification of Intent to Develop	Exxaro
Eskom Northern KZN Strengthening	KwaZulu-Natal, South Africa	2016 2017	Heritage Impact Assessment	ILISO Consulting
Garsfontein Township Development	Pretoria, Gauteng, South Africa	2016 2016	Notification of Intent to Develop	Leungo Construction Enterprises



Project Title	Project Location	Date:	Description of the Project	Name of Client
Massawa EIA	Senegal	2016 2017	Technical Reviewer Heritage Impact Assessment	Randgold Resources
Louis Botha Phase 2	Johannesburg, Gauteng, South Africa	2016 2016	Phase 2 Excavations	Royal Haskoning DHV
Beatrix EIA and EMP	Welkom, Free State, South Africa	2016 2017	Heritage Impact Assessment	Sibanye Gold Ltd
Sun City Heritage Mapping	Pilanesberg, North-West Province, South Africa	2016 2016	Phase 2 Mapping	Sun International
Sun City Chair Lift	Pilanesberg, North-West Province, South Africa	2016 2017	Notification of Intent to Develop	Sun International
Hendrina Underground Coal Mine EIA	Hendrina, Mpumalanga, South Africa	2016 2016	Heritage Impact Assessment	Umcebo Mining (Pty) Ltd
Elandsfontein EMP Update	Clewer, Mpumalanga, South Africa	2016 2017	Heritage Impact Assessment	Anker Coal

## 6 Professional Registrations

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

## 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

Heritage Impact Assessment

Application for a Mining Right and Environmental Authorisation of the proposed  
Palmietkuilen Mine, Gauteng Province

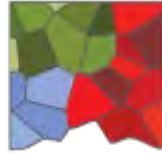
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## **Appendix B: Detailed HRM Methodology**



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## Heritage Cultural Significance, Field Rating and Impact Assessment Methodology

### Assessment Methodology Statement

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**Project Number:**

ZZZ9999

**Prepared for:**

Internal Document

June 2016

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This document has been prepared by Digby Wells Environmental.

<b>Document:</b>	<b>Assessment Methodology Statement</b>
<b>Description:</b>	<b>Heritage Cultural Significance, Field Rating and Impact Assessment Methodology</b>
<b>Project Code:</b>	<b>ZZZ9999</b>

#### Revision History

<b>Name</b>	<b>Responsibility</b>	<b>Version</b>	<b>Date</b>
Johan Nel ASAPA Member 095	HRM Unit Manager	Ver 1	May 2014
		Ver 2	October 2014
		Ver 3	May 2015
Justin du Piesanie ASAPA Member 270	HRM Manager	Ver 4	January 2016
		Ver 5	June 2016

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## 1 Introduction

Assessment of impacts include several steps aimed to evaluate the way in which environmental aspects will / may interact with the cultural landscape (*the environment*) resulting in environmental impacts to heritage resources. Environmental aspects and impacts are defined as:

- Environmental aspects: an element of an organisation’s activities or products or services that can interact with the environment’ (ISO 14001: 2004 - 3.6); and
- Environmental impacts: any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects (ISO 14001: 2004 - 3.7).

However, in terms of cultural heritage resources, environmental impacts should be assessed relative to the heritage value or cultural significance of a resource. The methodology employed in the various stages of the impact assessment process is described in more detail below.

## 2 Evaluation of Cultural Significance

The significance rating process is designed to provide a numerical rating of the cultural significance<sup>1</sup> of identified heritage resources. The evaluation was done as objectively as possible through a matrix developed by Digby Wells for this purpose. In addition, the methodology aims to allow ratings to be reproduced independently should it be required, provided that the same information sources are used.

This matrix takes into account heritage resources assessment criteria set out in subsection 3(3) of the NHRA (see Box 1), which determines the intrinsic, comparative and contextual significance of identified heritage resources. A resource’s importance rating is based on information obtained through review

Dimension	Attributes considered	NHRA Ref.
Aesthetic & technical	1 Importance in aesthetic characteristics	S.3(3)(e)
	2 Degree of technical / creative skill at a particular period	S.3(3)(f)
Historical importance & associations	3 Importance to community or pattern in country's history	S.3(3)(a)
	4 Site of significance relating to history of slavery	S.3(3)(i)
	5 Association with life or work of a person, group or organisation of importance in the history of the country	S.3(3)(h)
Information potential	6 Possession of uncommon, rare or endangered natural or cultural heritage aspects	S.3(3)(b)
	7 Information potential	S.3(3)(c)
	8 Importance in demonstrating principle characteristics	S.3(3)(d)
Social	9 Association to community or cultural group for social, cultural or spiritual reasons	S.3(3)(g)

**Box 1: NHRA section 3 criteria**

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



of available credible sources and representivity or uniqueness (i.e. known examples of similar resources to exist). The final significance attributed to a resource furthermore takes into account the physical integrity of the fabric of the resource. The formula used to determine significance can be summarised in Box 2.

$$\begin{aligned} \text{Value} &= \text{Importance} \times \text{Integrity} \\ \text{where} \\ \text{Importance} &= \text{average sum} \\ &\text{of} \\ &\text{Aesthetic} + \text{Historic} + \text{Scientific} + \text{Social} \end{aligned}$$

**Box 2: CS formula**

The rationale behind the heritage value matrix takes into account the fact that a heritage resource's value is a direct indication of its sensitivity to change (impacts). Value therefore needs to be determined prior to the completion of any assessment of impacts.

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

The significance of a resource is directly related to the impact on it that could result from project-related activities, as it provides minimum accepted levels of change to the resource. SAHRA has published minimum standards that include minimum required mitigation of heritage resources. These minimum requirements are integrated into the matrix to guide both assessments of impacts and recommendations for mitigation and management of resources.

The weight assigned to the various parameters for significance in the formula, significance ratings and recommended mitigation are presented in Table 3-1.

### 3 Field Rating

Although grading of heritage resources remains the responsibility of heritage resources authorities, SAHRA requires in terms of its Minimum Standards that heritage reports include Field Ratings for identified resources to comply with section 38 of the NHRA. The NHRA in terms of section 7 provides for a system of grading of heritage resources that form part of the national estate, distinguishing between three categories.

The field rating process is designed to provide a numerical rating of the recommended grading of identified heritage resources. The evaluation was 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. The formula used to determine field ratings is summarised in Box 3. The weight assigned to the various field rating parameters in the formula and the sum of the average ratings are presented in Table 3-1.

$$\begin{aligned} \text{Field Rating} &= \text{average sum} \\ &\text{of} \\ &\text{Aesthetic} + \text{Historic} + \text{Scientific} + \text{Social} \end{aligned}$$

**Box 3: Field rating formula**

**Table 3-1: Ratings and descriptions used in determining CS and field ratings**

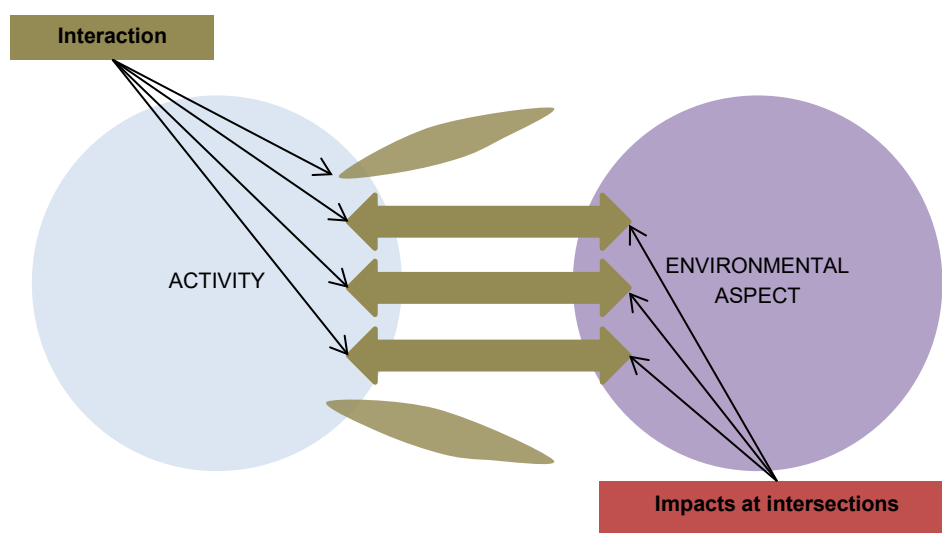
<b>Rating</b>	<b>IMPORTANCE</b> <i>A heritage resource's contribution to aesthetic, historic, scientific and social value.</i>	<b>INTEGRITY</b> <i>The undivided or unbroken state, material wholeness, completeness or entirety of a resource or site</i>	<b>FIELD RATING</b> <i>Recommended grading of identified heritage resources in terms of NHRA Section 7</i>
-	Not assessed - dimension and/or attribute not considered in determining value.		Not assessed - dimension and/or attribute not considered in field rating.
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.	No information potential, complete loss of meaning, Fabric completely degraded, original setting lost	
1	Common, well represented throughout diverse cultural landscapes	Fabric poorly preserved, limited information, little meaning ascribed, extensive encroachment on setting	Resources under general protection in terms of NHRA sections 34 to 37 with Negligible significance Grade IV C
2	Generally well represented but exhibits superior qualities in comparison to other similar examples	Fabric is preserved, some information potential (quality questionable) and meaning evident, some encroachment on setting	Resources under general protection in terms of NHRA sections 34 to 37 with Low significance Grade IV B
3	The resource exhibits attributes that are rare and uncommon within a region. It is important to specific communities.	Fabric well preserved, good quality information and meaning evident, limited encroachment	Resources under general protection in terms of NHRA sections 34 to 37 with Medium to Medium-High significance Grade IV A
4	Rare and uncommon, value of national importance	Excellent preservation of fabric, high information potential of high quality, meaning is well established, no encroachment on setting	Resources under general protection in terms of NHRA sections 34 to 37 with High significance Grade III B
5	The resource exhibits attributes that are considered singular, unique and/or irreplaceable to the degree that its significance can be universally accepted.		Resources under general protection in terms of NHRA sections 34 to 37 with Very High significance Grade III A
6			Heritage resources under formal protection that can be considered to have special qualities which make them significant within the context of a province or a region Grade II
7			Heritage resources under formal protection that can be considered to have special qualities which make them significant within a national and / or international context. Grade I



## 4 Impact Assessment

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

- **Project Activity:** Activities associated with the project that result in an environmental interaction during the different phases (construction, operation and decommissioning), e.g., new processing plant, new stockpiles, development of open pit, dewatering, water treatment plant;
- **Interaction:** An “environmental interaction” is 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:** The term “environmental aspect” refers to the 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.
- **Environmental Impact:** An “environmental impact” is 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.



**Figure 4-1: Graphical representation of impact assessment concept**



The potential impacts were considered through an examination of the project phase and activity, the environmental aspect, the interdependencies between aspects, an assessment and classification of categories, and consideration of the potential impact on heritage resources. An example of this process is presented in Figure 4-2.

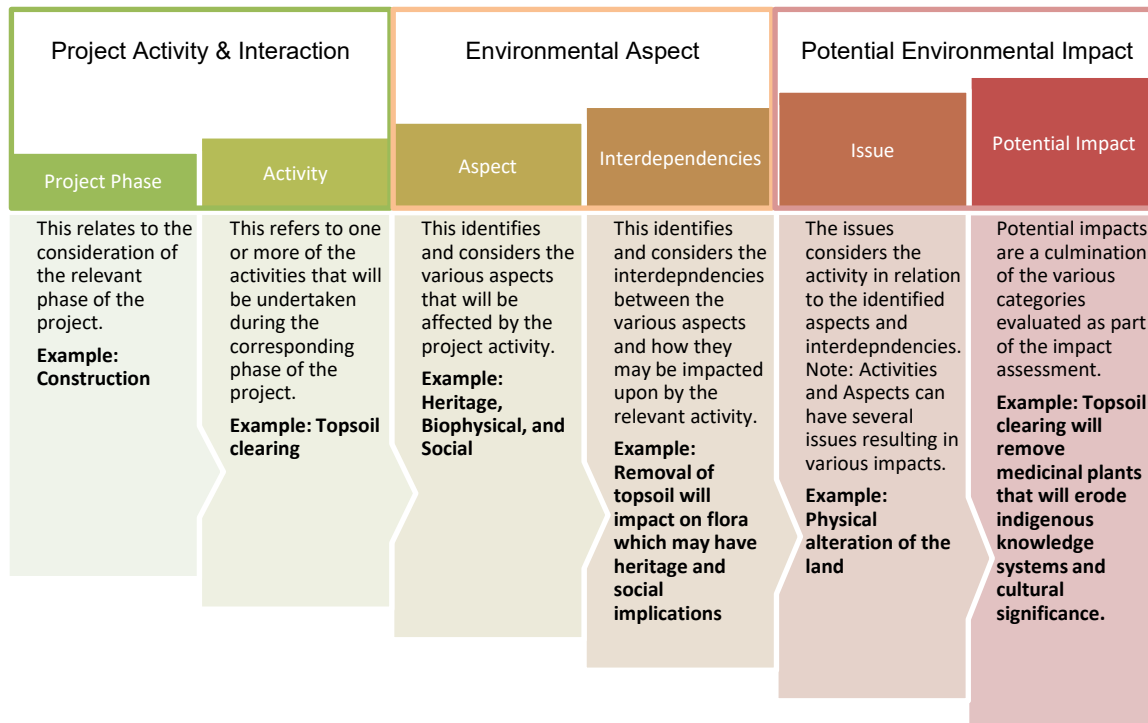


Figure 4-2: Example of how potential impacts were considered.

#### 4.1 Defining Heritage Impacts

Different heritage impacts may manifest in different geographical areas and diverse communities. For instance, heritage impacts can simultaneously affect the physical resource and have social repercussions: this is compounded when the intensity of physical impacts and social repercussions differ significantly. In addition, heritage impacts can influence the cultural significance of heritage resources without any actual physical impact on the resources taking place. Heritage impacts can therefore generally be placed into three broad categories (adapted from Winter & Bauman 2005: 36):

- Direct or primary heritage impacts** affect the fabric or physical integrity of the 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.



- **Indirect, induced or secondary heritage impacts** can 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 cultural significance that may be dependent on ritual patterns of access. Although the physical fabric of the resource is not affected through any primary impact, its significance is affected that can ultimately result in the loss of the resource itself.
- **Cumulative heritage impacts** 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 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 particular resource at the same time, e.g. the effect of regular blasting activities on a nearby rock art site or protected historical building high.
  - **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.
  - **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.

The relevance of the above distinction to defining the study areas in the HSR arises from the fact that heritage resources do not exist in isolation to the wider natural, social, cultural and heritage landscape: cultural significance is therefore also linked to rarity / uniqueness, physical integrity and importance to diverse communities.

In addition, the NHRA requires that heritage resources are graded 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. Three 'concentric' study areas were defined for the purposes of this study and are discussed in detail in the HSR.

## 4.2 Impact Assessment

The impact rating process is designed to provide a numerical rating of the identified heritage impacts. The significance rating follows an established impact/risk assessment formula is shown in Box 4.



The weight assigned to the various parameters for positive and negative impacts in the formula is presented in Table 4-2 below.

Project-related impacts on heritage resources have taken into account the inherent value of heritage resources, described above, and only applied to resources with values above negligible. As a result, the impact assessment did not consider individual resources, but was applied to diverse resources grouped in terms of similar values.

The magnitude will then be applied to pre- and post-mitigation scenarios with the intention of removing all impacts on heritage resources. Where project related mitigation does not avoid or sufficiently reduce negative changes/impacts on heritage resources with high values, mitigation of these resources may be required.

*Significance = consequence of an event x probability of the event occurring*

*where:*

*Consequence = type of impact x (Intensity + Spatial Scale + Duration)*

*and*

*Probability = Likelihood of an impact occurring*

In the formula for calculating consequence:

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

**Box 4: Impact assessment formula**

This may include alteration, restoration or demolition of structures under a permit issued by the HRAs.

Impacts were rated prior to mitigation and again after consideration of the proposed mitigation measures. Impacts were then categories into one of eight categories listed in Table 4-2. The relationship between the consequence, probability and significance ratings is also graphically depicted in Table 4-2.



**Table 4-1: Description of duration, extent, intensity and probability ratings used in impact assessment**

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

Value	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 RATING - A measure of the chance that consequences of that selected level of severity could occur during the exposure window.	
	Probability	Description	Exposure	Description	Intensity	Description	Probability	Description
2	<b>Short Term</b>	Impact will remain for <10% of Project Life	<b>Limited</b>	Impacts on heritage resources will have site specific repercussions, issues or effects, i.e. in context of the site specific study area.	<b>Low</b>	Minor change to Heritage Resource with Medium - Medium High Value	<b>Rare / Improbable</b>	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	<b>Transient</b>	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.	<b>Very Limited</b>	Impacts on heritage resources will be limited to the identified resource and its immediate surroundings, i.e. in context of the specific heritage site.	<b>Very low</b>	No change to Heritage Resource with values medium or higher, or Any change to Heritage Resource with Low Value	<b>Highly Unlikely /None</b>	Expected never to happen. Impact will not occur.

**Table 4-2: Impact significance ratings, categories and relationship between consequence, probability and significance**

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)

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



## 5 Mitigation Measures and Recommendations

The desired outcome of an impact assessment is the removal of negative impacts on heritage resources through the implementation of feasible mitigation measures. The mitigation and management measures recommended in this section comply with the General Principles set out under section 5 of the NHRA. The recommendations further considered the cultural significance of heritage resources and were guided by the minimum mitigation contained in the SAHRA Minimum Standards (See Box 5).

Designation	Recommended mitigation
Negligible	Sufficiently recorded, no mitigation required
Low	Resource must be recorded before destruction, including detailed site mapping, surface sampling may be required
Medium	Mitigation of resource to include detailed recording and mapping, and limited sampling, e.g. STPs.
Medium High	Project design should aim to reduce or remove changes; Mitigation of resource to include extensive sampling and recording, e.g. test excavation, analyses, etc.
High	Project design must aim to avoid change to resource; Partly conserved, Conservation Management Plan (CMP)
Very High	Project design must change to avoid all change to resource; Conserved in entirety, CMP

**Box 5: Recommended minimum level of required mitigation**

Recommended mitigation is therefore divided into two categories: *project-related* and *mitigation of heritage resources* defined below.

- Project-related mitigation requires changes or amendments to project design, planning and siting of infrastructure to avoid or reduce physical impacts on heritage resources. Project-related mitigation measures are always the preferred option, especially where heritage resources with higher cultural significance will be impacted on. Project-related mitigation may include:
  - *In situ* preservation (i.e. no-development) of heritage resources for which Conservation Management Plans (CMPs) are required; and
  - Conservation of heritage resources through, for example, incorporating the resources into project design and planning, for which CMPs are also required.
- Mitigation of heritage resources may be necessary where project-related mitigation will not sufficiently reduce or remove impacts, thus resulting in partial or complete changes (including destruction) to a resource. Such resources need to be mitigated to ensure that they are fully recorded, documented and researched before any negative change occurs. This may require actions such as:
  - Intensive detailed recording of sites through various non-intrusive techniques to create a documentary record of the site – “preservation by record”;
  - 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 a regulated permitted activity for which permits need to be issued by



the relevant heritage authorities. Such mitigation may result in a reassessment of the value of a 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; and

- Where resources have negligible significance the specialist may recommend that no further mitigation is required and the site may be destroyed, for which a destruction permit must be applied for.

Appropriate mitigation measures were identified for each impact, and the procedure discussed above was to assess the possible consequence, probability and significance of each impact post-mitigation.

The post-mitigation rating provided an indication of the significance of residual impacts, while the difference between an impact's pre- and post-mitigation ratings represents the degree to which the recommended mitigation measures are expected to be effective in reducing or ameliorating that impact.

Assessment Methodology Statement

Heritage Cultural Significance, Field Rating and Impact Assessment Methodology

ZZZ9999



DIGBY WELLS  
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Heritage Impact Assessment

Application for a Mining Right and Environmental Authorisation of the proposed  
Palmietkuilen Mine, Gauteng Province

CNC4065



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## Appendix C: Plans



# Palmietkuilen Project EIA

## Identified Heritage Resources

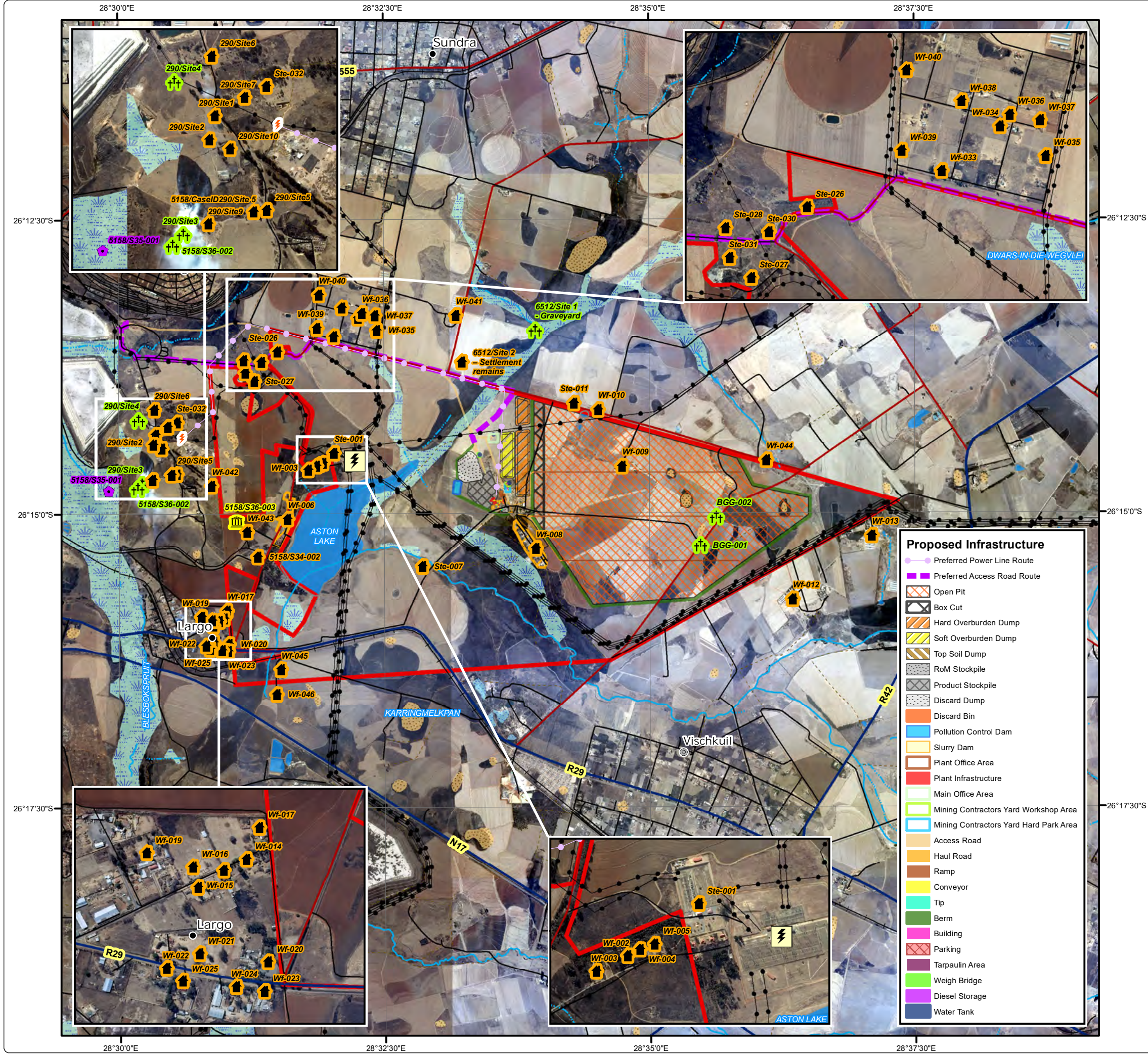
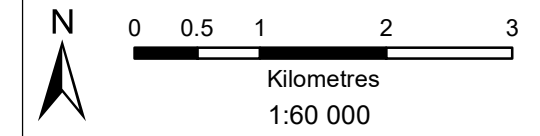
### Legend

- Mining Right Boundary
- Other Town
- Settlement
- ⚡ Sub-Station
- ⚡ Ukufisa Sub-Station
- Power Line
- Arterial / National Route
- Main Road
- Minor Road
- Track
- +— Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam / Lake
- Wetland
- Perennial Pan
- Non-Perennial Pan / Stream

### Identified Heritage Resource

- Archaeological - LFC
- Burial Grounds & Graves
- Historical Built Environment
- Public Monument and Memorial
- Historical Built Environment

- ### Proposed Infrastructure
- Preferred Power Line Route
  - Preferred Access Road Route
  - Open Pit
  - Box Cut
  - Hard Overburden Dump
  - Soft Overburden Dump
  - Top Soil Dump
  - RoM Stockpile
  - Product Stockpile
  - Discard Dump
  - Discard Bin
  - Pollution Control Dam
  - Slurry Dam
  - Plant Office Area
  - Plant Infrastructure
  - Main Office Area
  - Mining Contractors Yard Workshop Area
  - Mining Contractors Yard Hard Park Area
  - Access Road
  - Haul Road
  - Ramp
  - Conveyor
  - Tip
  - Berm
  - Building
  - Parking
  - Tarpaulin Area
  - Weigh Bridge
  - Diesel Storage
  - Water Tank



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

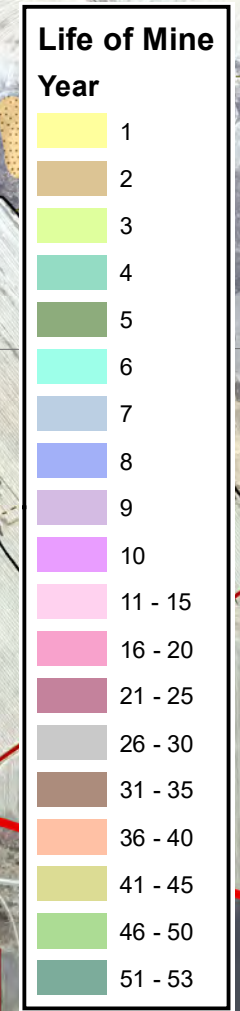
Projection: Transverse Mercator Datum: WGS 1984 Central Meridian: 29°E

Ref #: meg.CNC4065.201607.049 Revision Number: 5 Date: 24/03/2017



# Palmietkuilen Project EIA

## Life of Mine Plan

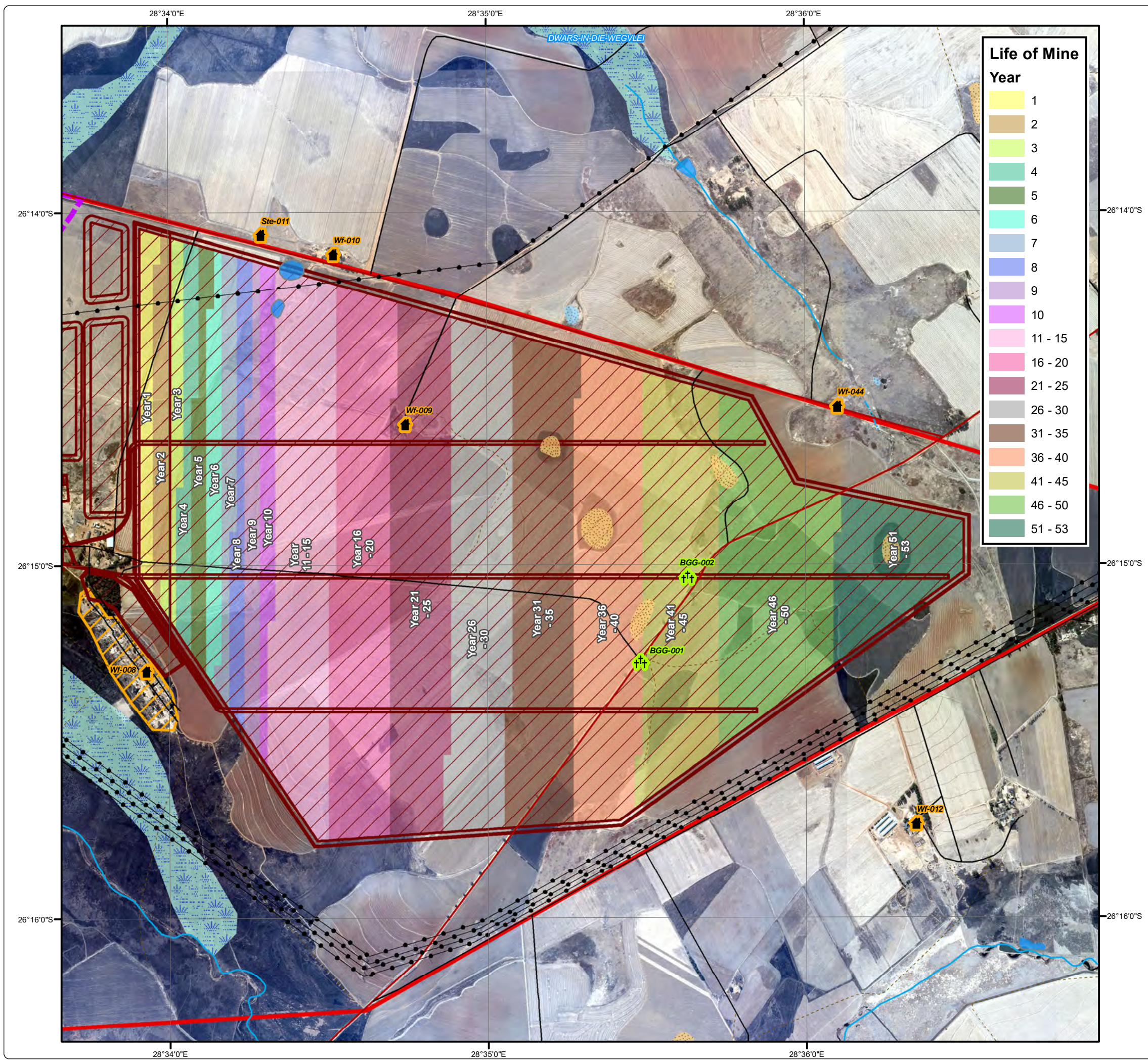


### Legend

- Mining Right Boundary
- Preferred Access Road Route
- Infrastructure Footprint
- Power Line
- Main Road
- Minor Road
- Track
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam / Lake
- Wetland
- Perennial Pan
- Non-Perennial Pan / Stream

### Identified Heritage Resource

- Burial Grounds & Graves
- Historical Built Environment
- Historical Built Environment



Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity  
 Projection: Transverse Mercator Ref #: meg.CNC4065.201610.129  
 Datum: WGS 1984 Revision Number: 2  
 Central Meridian: 29°E Date: 24/03/2017

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