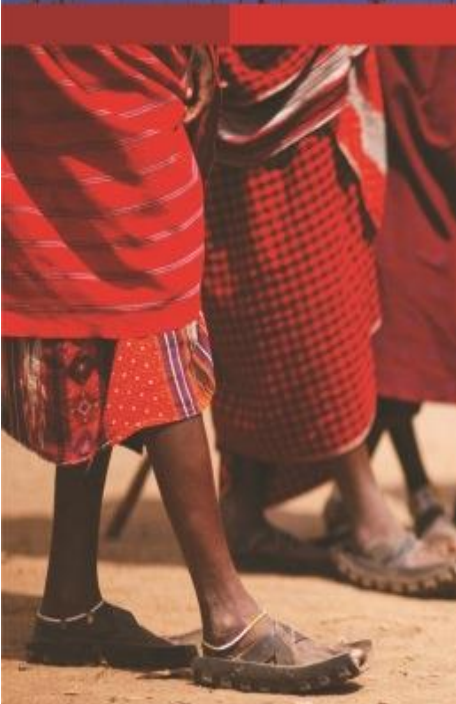




DIGBY WELLS
ENVIRONMENTAL



Environmental Impact Assessment for the Millsite TSF Complex

Heritage Impact Assessment

Project Number:

SIB4276

Prepared for:

Sibanye-Stillwater

November 2017

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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 Sibanye-Stillwater, other than fair remuneration for work performed, specifically in connection with the Heritage Resources Management (HRM) Process for the Environmental Impact Assessment for the Millsite TSF Complex, located near Randfontein, Gauteng Province.



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EXECUTIVE SUMMARY

Sibanye Gold Limited trading as Sibanye-Stillwater (hereinafter Sibanye-Stillwater) currently owns and operates the Cooke Mine under the authorisation of Mining Right (MR) 09/2008, including the reclamation and reprocessing of Dump 20 under MR 173. Sibanye-Stillwater intends to amend the approved Cooke Mine Environmental Management Programme (EMPr) in accordance with Regulation 31 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, 2017 (GN R 982 as amended by GN R 326 of 7 April 2017) to include the and proposed reclamation of the Millsite Tailings Storage Facility (TSF) Complex under MR 173.

This report constitutes the Heritage Impact Assessment (HIA) in support of the amendment application. The HIA was completed in compliance with the requirements encapsulated within the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) to inform the South African National Heritage Resources Agency (SAHRA) and the Provincial Heritage Resources Authority of Gauteng (PHRA-G) of the proposed Project.

The Millsite TSF Complex is underlain by dolomitic rock that has the potential for karst topography and is palaeontologically sensitive. The Malmani Subgroup dolomite of the Chuniespoort Group has an inherent stromatolitic nature and has the potential for karst topography to develop. Karst topography refers to landscapes formed from the dissolution of soluble rocks, including dolomite and limestone. Dissolution of these soluble Malmani dolomites created voids – karst caves – that filled with fine- to coarse-grained alluvium during periodic flooding. The alluvium may be represented by bodies of breccia, sandstone and siltstone.

No heritage resources were recorded within the development footprint of the Millsite TSF Complex. This notwithstanding, the Millsite TSF Complex itself could be argued as a heritage resource generally protected in terms of Section 34 of the NHRA.

One burial ground (BGG-001) and one memorial (BGG-002) have been recorded within proximity to the Millsite TSF Complex. These sites are situated 1799 m and 520 m away from the development footprint respectively.

BGG-001 correlates with the graves of two British soldiers, Beaty-Powell and Davies, which perished during skirmishes associated with the Jameson Raid (Refer to Section 5 below). As indicated by Robert Gilmour, these graves were relocated from their original position during the early 20th century to allow for the placement of mining infrastructure associated with the historic Randfontein mine.

BGG-002 is a memorial for Barend Daniel De Beer, who passed away in the underground mining operations at that location in 1939.

Table: Location information of identified heritage resources

Site ID	Summary Description	Latitude	Longitude
BGG-001	Burial Ground	-26.150318	27.724361
BGG-002	Memorial	-26.140912	27.716861

The cultural significance (CS) assessment of these resources were considered on various criteria contained within Section 3 of the NHRA. This assessment is summarised as follows:

Table: CS assessment of known palaeontological and heritage resources

Resource ID	Aesthetic	Historic	Scientific	Social	INTEGRITY	VALUE
Malmani Subgroup and karst caves	-	-	5	-	4	20
Historical sites associated with living communities - good integrity	4	3	3	3	4	13
Burial grounds and graves	-	-	-	5	4	20

Considering the proposed Project and associated activities, the potential for the exposure of, or damage to fossiliferous material is low. Furthermore, this geological phenomenon creates karst caves which itself however, is a motivating factor in authorising the proposed reclamation as the TSF may be at risk of localised instability as the potential for sinkholes is high.

Section 34(1) of the NHRA makes provision for the protection of structures older than 60 years, the Millsite TSF Complex falling within this threshold. While an argument can be made that the Millsite TSF Complex is generally protected under this provision, it is recommended that Sibanye-Stillwater be exempt from applying for a Section 34 Destruction Permit as regulated by Chapter III of the Regulations to the Act (GN R 548), as the health benefits outweigh the heritage impact.

No other heritage resources were recorded within or in proximity to the Millsite TSF Complex that may be impacted upon by the proposed Project.

These findings considered, the following recommendations are made:

- Exemption from further palaeontological assessment;
- Exemption from permit applications in respect of Section 34 of the NHRA for the Millsite TSF Complex, as regulated by Chapter III of GN R 548;
- Development and implementation of a Conservation Management Plan (CMP) for known sites within proximity to the Millsite TSF Complex; and
- Development and implementation of project specific Chance Find Protocols (CFPs) as a condition of authorisation.

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1 Introduction

Sibanye Gold Limited trading as Sibanye-Stillwater (hereinafter Sibanye-Stillwater) currently owns and operates the Cooke Mine under the authorisation of Mining Right (MR) 09/2008, including the reclamation and reprocessing of Dump 20 under MR 173. Sibanye-Stillwater intends to amend the approved Cooke Mine Environmental Management Programme (EMPr) in accordance with Regulation 31 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, 2017 (GN R 982 as amended by GN R 326 of 7 April 2017) to include the and proposed reclamation of the Millsite Tailings Storage Facility (TSF) Complex under MR 173.

To this effect, Sibanye-Stillwater appointed Digby Wells Environmental (hereinafter Digby Wells) as the independent Environmental Assessment Practitioner (EAP) to comply with the national legislative process as outlined in Section 2 below. This report constitutes the Heritage Impact Assessment (HIA) in support of the amendment application. The HIA was completed in compliance with the requirements encapsulated within the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) to inform the South African National Heritage Resources Agency (SAHRA) and the Provincial Heritage Resources Authority of Gauteng (PHRA-G) of the proposed Project.

1.1 Project background

The Randfontein Estates Gold Mining Company Limited, and its predecessors, established the Cooke Operations during the late 19th century. This comprised the Randfontein, Cooke, Doornkop (JV), Old Randfontein Operations, a section of No. 4 Shaft, and the decommissioned Lindum Reef Section. Subsequent to this, the Lindum Reefs Gold Mining Company Limited was established as a separate company to mine residual ore from the mining operations at the Randfontein section, and reclamation of sand and slimes dump material. West Rand mining operations continued under various companies for many years.

Sibanye-Stillwater formed as a result of the unbundling of the Gold Fields Group's Kloof Driefontein Complex and Beatrix Gold Mines in the Free State, are the present owners and operators of the Cooke Operations. The current authorisations and associated EMPr's are summarised in Table 1-1.

Table 1-1: Authorisations and associated EMPr's

Authorisation	EMPr Title
30/5/1/2/2 (173) MR	Amendment To Rand Uranium's Environmental Management Programme For The Proposed Millsite Tailings Storage Facility (TSF)
09/2008	Addendum To The Environmental Management Programme: Reclamation of Sand Dump 20

Authorisation	EMP Title
30/5/1/2/2 (173) MR	<ul style="list-style-type: none"> ▪ Amendment to Rand Uranium’s Environmental Management Programme for the proposed Millsite Interim Disposal Component of the Cooke Uranium project – Pits Depositions (Permit 3A); and ▪ Environmental Impact and Environmental Management Plan Amendment for the Cooke Optimisation Project

1.2 Project description

As previously stated, Sibanye-Stillwater intends to amend the EMPr for the Cooke Operation to include the reclamation of the Millsite TSF Complex (Table 1-2) into their mining schedule. The proposed amendment is to secure an extension of the Life of Mine (LoM) as reclamation activities at Dump 20 as part of the Cooke Operations are nearing completion. The proposed hydraulic reclamation methodologies¹ are identical to the approved activities currently being completed at Dump 20, as presented in Figure 1-2.

No new infrastructures are required to undertake the Project. Sibanye-Stillwater will however, be required to reconstruct pipelines along previously approved routes between the Millsite TSF Complex to the Dump 20 Booster Pump Station (BPS). Existing pipelines from the BPS to Cooke Plant will be utilised to transport the slurry for processing.

Table 1-2: Property Details

Farm Name:	<ul style="list-style-type: none"> ▪ Remaining Extent of the Farm Rietfontein 162IQ; ▪ Remaining Extent of the Farm Waterfal 174IQ; ▪ Remaining Extent of the Farm Randfontein 247IQ; and ▪ Portion 108 of the Farm Elandsvlei 249IQ 	
Application Area (Ha):	Inclusion of 453 ha (Millsite TSF Complex footprint)	
Magisterial District:	West Rand District Municipality (WRDM); City of Johannesburg Metropolitan Municipality (CoJMM)	Mogale City Local Municipality (MCLM); and Rand West City Local Municipality (RWCLM) (<i>location of Millsite TSF Complex</i>).
Distance & direction	<ul style="list-style-type: none"> ▪ 4km north of Randfontein; and ▪ 5km south west of Krugersdorp 	

¹ For the sake of brevity, a detailed description of activities to be undertaken are not included in this report. A detailed description of activities is included in the EIA / EMPr amendment report.



Figure 1-1: Current extent of the Millsite TSF Complex

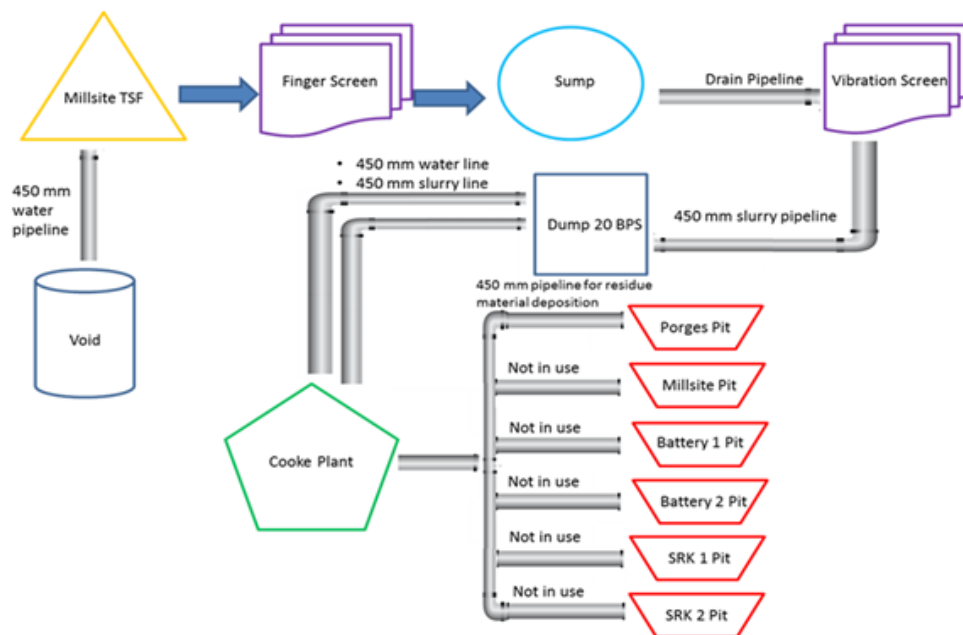


Figure 1-2: Millsite TSF Complex reclamation process

1.3 Specified mining methods

1.3.1.1 Construction Phase

The construction phase comprises the establishment of supporting infrastructures to complete the proposed reclamation of the Millsite TSF Complex. This will include:

- Laying of the finger screen at the toe of the TSF;
- Placement of the sump at the TSF base;
- Placement of a tank and pump after the vibrating screen;
- Laying a water pipeline to the TSF and construction of a water tank; and
- Laying of the slurry pipeline to the BPS at Dump 20 (an existing culvert will need to be reopened for the slurry pipeline to traverse a road between the Millsite TSF Complex and Dump 20). The water and slurry pipelines will follow existing pipeline routes approved under 30/5/1/2/2 (173) MR.

1.3.1.2 Operational Phase

All related operations, including water pumping, slurry pumping and tailings disposal form part of the operational phase. These will include:

- Mixing the slimes and water to create a slurry;
- Hydraulic conveying of the slurry to the Cooke Plant via the BPS at Dump 20; and
- Final deposition of the residue material into the open pits.

1.3.1.3 Decommissioning Phase

During decommissioning all supporting infrastructure will be removed, and the Millsite TSF Complex footprint and disturbed areas rehabilitated. The following activities are defined as part of the decommissioning phase:

- Rehabilitation of the Millsite TSF Complex footprint;
- Removal of structures and infrastructure (pipelines, screens, berms); and
- Rehabilitation of the pits should they have been successfully sealed and filled.

The rehabilitation of these areas will be undertaken as per the approved rehabilitation and closure plan at the time.

1.3.1.4 Residual and Post Closure Phase

Post-closure undertakings continue after mining and decommissioning activities have ceased. This phase will entail post-closure final rehabilitation and monitoring in accordance with the approved rehabilitation and closure plan.

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 authorisation application applicable to this Project. Digby Wells completed the HRM Process in accordance with Section 38(8) of the NHRA.

1.5 Scope of work

The Scope of Work (SoW) for the specialist HRM process included the compilation of an HIA to comply with Section 38(3) of the NHRA. The following activities were completed as part of this SoW:

- Completing a literature review to assist in defining the predominant cultural landscape;
- Undertaking historical layering to identify potential structures older than 60 years that are protected under Section 34 of the NHRA, or any other tangible heritage resources;
- Identification and mapping (*as far as feasible*) of all heritage resources in the proposed site-specific study area;
- Assessment of Cultural Significance (CS) of identified heritage resources;
- Identification of potential impacts to heritage resources based on Project activities;
- An evaluation of the impact of the operation on heritage resources relative to the sustainable socio-economic benefits that may be derived from the Project;
- Present the results of consultation with Interested and Affected Parties (I&APs) and/or stakeholders;
- Recommend feasible management or mitigation measures to avoid and/or reduce negative impacts and enhance positive ones; and
- 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 expertise of the HRM specialist is presented in Table 1-3.

Table 1-3: Expertise of the specialist

Team Member	Bio Sketch
Justin du Piesanie ASAPA Member 270	Justin is the HRM Unit Manager at Digby Wells. Justin joined the company in August 2011 as an archaeologist and was subsequently made unit manager in the Social and Heritage Services Department. He obtained his Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand

Team Member	Bio Sketch
AMAFA Registered ICOMOS Member 14274 IAIAsa Member Years' Experience: 11	in 2008, specialising in the Southern African Iron Age. Justin also attended courses in architectural and urban conservation through the University of Cape Town's Faculty of Engineering and the Built Environment Continuing Professional Development Programme in 2013. Justin is a professional member of the Association of Southern African Professional Archaeologists (ASAPA), and accredited by the association's Cultural Resources Management (CRM) section. He is also a member of the International Council on Monuments and Sites (ICOMOS), an advisory body to the UNESCO World Heritage Convention. He has over 10 years combined experience in HRM in South Africa, including heritage assessments, archaeological mitigation, grave relocation, and NHRA Section 34 application processes. Justin has gained further generalist experience since his appointment at Digby Wells in Botswana, Burkina Faso, the Democratic Republic of Congo, Liberia, Mali and Senegal on projects that have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage. Furthermore, Justin has acted as a technical expert reviewer of HRM projects undertaken in Cameroon and Senegal. Justin's current focus at Digby Wells is to develop the HRM process as an integrated discipline following international HRM principles and standards. This approach aims to provide clients with comprehensive, project-specific solutions that promote ethical heritage management and assist in achieving strategic objectives.

1.7 Structure of the report

The remainder of the report, with references to the relevant information required in terms of Section 38(3) of the NHRA, is structured as per the below table.

Table 1-4: Structure of the report

Chapter	Description	NHRA information requirements
2	Outlines the legislative framework relevant to the specialist heritage study.	-
3	Identifies the specific constraints and limitations of the HIA.	-
4	Describes the methodology employed in the compilation of this HIA.	-
5	Provides the baseline cultural landscape.	38(3)(a)
6	Motivates for the defined CS of the identified heritage resources and landscape.	38(3)(b)

Chapter	Description	NHRA information requirements
	Considers the potential impacts to heritage resources by project related activities.	38(3)(c)
	Outlines possible risks to heritage resources and heritage related risks to the project.	
7	Considers the development context to assess the socio-economic benefits of the project in relation to the presented impacts and risks.	38(3)(d)
8	Presented the results of consultation.	38(3)(e)
9	Details the specific recommendations based on the contents of the HIA.	38(3)(g)
10	Collates the most salient points of the HIA and concludes with the specific outcomes and recommendations of the study.	38(3)(f) 38(3)(g)
11	Lists the source material used in the development of the report.	-

2 Legislative and policy framework

The HRM process is governed by the national legislative framework. This section provides a brief summary of the relevant legislation pertaining to the conservation and responsible management of heritage resources.

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

Applicable legislation used to compile the report	Reference where applied
<p><u>Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</u></p> <p>Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –</p> <p>i. Prevent pollution and ecological</p>	<p>The EIA process and associated HRM process is being undertaken to identify heritage resources and determine heritage impacts associated with the Project.</p> <p>As part of the HRM process, mitigation measures and monitoring plans will be recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the</p>

Applicable legislation used to compile the report	Reference where applied
<p>degradation;</p> <p>ii. Promote conservation; and</p> <p>iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p>	<p>Constitution.</p>
<p><u>Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)</u></p> <p>The MPRDA sets out the requirements relating to the development of the nation's mineral and petroleum resources. It also aims to ensure the promotion of economic and social development through exploration and mining-related activities.</p> <p>The MPRDA requires that mining companies assess the socio-economic impacts of their activities from start to closure and beyond. Companies must develop and implement a comprehensive Social and Labour Plan (SLP) to promote socio-economic development in their host communities and to prevent or lessen negative social impacts.</p> <p>Section 102 of this Act applies in respect of proposed amendments to the existing mining rights. A Section 102 Amendment does not explicitly require a heritage study and therefore does not trigger a NHRA section 38(8) application. However, a Section 102 Amendment does require an EA application to be completed which entails a BAR or EIA to be conducted.</p> <p>The EIA or BAR must therefore be conducted in accordance with Section 39 of the MPRDA that give effect to the general objectives of integrated environmental management encapsulated in Chapter 5 of the NEMA. The EIA must furthermore speak to impacts that the mining will have on the environment in accordance with section 24(7) of the NEMA.</p>	<p>This HIA, which relates specifically to the Cooke and Millsite Operations Regulation 31 Application, has been compiled in accordance with the MPRDA read with the EIA Regulations, 2014.</p>
<p><u>National Environmental Management Act, 1998 (Act No. 107 of 1998)</u></p>	<p>The EIA process is being undertaken in accordance with the principles of Section 2 of</p>

Applicable legislation used to compile the report	Reference where applied
<p>The NEMA, as amended, was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making on issues affecting the environment. Section 24 (1)(a), (b) and (c) of NEMA state that:</p> <p><i>The potential impact on the environment, socio-economic conditions and cultural heritage of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.</i></p> <p>The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2) and GN R.985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended.</p>	<p>NEMA as well as with the EIA 2014 Regulations, promulgated in terms of NEMA.</p> <p>Based on the regulatory process, it has been identified that a full EIA process is required for the Project. An application for the amendment and consolidation of the various EMPr's will be submitted to the DMR who is the relevant Competent Authority in terms of this application for authorisation.</p>
<p><u>GN R. 982: Environmental Impact Assessment Regulations, 2014 (as amended by GN R 326 of 7 April 2017)</u></p> <p>Regulation 31 makes provision for an amendment that will produce a change to the scope of a valid environmental authorisation where such change will result in an increased level or change in the nature of the impact where such level or change of impact was not (a) assessed and included or (b) taken into consideration in the initial application and the change does not, on its own, constitute a listed activity or specified activity as defined below.</p> <p>Three listing notices set out a list of identified activities which may not commence without an Environmental Authorisation from the relevant Competent Authority through one of the following</p>	<p>All required infrastructures and process in respect of this Project have previously been approved, and no new Listed Activities are triggered.</p> <p>This HIA was undertaken in support of the Regulation 31 Amendment process as required by Section 24 of the NEMA and Section 38 of the NHRA.</p>

Applicable legislation used to compile the report	Reference where applied
<p>processes:</p> <ul style="list-style-type: none"> ▪ Regulation GN R. 983 - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation and which must follow a basic assessment process. ▪ Regulation GN R. 984 – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation and which must follow an environmental impact assessment process. ▪ Regulation GN R. 985 – Listing Notice 3: This notice provides a list of various environmental activities which have been identified by provincial governmental bodies which if undertaken within the stipulated provincial boundaries will require environmental authorisation. The basic assessment process will need to be followed. 	
<p><u>National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></p> <p>The NHRA is the overarching legislation that protects and regulates the management of heritage resources in South Africa, with specific reference to the following Sections:</p> <ul style="list-style-type: none"> ▪ 5. General principles for HRM ▪ 6. Principles for management of heritage resources ▪ 7. Heritage assessment criteria and grading ▪ 38. Heritage resources management <p>The Act requires that Heritage Resources Authorities (HRAs), in this case the South African Heritage Resources Agency (SAHRA) and the Mpumalanga Provincial Heritage Resources Authority (MPRHA), be notified as early as possible of any developments that may exceed</p>	<p>This HIA will be submitted to the SAHRA and PHRA-G. The HIA was compiled to comply with of subsection 3(3)(a) and (b), 38(3), (4) and (8) of the NHRA.</p>

Applicable legislation used to compile the report	Reference where applied
certain minimum thresholds in terms of Section 38(1), or when assessments of impacts on heritage resources are required by other legislation in terms of Section 38(8) of the Act.	

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

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

3 Constraints and Limitations

The following constraints and limitations were experienced during compilation of this HIA:

- The HIA only considers the EMPr amendment as relevant to the reclamation of the Millsite TSF Complex;
- All authorised activities across the various Mining Rights are considered relevant and remain applicable and were not considered in this assessment;
- Whilst every attempt to obtain the latest available information was made, the reviewed literature does not represent an exhaustive list of information sources for the various study areas;
- The HIA does not present an exhaustive list of heritage resources in the various study areas;
- Results from previously completed heritage studies were not subject to an assessment of CS or verified during the field survey;
- Palaeontological and archaeological resources commonly occur at subsurface levels. These types of resources may not be adequately recorded or documented by assessors without intrusive and destructive methodologies. Therefore, the reviewed literature and previously completed assessments are in themselves limited to surface observations; and
- The HIA was compiled prior to the initiation of the regulated consultation process. No results from formal consultation were considered in the compilation of this HIA. All heritage related comments will be addressed as part of the required Comments and Response Report (CRR) after the public commenting period to further satisfy the requirements Section 38(3) of the NHRA.

4 Methodology

4.1 Defining the study area

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

- The *site-specific* study area – the farm portions extent associated with the proposed Project including a 500 m buffer area. The site-specific study area may extend linearly. In such instances, the defined site-specific study area includes the linear

development, e.g. a road, and a 200 m buffer either side of the development footprint; and

- The *local* study area – the area most likely to be influenced by any changes to heritage resources in the Project area, or where project development could cause heritage impacts. Defined as the area bounded by the local municipality, in this instance the MCLM, RLM and JMM, with particular reference to the immediate surrounding properties / farms. The local study area was specifically examined to offer a backdrop to the socio-economic conditions within which the proposed development will occur. The local study area furthermore provided the local development and planning context that may contribute to cumulative impacts.

4.2 Statement of cultural significance

Digby Wells designed the significance rating process to provide a numerical rating of the CS² of identified heritage resources. This process considered heritage resources assessment criteria set out in subsection 3(3) of the NHRA, which determined the intrinsic, comparative and contextual significance of identified heritage resources. A resource's importance rating was based on information obtained through review of available credible sources and representativity or uniqueness (i.e. known examples of similar resources to exist).

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

The matrix rated the potential, or importance, of an identified resource relative to its contribution to certain values – aesthetic, historical, scientific and social. Resource significance was directly related to the impact on it that could result from project-related activities, as it provided minimum accepted levels of change to the resource.

4.3 Definition of heritage impacts

Potential impacts to heritage resources may manifest differently across geographical areas or diverse communities when one considers the simultaneous affect to the tangible resource and social repercussions associated with the intangible aspects. Furthermore, potential impacts may concurrently influence the CS of heritage resources. This assessment therefore considers three broad categories adapted from Winter & Bauman 2005: 36.

² 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.

Table 4-1: Impact definition

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

4.4 Secondary data collection

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

A survey of diverse information repositories was made to identify appropriate relevant information sources. These sources were analysed for credibility and relevance. 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 proposed 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 South African Heritage Resources Information System (SAHRIS), online / electronic journals and platforms, and certain internet sources. This HIA only includes a summary and discussion of the most relevant findings. Relevant sources were cited and included in a reference list.

Historical layering is a process whereby diverse cartographic sources from various time periods are layered chronologically using Geographic Information System (GIS). The rationale behind historical layering is threefold, as it:

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

Table 4-2: Qualitative data sources

Reviewed Qualitative Data		
Databases		
University of the Witwatersrand (Wits) Archaeological Database (2010)	Genealogical Society of South Africa (GSSA)	SAHRIS
SAHRIS Cases		
Case ID: 6854	Case ID: 871	Case ID: 4700
Case ID: 9370	Case ID: 8996	Case ID: 10302
Case ID: 8430	Case ID: 8432	Case ID: 8433
Case ID: 8432	Map ID: 00596	Map ID: 00543

Table 4-3: Aerial imagery considered

Aerial photographs						
Job no.	Flight plan	Photo no.	Map ref.	Area	Date	Ref.
129	10	73872-73873	2627	Johannesburg / Potchefstroom	1938	129/1938
	11	73906-73907				
314	4	44464-44465	2627, 2628	Johannesburg / Vereeniging	1952	314/1952

4.5 Primary data collection

Justin du Piesanie collected primary data through a field assessment of the Millsite TSF Complex on 10 October 2017. A second field survey, in the accompaniment of Robert Gilmour and Barbara Wessels, was completed on 1 November 2017. The field based data collection was non-intrusive (i.e. no sampling), primarily vehicular, with the objective to:

- Visually record the current state of the cultural landscape; and
- Record heritage resources that may be impacted upon through reclamation of the Millsite TSF Complex.

5 Cultural heritage baseline description

The Millsite TSF Complex is underlain by lithology's of the Witwatersrand and Transvaal Supergroups spanning the Mesoarchean through Eoproterozoic Eras (See Table 5-1). The Witwatersrand Supergroup dates to 2800 – 2650 million years ago (Ma) and is covered by younger rocks both to the east and west (McCarthy, 2006). The West Rand Group of the Witwatersrand Supergroup comprise of formations consisting of quartzite, shale and minor / subordinate conglomerate. Paleontologically the West Rand Group is not sensitive and has insignificant / zero fossil potential (SAHRA, 2013a). It is not considered further in this assessment.

The Witwatersrand Supergroup in the region is overlaid by the Transvaal Basin of the Transvaal Supergroup, dating from 2650 – 290 Ma. The associated Malmani Subgroup dolomite of the Chuniespoort Group has an inherent stromatolitic nature and has the potential for karst topography to develop. Karst topography refers to landscapes formed from the dissolution of soluble rocks, including dolomite and limestone. Dissolution of these soluble Malmani dolomites created voids – karst caves – that filled with fine- to coarse-grained alluvium during periodic flooding. The alluvium may be represented by bodies of breccia, sandstone and siltstone. The detritus can include diverse animal bone fragments including hominid remains and tools (Martini, 2006, pp. 662-663; Knight, et al., 2014, p. 8; Sinclair, et al., 2003), similar to those excavated from the Sterkfontein Caves in the Cradle of Humankind (CoH) World Heritage Site (WHS), which is the most significant example of a karst landscape in the region. For this reason, the Malmani Subgroup has a high palaeontological sensitivity (SAHRA, 2013b).

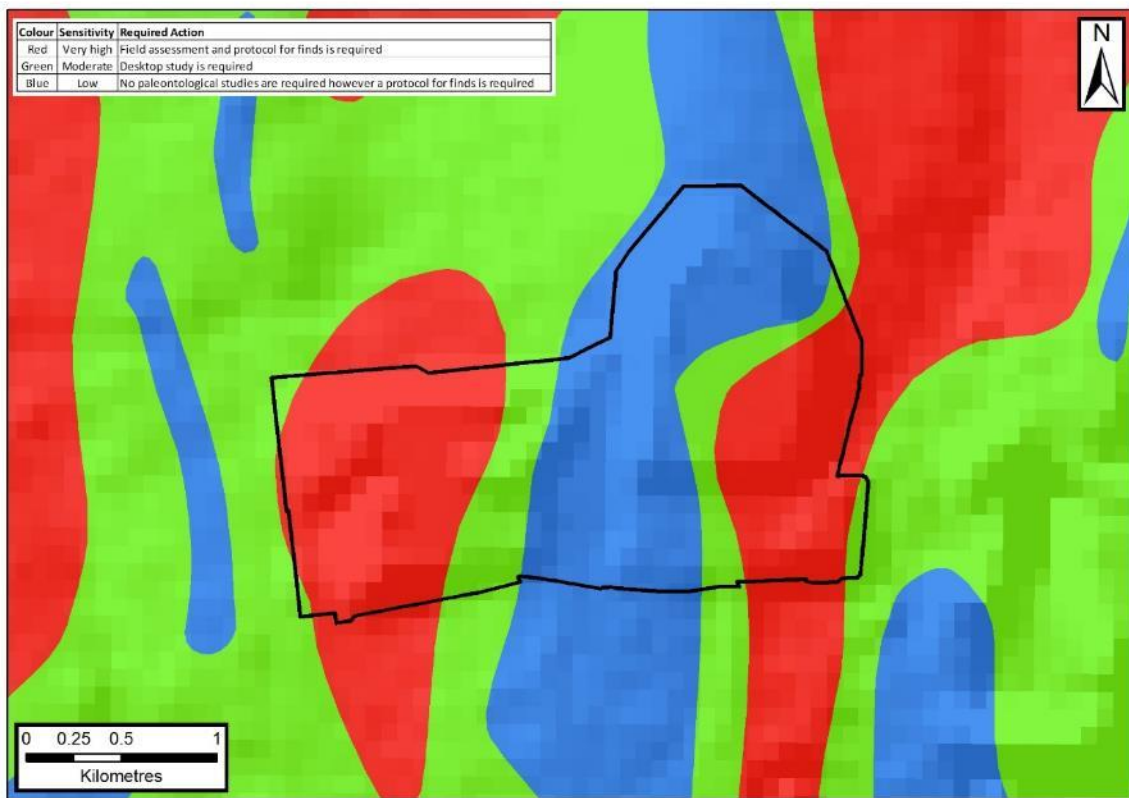


Figure 5-1: Palaeo-Sensitivity Plan for the Millsite TSF Complex (Adapted from SAHRIS)

Table 5-1: Geology of the Millsite TSF Complex

Ma	Eon	Era	Lithostratigraphic units			Lithology	Sensitivity	Fossils	
2500-	PROTEROZOIC	EOPROTEROZOIC Vaalian	Transvaal Supergroup	Chuniespoort Group	Malmani Subgroup	Frisco Formation	Mainly stromatolitic dolomite, shale	High	Range of shallow marine to intertidal stromatolites (domes, columns etc), organic-walled microfossils. Early continental shelf environments (margins of Kaapvaal Craton). Potential fossiliferous late Cenozoic cave breccias within 'Transvaal Dolomite' outcrop area, similar to Sterkfontein karst topography
Eccles Formation						Cherty dolomites, erosion breccias			
Lyttelton Formation						Shales, quartzites and stromatolitic dolomite			
Monte Christo Formation						Erosive breccia, stromatolitic and oolitic platformal dolomite			
Oaktree Formation						Carbonaceous shale, stromatolitic dolomite, locally developed quartzite			
2650-				Black Reef Formation	Relatively mature quartz arenites with lesser conglomerate and sub-ordinate mudrock				

Ma	Eon	Era		Lithostratigraphic units			Lithology	Sensitivity	Fossils
2800	ARCHAEAN	MESOARCHAEAN	Randian	Witwatersrand Supergroup	West Rand Group	Government Subgroup	Quartzite, shale, minor/subordinate conglomerate	Zero	None
						Afrikaner Formation			
						Elandslaagte Formation			
						Palmietfontein Formation			
						Tusschenin Formation			
						Coronation Formation			
						Promise Formation			

The CoH WHS is also known for its accumulations of stone tool technologies. The Stone Age was largely influenced by the environment such as the geology, the geomorphology, climate, fauna and flora of the area (Lombard, et al., 2012). Three periods are defined for the Stone Age i.e. the Early Stone Age (ESA), the Middle Stone Age (MSA) and the Late Stone Age (LSA). Significantly, stone tool accumulations from the ESA and MSA have been recorded alongside hominid remains at the CoH WHS (Barras, 2014; Berger, et al., 2010). These accumulations provide tangible evidence for occupation of the areas from as early as 2.3 Ma during the ESA through the MSA. In contrast to the cruder ESA and MSA technologies, the LSA is characterised by the presence of microlithic stone tools and evidence of modern cognitive behaviour, which includes complex spiritual beliefs and ritual ceremonies, structured society and artistic expression. The LSA is associated with hunter-gatherer societies such as the *San / Bushmen* and *Khoi* herders (Deacon & Deacon, 1999).

Surface accumulations of MSA and LSA lithics have been recorded throughout the region, however these finds are commonly not found *in situ* and provide limited contextual information beyond form, function and technique of manufacture.

The LSA is followed temporally by the farming community period. Archaeologically, common identifiers of this period include stonewalled settlements and ceramics. Klipriviersberg and Type N stonewalled settlements can be found within the regional study area. Ethnographically, the Fokeng are associated with Type N settlements, which are characterised by a group of primary enclosures arranged in a ring and linked by secondary walling to form a secondary enclosure. Some detached structures occur within the enclosure and these settlements date between AD 1500 and 1700 AD (Huffman, 2007). The Fokeng also built stonewalled settlements in southern Gauteng, referred to as Klipriviersberg type sites. These sites consist of scalloped stonewalled structures, small stock kraals and surrounded by residential zones (Huffman, et al., 2006/2007). Ceramics facies associated with Type N and Klipriviersberg type settlements are characterised by the presence of comb stamping in pendant triangles and horizontal bands below the rim, rim notches and applied bands (Maggs, 1976). This facies is known as the *Uitkomst* facies (1550-1650 AD). Other pottery associated with Type N settlements is the *Ntsuanatsatsi* facies, named after the type site near Frankfort in the Free State (Huffman, 2007). The facies is characterised by comb stamping and finger pinching decoration techniques and has been identified as a local variant of the *Uitkomst* facies (Huffman, 2002).

The relative political stability³ of the region was disrupted by the *Mfecane* of the 19th century. The *Mfecane* refers to the period 1815 to 1840 during which large-scale population displacement occurred in the South African interior. The *Mfecane* stemmed from expansion spearheaded by the Zulu general Mzilikazi and his army out of KwaZulu-Natal. During this time, different groups assimilated and realigned political affiliations to increase their political

³ The author acknowledges that in southern Africa the last 500 years represents a formative period that is marked by enormous internal economic invention and political experimentation that shaped the cultural contours and categories of modern identities outside of European contact. This period is currently not well documented and is being explored through the 500 year initiative.

strength. In some instances this manifested as new identities. As the *Mfecane* spread, they would attack and pillage settlements, displacing large groups of people (Golan, 1990; Garstang, et al., 2014).

While this dispersion of local inhabitants was occurring in the interior of the country, the *Voortrekkers* were making their way north from the Cape to escape the control of the British. As such, groups moving through and settling in the Gatsrand did not encounter many local communities. The trek leaders Andries Hendrik Potgieter and Sarel Cilliers did, however, establish contact with the Bataung and their chief Makwana who exchange parcels of land for protection against Mzilikazi. They succeeded in driving Mzilikazi across the Limpopo River by 1837 (Shorten, 1970; van Eeden, 1988; The Voortrekkers, 2014).

Shortly after settling in the region, gold was discovered. Some sources say that gold was found as early as 1834, by a hunter named Carel Kruger, who took samples from the Witwatersrand. Other discoveries include the find of John Henry Davies (an English mineralogist) in 1852, who identified gold on the farm of Paardekraal (now Krugersdorp) (von Ketelhodt, 2007). In 1856, Lieutenant Lys recovered a small amount of gold from crushed conglomerate on the farm of Driefontein (Shorten, 1970).

During this period, relations between the British and the Boers were strained, culminating in the Transvaal War (i.e. the first Anglo-Boer War) between November 1880 and March 1881. A notable event during the war, within proximity to the study area, was the gathering of approximately 10 000 Boers near Krugersdorp in rejection of British Authority. Most of the skirmishes however, occurred at Potchefstroom. The War ended with the signing of a peace treaty and the declaration of an independent *Zuid Afrikaanse Republiek* (ZAR) (South African History Online, 2014c).

Subsequent to this, gold along the Witwatersrand Reef was discovered by George Harrison between the Wilgespruit and Langlaagte farms in 1886. This discovery sparked a gold rush that lead to:

- The declaration of public diggings by the ZAR;
- The establishment of Johannesburg;
- The Jameson Raid; and
- The South African War (i.e. the Second Anglo-Boer War).

The declaration of public diggings encouraged mining magnates, fortune seekers and labourers to settle in the small mining camp that would eventually become Johannesburg. Notably, Cecil John Rhodes and his associate Charles Rudd established Gold Fields of South African Limited in 1887 as one of the first mining houses to undertake large scale mining activities on the reef. Also in 1887, the town of Krugersdorp was established (von Ketelhodt, 2007) The Randfontein Estates Gold Mining Company, Witwatersrand Limited (Randfontein Estates) was founded by J.B Robinson in 1889. It was named after the farm Randfontein 3: the first discovery of gold reserves in the area. In 1890, Randfontein Estates

was granted a Township Area on the farm Randfontein, where the Kimberley, Potchefstroom and Johannesburg roads converged (Renwick, 2009).

Control of the gold fields however, remained vested in the ZAR who imposed several restriction on *Uitlanders*⁴. To combat this, the British under Rhodes, developed a plan to destabilise the ZAR government in Johannesburg through a revolt and seize control of the goldfields where armed British forces and the British High Commissioner would ensure the “protection” of the British in the Transvaal. With all plan in place, the Reform Committee and Rhodes himself delayed the plan and even suggested it be dropped. Dr. Leander Starr Jameson, responsible for leading the armed force, continued with the plans despite these concerns. As the armed forces entered the Transvaal, the element of surprise was lost due to not severing the telegraphs lines properly, and after several skirmishes with Boer forces, surrendered on the farm Vlakfontein (Birkholtz, 2006). The monument to this event is located adjacent the R588 near the Doornkop Gold mine.

The Jameson Raid of 1896 as it became known, exacerbated the existing tensions between the ZAR and British, and is believed to be the catalyst for the South African War of 1899 – 1902. After this event, the ZAR were convinced the Britons were intent on war, and eventually issued Britain with an ultimatum that made the war inevitable (Von der Hyde, 2013). Several skirmishes and battles were fought amongst the ZAR and Britain. The Gatsrand was deemed an ideal tactical position because of its proximity to the western railway. Three blockhouses were built in the Gatsrand on the farms of Modderfontein, Bank Station and Vlakfontein 364. Windbreaks or “sangas” have been identified on the farms of Driefontein 113IQ and Driefontein 355IQ. These were supposedly used during the both Boer War at temporary camps (Huffman, et al., 1994). The Boer Wars left local inhabitants in extreme poverty, with most farmers selling their land to avoid complete ruin (van Eeden, 1988). The most notable battle in the region was the Battle of Doornkop on 29 May 1900. Furthermore, the South African War resulted in the development of concentration camps. In proximity to the Millsite TSF Complex was the Krugersdorp Concentration Camp formed in 1901, which housed more than 6 000 women and children by the end of 1901 (du Plooy, 2004).

After nearly three years, the South African War ended in May 1902 with the signing of a peace treaty at Melrose House in Pretoria (Von der Hyde, 2013). The end of the war resulted in the flourishing of the region with renewed mining activities and an increase in the population (van Eeden, 1988). The population grew rapidly with the influx of over 10 000 poor white Afrikaners who lost their farms through the ‘scorched earth policy’ of the British, taking up residence in increasingly crowded and racially mixed slums (Bonner & Segal, 1998). These groups were known as ‘bywoners’, a name given to poor white families settling on the Highveld after the war (Huffman, et al., 1991). Mines established during this time included Venterspost (1934), Libanon (1936), West Driefontein (1945), East Driefontein

⁴ The name used by the ZAR and its citizens to describe the recent arrival of foreigners, especially the British. These people were mostly associated with the Rand Gold Rush and lived in Johannesburg.

(1968) and later Kloof (1968). The West Driefontein Mining company was registered on the 7 March 1945 with the sinking of shafts no. 1 and 2 (now shafts 11 and 12). By 1964, the twin shaft system of the Kloof Mine was sunk and by 1968 the Kloof Mine was opened. The Cooke section near Randfontein and Krugersdorp was opened in 1973 with Cooke 1, Cooke 2 in 1977 and Cooke 3 in 1983 (Sibanye Gold, 2014a).

An integral part of the flourishing mining industry was the use of a cheap labour force, initially associated with migrant African population, and later the addition of Chinese labour. These groups were housed in the many mining compounds either on or adjacent to the mine property, reducing transport costs and increase savings for the mines who would deduct communal eating and living costs from the workers' wages (Brodie, 2008).

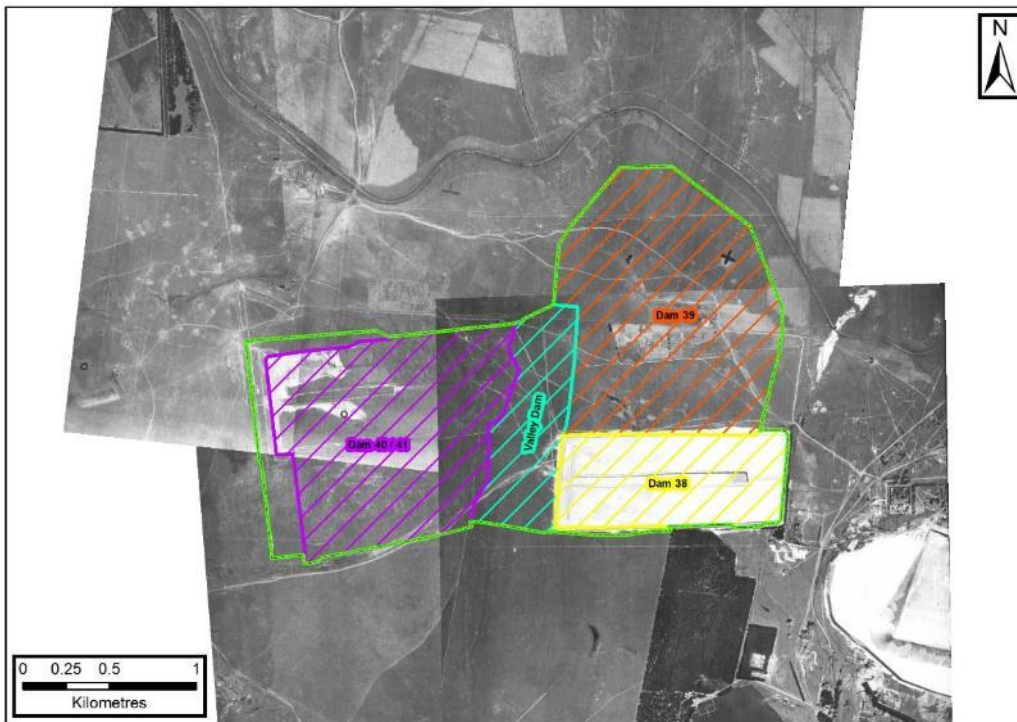


Figure 5-2: Historical imagery of the Millsite TSF Complex dated 1938

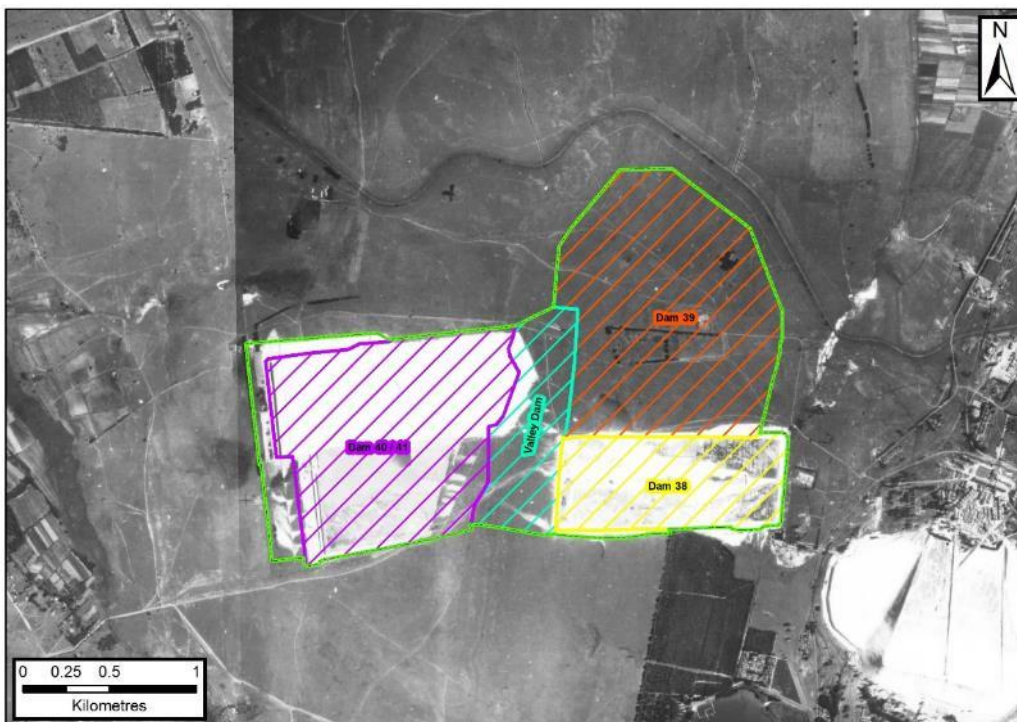


Figure 5-3: Historical imagery of the Millsite TSF Complex dated 1952

5.1.1 Results of the field survey

No heritage resources were recorded within the development footprint of the Millsite TSF Complex. This notwithstanding, the Millsite TSF Complex itself could be argued as a heritage resource generally protected in terms of Section 34 of the NHRA.

One burial ground (BGG-001) and one memorial (BGG-002) have been recorded within proximity to the Millsite TSF Complex. These sites are situated 1799 m and 520 m away from the development footprint respectively.

BGG-001 correlates with the graves of two British soldiers, Beaty-Powell and Davies, which perished during skirmishes associated with the Jameson Raid (Refer to Section 5 above). As indicated by Robert Gilmour, these graves were relocated from their original position during the early 20th century to allow for the placement of mining infrastructure associated with the historic Randfontein mine.

BGG-002 is a memorial for Barend Daniel De Beer, who passed away in the underground mining operations at that location in 1939.



Figure 5-4: Photograph of A – BGG-001 and B – BGG-002

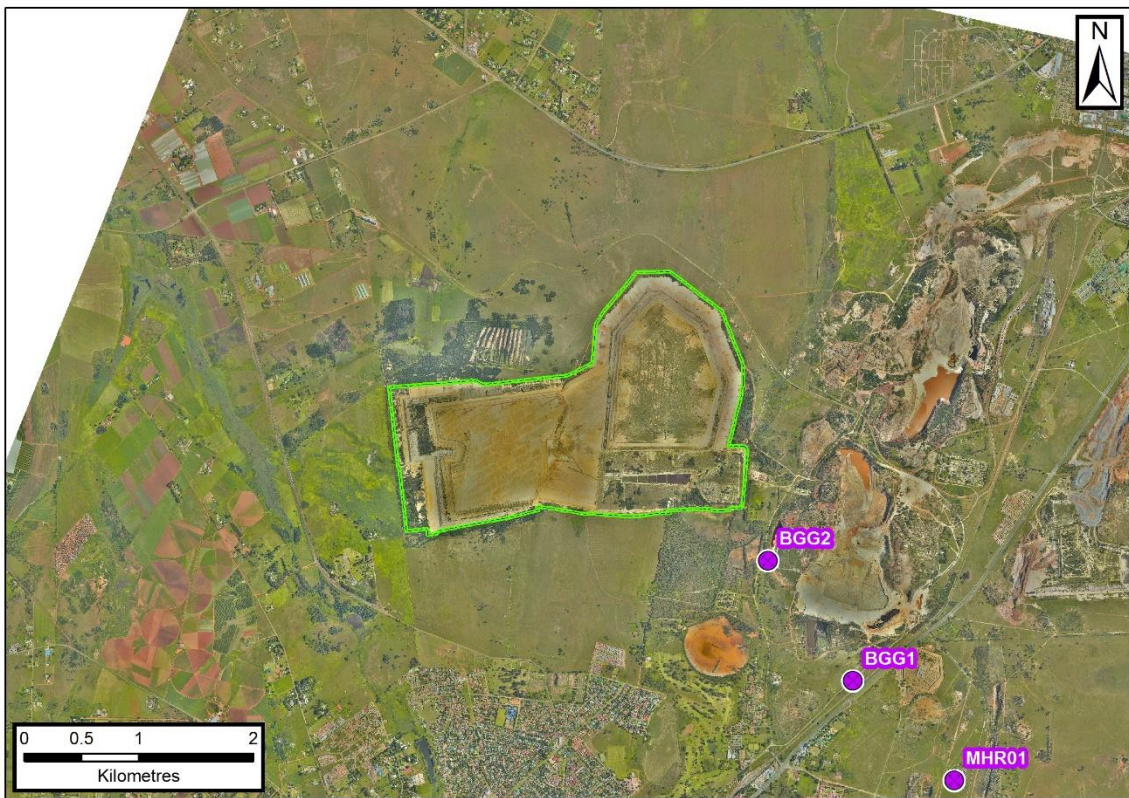


Figure 5-5: Location of identified heritage resources within proximity to the Millsite TSF Complex

Table 5-2: Location information of identified heritage resources in proximity to the Millsite TSF Complex

Site ID	Summary Description	Latitude	Longitude
BGG-001	Burial Ground	-26.150318	27.724361
BGG-002	Memorial	-26.140912	27.716861

6 Impact Assessment

6.1 Cultural significance of the landscape

A representative sample of the recorded heritage resources within the local study area demonstrates that the landscape comprises heritage resource types ranging from paleontological through historical (Figure 6-1). These findings are congruent with our secondary data collection as presented in Section 5 above.

The cultural landscape, as represented by heritage resources, is intrinsic to the history and beliefs of communities. These characterise community identity and cultures, are finite, non-renewable and irreplaceable.

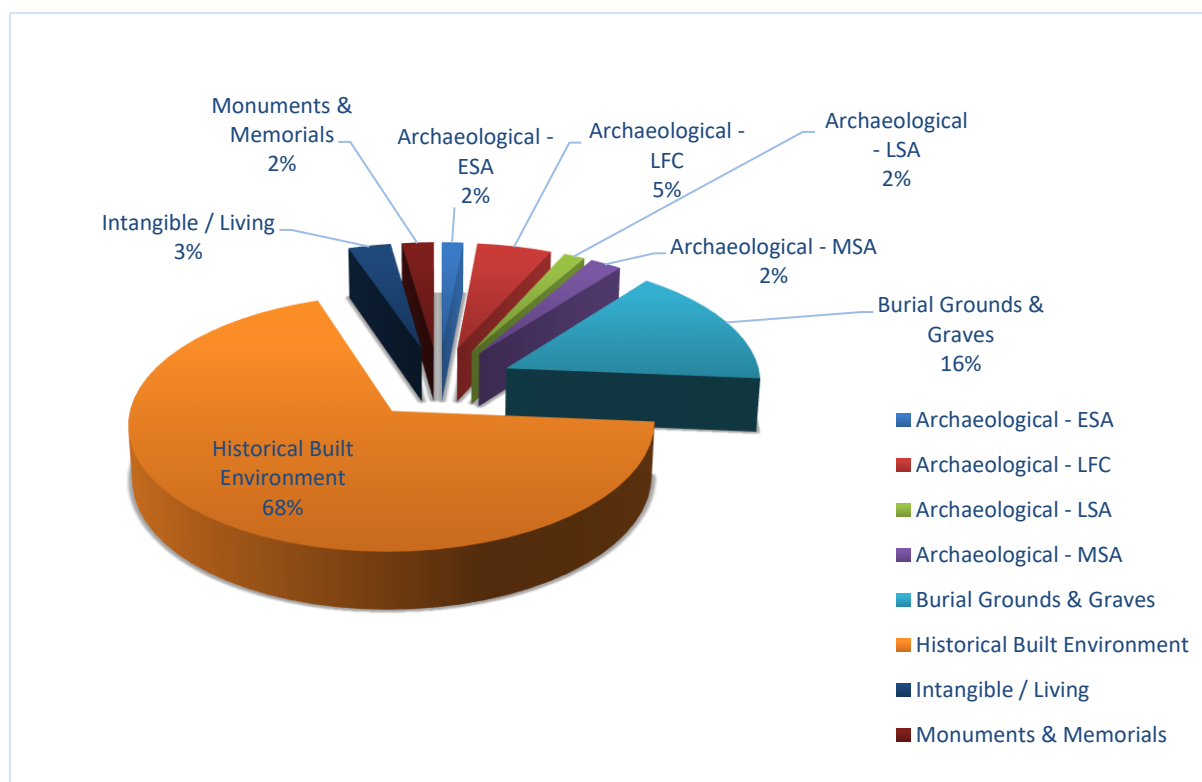


Figure 6-1: Representative sample of recorded heritage resources

To define the CS of the landscape, the importance of the various categories occurring within the local study area were considered on four dimensions as defined in Section 4.2 above. The results of the CS determination are summarised in Table 6-1.

Table 6-1: Statement of CS of the landscape

Resource ID	Aesthetic	Historic	Scientific	Social	INTEGRITY	VALUE
Malmani Subgroup and karst caves	-	-	5	-	4	20
Archaeological sites with good integrity	4	4	4	-	3	12
Archaeological sites with poor integrity	0	5	2	-	1	2
Historical sites associated with living communities - good integrity	4	3	3	3	4	13
Historical sites associated with living communities - poor integrity	1	3	2	3	1	2
Historical sites not associated with living communities - good integrity	4	3	3	-	4	13
Historical sites not associated with living communities - poor integrity	1	3	2	-	1	2
Burial grounds and graves	-	-	-	5	4	20

Archaeological and historical sites were assessed on all dimensions and attributes. Palaeontological sites, karst caves and burial grounds and graves were assessed on select dimensions as applicable. The result of the assessment indicates that the cultural landscape ranges predominantly from negligible to medium-high, with palaeontological sites / karst caves and burial grounds and graves being the notable exception.

6.2 Heritage Impact Assessment

Based on the understanding of the proposed amendments presented in Section 1.2 above, as well as the results of the field survey reported in Section 5.1.1, no direct or indirect impacts to heritage resources are envisaged.

6.3 Cumulative impacts on the cultural landscape

Cumulative impacts occur from in-combination effects of various impacts on heritage resources acting within a host of processes that result in an incremental effect. The importance of identifying and assessing cumulative impacts is that the whole is often greater

than the sum of its parts. This implies that the total effect of multiple stressors or change processes acting simultaneously on a system may be greater than the sum of their effects when acting in isolation.

As demonstrated in the cultural baseline, the local study area contributes to the historic mining landscape associated with the West Rand, and the mining history of Johannesburg at large.

The cumulative impacts manifest as additive, synergistic and neutralising. These are summarised in Table 6-2 and discussed separately below.

Table 6-2: Summary of potential cumulative impacts

Type	Cumulative Impact	Direction of Change	Extent of Impact
Neutralising	The sense of place will be altered insofar as the historical mining landscape, characterised by the numerous individual historical dumps, will change to a modernised mining landscape through reclamation of the Millsite TSF Complex and surrounding TSFs in the local study area. This change, however, is an inherent, organic continuation of a living mining heritage. The creation of new mining-related sites neutralises the removal of older, existing structures. The overall sense of place, however, remains intrinsically associated with a mining heritage.	Neutral to positive	Local, Regional
Additive	The <i>historic</i> mining landscape will be permanently changed through the reclamation of historical TSFs, i.e. tangible markers of the mining history of the West Rand.	Negative	Local, Regional
Synergistic	The removal of historical TSFs will increase the historical cultural significance of remaining TSFs and other mining infrastructure. The significance of these will exponentially increase as more features are removed.	Negative	Site Specific, Local & Regional

As demonstrated, the area within which the proposed development footprint is situated is associated with historic mining activities of the West Rand specifically, but that also contributes to the overall mining heritage of the greater Johannesburg area. Visible tangible markers associated with this history are historic mining infrastructures, such as headgears, and more significantly, historical TSFs.

The proposed Project, when considered against other proposed developments in the local study area, will have neutralising cumulative impact. These will be manifested primarily through the alteration to the sense-of-place in so far as the historic mining landscape characterised by the numerous individual historical dumps will be changed into a modernised mining landscape through time. The overall sense-of-place, however, will

remain intrinsically associated with the mining landscape, which is a part of a living mining heritage and cannot therefore be “preserved” through keeping of the static *status quo*.

The proposed reclamation activities will result in an additive cumulative impact to the historic mining landscape, i.e. the sum of all the effects of the reclamation. Reclamation activities will decrease the number of remaining historical TSFs as tangible markers of historic mining activities on the West Rand.

The removal of the historical TSF’s will subsequently gradually increase the significance of *in situ* resources. Through time, the remaining historical TSFs associated with the mining heritage of the greater Johannesburg region will have a high CS regardless of the integrity of the resource.

6.4 Low risks and unplanned events

Based on the nature of the proposed Project, sources of risk to heritage resources are primarily restricted to the processes associated with the hydraulic reclamation of the historical TSFs. Here, the potential for exposure of heritage resources located beneath historical TSFs is high. An example is the discovery of Chinese indentured workers burial grounds during reclamation activities associated with the Crown Mines in Johannesburg.

The potential unplanned events, the associated impacts and management measures have been identified and summarised in Table 6-3 below.

Table 6-3: Unplanned events and their management measures

Unplanned event	Potential impact	Mitigation/ Management/ Monitoring
Accidental exposure of unidentified heritage resources	Damage and/or destruction of heritage resources generally protected under Section 35 and 36 of the NHRA	<p>Chance Finds Protocols (CFPs) must be developed and included as a condition of authorisation that clearly describes the process and appropriate management of the exposure of previously unidentified heritage resources.</p> <p>The established and defined CFPs must be implemented prior implementation of the Project.</p>
Accidental damaged to known heritage resources	Damage to heritage resources generally protected under Section 36 of the NHRA	<p>A Conservation Management Plan (CMP) must be developed and implemented to monitor the recorded sites, as well as manage any accidental damage to these heritage resources. The CMP must at a minimum:</p> <ul style="list-style-type: none"> ■ Clearly delineate the extent of the identified sites; ■ Formalise the established minimum buffer of 50 m surrounding the sites within which no activities may be performed; ■ Record the resources via detailed mapping and numbering;

Unplanned event	Potential impact	Mitigation/ Management/ Monitoring
		<ul style="list-style-type: none"> ■ Provide a statement of current preservation status; ■ Define an Sibanye-Stillwater roles and responsibilities matrix; ■ State the conditions for project specific management and monitoring protocols; ■ Include a grievance mechanism to record any grievances received from Interested and Affected Parties (I&APs).

7 Identified heritage impacts versus socio-economic benefit

The development context of the local study area provides a broad understanding of the socio-economic environment based on information from:

- Statistics South Africa;
- The WRDM-IDP (West Rand District Municipality, 2017); and
- The RWCLM-IDP (Rand West City Local Municipality, 2016).

Information collated from the aforementioned sources provide context to evaluate the identified potential heritage impacts against the socio-economic benefits of the Project.

As previously stated, the Millsite TSF Complex is situated within the municipalities as presented in Table 7-1.

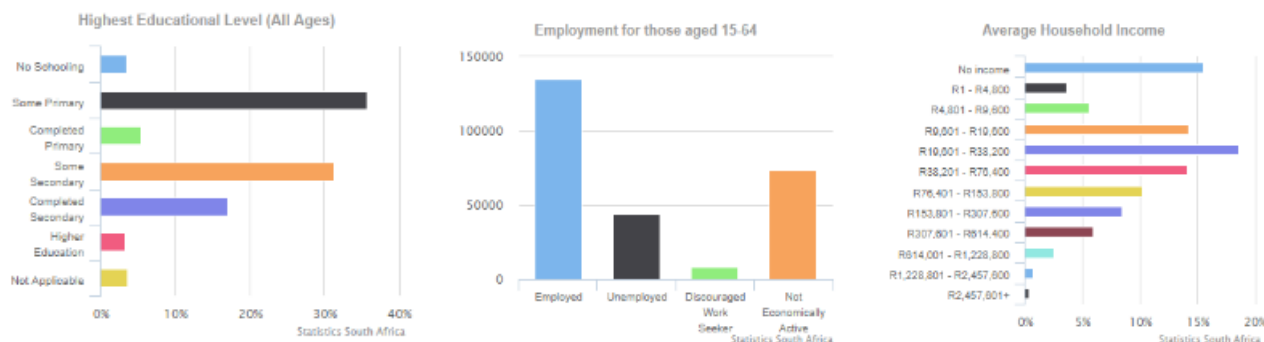
Table 7-1: Applicable municipalities

District Municipality	Local Municipality
WRDM	MCLM
	RWCLM

Demographically, these municipalities are plagued with limited skilled individuals (*less than 16% of individuals completed secondary school*), high unemployment rates and dependency ratios⁵ (Figure 7-1). The current principal industry within the RWCLM, i.e. mining, has limited capacity for unskilled employment to alleviate the status quo. Therefore, alternative economic drivers are required.

⁵ Note: Statistical information sourced from www.statssa.gov.za based on data collected during the 2011 census.

A



B

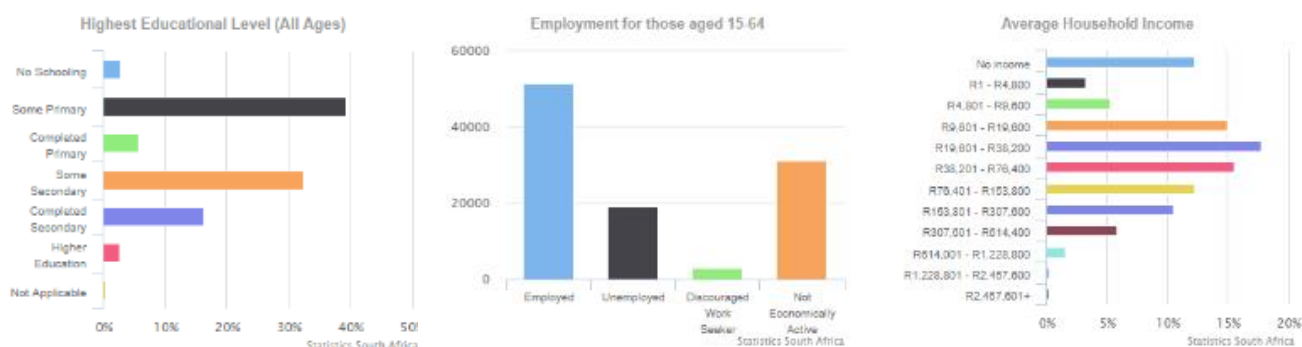


Figure 7-1: A – MCLM Statistics B – Randfontein Local Municipality⁶ Statistics

At a district level, the decline or non-sustainability of the mining industry has resulted in the municipality’s focus on economic diversification, but still recognising that the mining industry is a very important economic sector. Rather than functioning in isolation, the mining sectors should play a significant role in catalysing the development of other economic activities in the region, complementing developed Spatial Development Plans.

Identified drivers outside of the mining sector include:

- Increased tourism;
- Agriculture;
- Agro-processing; and
- Renewable energy industries.

In the context of this assessment, the proposed Project will have both a negligible effect in terms of heritage impacts and socio-economic benefit. This notwithstanding, the role of

⁶ Randfontein Local Municipality has subsequent to the 2011 census been amalgamated with Westonaria Local Municipality to form the RWCLM.

heritage within the context of increased tourism may be a potential alleviator of pressure to the economically disenfranchised surrounding communities.

To this effect, the Preliminary Closure Strategy for the Cooke Operations has considered the role of Sibanye-Stillwater in the promotion of tourism as an economic driver. A proposed approach, as presented in the strategy includes:

1. Understanding the baseline of tangible heritage resources and associated historical context;
2. Establishing a tourism forum between the various mining houses operating in the local study area to share information, obtain buy-in, and complete a feasibility assessment;
3. Identifying the various formal and informal structures to be engaged in the development and implementation of a tourism plan; and
4. Engage with the public to collate inputs and workshop the proposed tourism.

8 Consultation

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

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

No informal heritage specific consultation was undertaken as part of this assessment. Additionally, at the time of compiling this report the required regulatory SEP had not commenced. All comments received through the public review of this report and the draft EIA / EMP_r will be collated into a Comments and Response Report (CRR) to respond to and address any comments raised.

The final EIA / EMP_r, CRR and HIA will be submitted to SAHRA and PRHA-G for adjudication as required in terms of Section 38(8) of the NHRA.

9 Recommendations

The Millsite TSF Complex is underlain by dolomitic rock that has the potential for karst topography and is palaeontologically sensitive. This notwithstanding, considering the proposed Project and associated activities, the potential for the exposure of, or damage to

fossiliferous material is low. Furthermore, as previously discussed in Section 5 above, this geological phenomenon creates karst caves. This geological feature itself however, is a motivating factor in authorising the proposed reclamation as the TSF may be at risk of localised instability as the potential for sinkholes is high. It is therefore recommended that the proposed Project be exempt from further palaeontological assessment based on the motivation provided.

Section 34(1) of the NHRA makes provision for the protection of structures older than 60 years, the Millsite TSF Complex falling within this threshold as demonstrated in Figure 5-2 and Figure 5-3. While an argument can be made that the Millsite TSF Complex is generally protected under this provision, it is recommended that Sibanye-Stillwater be exempt from applying for a Section 34 Destruction Permit as regulated by Chapter III of the Regulations to the Act (GN R 548), as the health benefits outweigh the heritage impact.

No other heritage resources were recorded within or in proximity to the Millsite TSF Complex that may be impacted upon by the proposed Project. Nevertheless, based on the discussed low risks and unplanned events in Section 6.4 above, Sibanye-Stillwater must develop and include the aforementioned CMP and project specific CFPs as a condition of authorisation.

10 Conclusion

Sibanye-Stillwater appointed Digby Wells to undertake the necessary authorisations in support of the amendment of the Cooke Operations EMPr to include the Millsite TSF Complex and the reclamation thereof. This report constitutes the HIA in terms of Section 38(8) of the NHRA to promote compliance with the regulatory framework.

The results of the report demonstrate that the proposed Project is situated in a landscape that has CS. Based on the findings, the following recommendations as detailed in Section 9 above are made:

- Exemption from further palaeontological assessment;
- Exemption from permit applications in respect of Section 34 of the NHRA for the Millsite TSF Complex, as regulated by Chapter III of GN R 548;
- Development and implementation of a CMP for known sites within proximity to the Millsite TSF Complex; and
- Development and implementation of project specific CFPs as a condition of authorisation.

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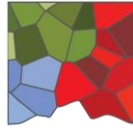
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Appendix A: Specialist CV



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 Limited



Project Title	Project Location	Date:		Description of the Project	Name of Client
Kibali Gold Hydro-Power Project	Orientale Province, Democratic Republic of Congo	2012	2014	Heritage Impact Assessment	Randgold Resources Limited
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012	2012	Heritage Impact Assessment	Aquarius Resources
Environmental Authorisation for the Gold One Geluksdal TSF and Pipeline	Gauteng, South Africa	2012	2012	Heritage Impact Assessment	Gold One International
Platreef Burial Grounds and Graves Survey	Mokopane, Limpopo Province, South Africa	2012	2012	Burial Grounds and Graves Survey	Platreef Resources
Resgen Boikarabelo Coal Mine	Limpopo Province, South Africa	2012	2012	Phase 2 Excavations	Resources Generation
Bokoni Platinum Road Watching Brief	Burgersfort, Limpopo Province, South Africa	2012	2012	Watching Brief	Bokoni Platinum Mine
SEGA Gold Mining Project	Burkina Faso	2012	2013	Socio Economic and Asset Survey	Cluff Gold PLC
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012	2015	Heritage Impact Assessment	Aquarius Resources
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
Exxaro Belfast GRP	Belfast, Mpumalanga, South Africa	2013	-	Grave Relocation	Exxaro Coal Mpumalanga (Pty) Ltd
Nzoro 2 Hydro Power Project	Orientale Province, Democratic Republic of Congo	2014	2014	Social consultation	Randgold Resources Limited
Eastern Basin AMD Project	Springs, Gauteng, South Africa	2014	2014	Heritage Impact Assessment	AECOM
Soweto Cluster Reclamation Project	Soweto, Gauteng, South Africa	2014	2014	Heritage Impact Assessment	Ergo (Pty) Ltd



Project Title	Project Location	Date:		Description of the Project	Name of Client
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	Oriental Province, Democratic Republic of Congo	2014	2014	Heritage Impact Assessment	Randgold Resources Limited
GoldOne EMP Consolidation	Westonaria, Gauteng, South Africa	2014	2014	Gap analysis	Gold One International
Yzermite PIA	Wakkerstroom, Mpumalanga, South Africa	2014	2014	Palaeontological Assessment	EcoPartners
Sasol Mooikraal Basic Assessment	Sasolburg, Free State, South Africa	2014	2014	Heritage Basic Assessment	Sasol Mining
Oakleaf ESIA Project	Bronkhorstspruit, 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
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



Project Title	Project Location	Date:	Description of the Project	Name of Client
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
Grootvlei MRA	Springs, Gauteng, South Africa	2016 2016	Notification of Intent to Develop	Ergo (Pty) Ltd
Lambda EMP	Mpumalanga, South Africa	2016 2016	Palaeontological Impact Assessment	Eskom Holdings SOC Limited
Kilbarchan Basic Assessment and EMP	Newcastle, KwaZulu-Natal, South Africa	2016 2016	Heritage Basic Assessment	Eskom Holdings SOC Limited
Grootegeluk Amendment	Lephalale, Limpopo Province, South Africa	2016 2016	Notification of Intent to Develop	Exxaro
Garsfontein Township Development	Pretoria, Gauteng, South Africa	2016 2016	Notification of Intent to Develop	Leungo Construction Enterprises
Massawa EIA	Senegal	2016 2017	Technical Reviewer Heritage Impact Assessment	Randgold Resources Limited
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 and Heritage Basic Assessment	Sun International
Hendrina Underground Coal Mine EIA	Hendrina, Mpumalanga, South Africa	2016 2017	Heritage Impact Assessment	Umcebo Mining (Pty) Ltd
Elandsfontein EMP Update	Clewer, Mpumalanga, South Africa	2016 2017	Heritage Impact Assessment	Anker Coal
Eskom Northern KZN Strengthening	KwaZulu-Natal, South Africa	2016 -	Heritage Impact Assessment	ILISO Consulting
Thabametsi GRP	Lephalale, Limpopo Province, South Africa	2017 -	Grave Relocation	Exxaro Resources Ltd
Grootegeluk Watching Brief	Lephalale, Limpopo Province, South Africa	2017 2017	Watching Brief	Exxaro Resources Ltd
Matla HSMP	Kriel, Mpumalanga Province, South Africa	2017 2017	Heritage Site Management Plan	Exxaro Coal Mpumalanga (Pty) Ltd
Ledjadja Coal Borrow Pits	Lephalale, Limpopo Province, South Africa	2017 2017	Heritage Basic Assessment	Ledjadja Coal (Pty) Ltd
Exxaro Belfast Implementation Project PIA	Belfast, Mpumalanga, South Africa	2017 2017	Palaeontological Impact Assessment	Exxaro Coal Mpumalanga (Pty) Ltd

Project Title	Project Location	Date:	Description of the Project	Name of Client
Lanxess Chrome Mine Archaeological Mitigation	Rustenburg, North West Province, South Africa	2017 2017	Phase 2 Excavations	Lanxess Chrome Mine (Pty) Ltd
Goulamina EIA Project	Goulamina, Sikasso Region, Mali	2017 2017	Heritage Impact Assessment	Birimian Limited
Zuurfontein Residential Establishment Project	Ekurhuleni, Gauteng, South Africa	2017 2017	Notification of Intent to Develop	Shuma Africa Projects
Kibali Grave Relocation Training and Implementation	Oriental Province, Democratic Republic of Congo	2017 -	Grave Relocation	Randgold Resources Limited
Exxaro Matla HRM	Kriel, Mpumalanga	2017 -	Heritage Impact Assessment	Exxaro Coal Mpumalanga (Pty) Ltd

6 Professional Registrations

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

7 Publications

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













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

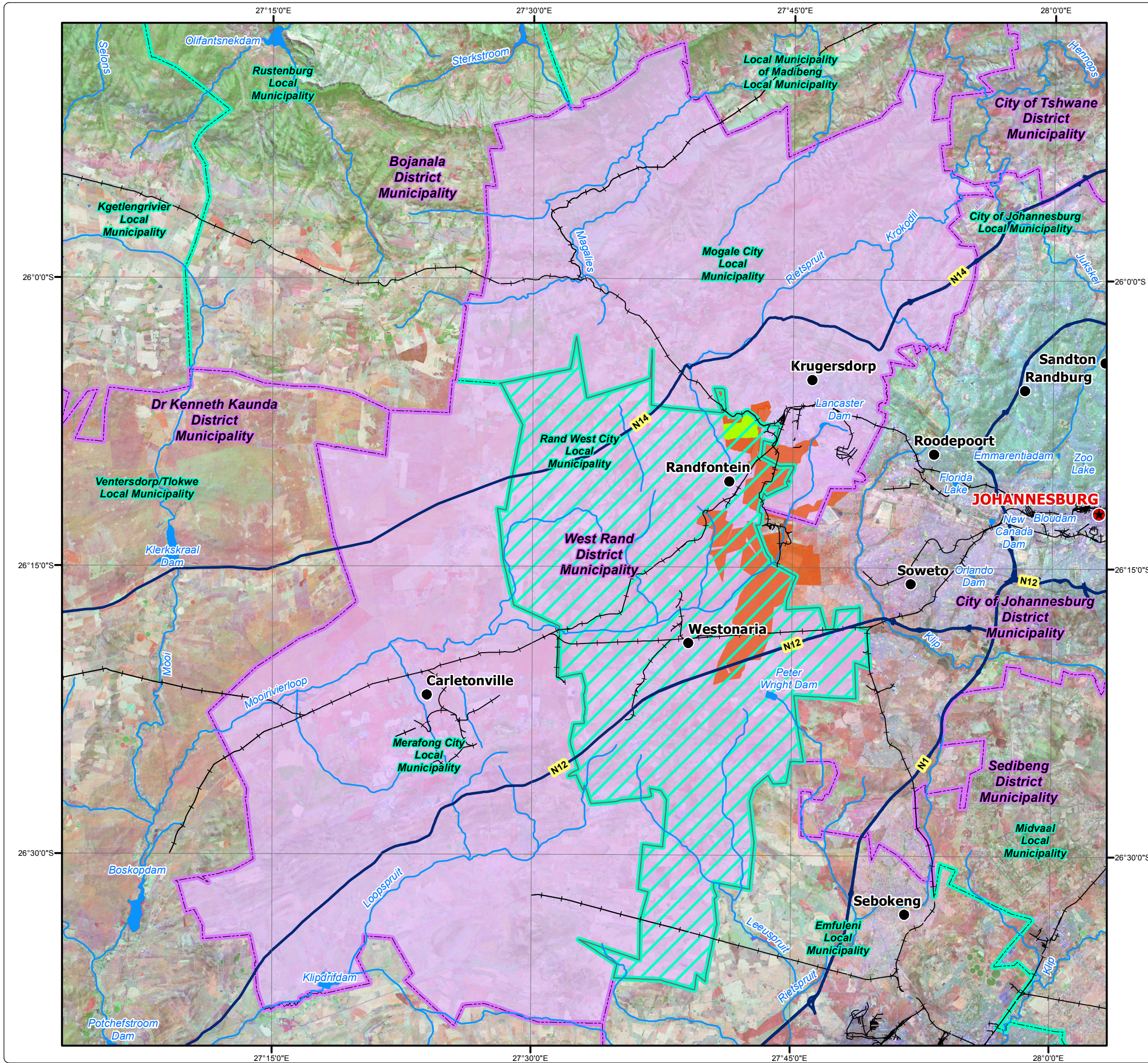
Appendix B: Plans

Sibanye Rand Uranium Operations

Local Setting

Legend

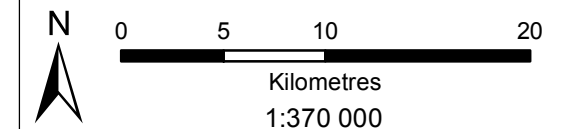
-  Cooke Project Area
-  City
-  Major Town
-  Arterial / National Route
-  Railway Line
-  Perennial Stream
-  Dam
-  District Municipality (2016)
-  Local Municipality (2016)
-  Regional Study Area
-  Local Study Area
-  Site Specific Study Area



DIGBY WELLS ENVIRONMENTAL















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

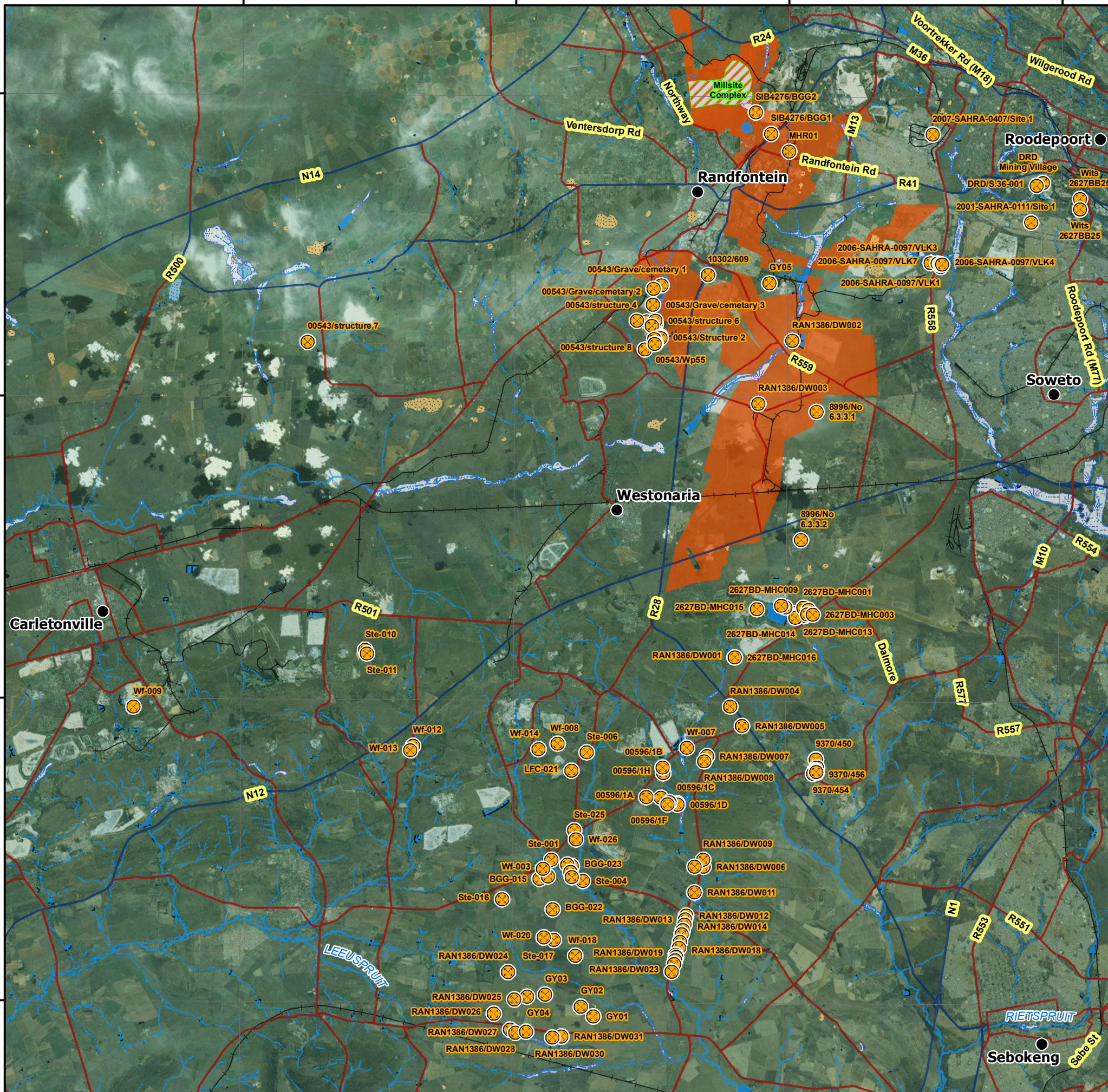
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Central Meridian: 27°E	Date: 20/10/2017



Sibanye Rand Uranium Operations Identified Heritage Resources

Legend

-  Cooke Project Area
-  Millsite Complex
-  Identified Heritage Resource
-  Major Town
-  Arterial / National Route
-  Main Road
-  Railway Line
-  Non-Perennial Stream
-  Perennial Stream
-  Dam Wall
-  Dam / Lake
-  Perennial Pan
-  Non-Perennial Pan
-  Wetland



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

Projection: Transverse Mercator Ref #: meg.SIB4276.201705.134
 Datum: Cape Revision Number: 1
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