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## Environmental Authorisation in Support of the Prospecting Right Application for Farms Groningen 779 LR and Inhambane 802 LR

### Heritage Basic Assessment Report

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**Project Number:**

AOL3685

**Prepared for:**

Rustenburg Platinum Mines Limited

August 2016

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This document has been prepared by Digby Wells Environmental.

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|----------------------|--|
| <b>Report Type:</b>  | <b>Heritage Basic Assessment Report</b>  |
| <b>Project Name:</b> | <b>Environmental Authorisation in Support of the Prospecting Right Application for Farms Groningen 779 LR and Inhambane 802 LR</b> |
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## EXECUTIVE SUMMARY

Rustenburg Platinum Mines Limited (hereinafter RPM), a subsidiary of Anglo American Platinum Limited (Anglo), intends to prospect for Platinum Group Metals (PGMs) and associated minerals on the farms Groningen 779 LR and Inhambane 802 LR in Limpopo Province, South Africa.

To comply with the requirements of the South African national legal framework, RPM appointed Digby Wells Environmental (hereinafter Digby Wells) to undertake the necessary studies in support of the Basic Assessment (BA) process as part of the application for Environmental Authorisation (EA).

The baseline results reported in this HBAR demonstrated that the proposed Prospecting Right Application (PRA) study area has little to negligible evidence for palaeontological sensitivity, but that the cultural landscape in general is sensitive and comprised of diverse heritage resources. These comprised of heritage resources categorised in terms of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) as:

- Section 35 – Archaeological resources, specifically Middle Stone Age (MSA) accumulations and Late Farming Community (LFC) period surface scatters and stonewalled sites; and
- Section 36 – Burial Grounds and Graves associated surrounding communities.

These are summarised in the table below:

| Resource ID                 | VALUE | Designation | Recommended Field Rating |
|-----------------------------|-------|-------------|--------------------------|
| Burial grounds and graves   | 20    | Very High   | Grade I                  |
| LFC stonewalled settlements | 16    | High        | Grade II                 |
| LFC surface scatters        | 2     | Negligible  | General Protection IV C  |
| MSA accumulations           | 0     | Negligible  | General Protection IV C  |

The most significant identified heritage resources included archaeological LFC stonewalled sites associated with the Langa Ndebele history and burial grounds and graves. However, when considered on an individual proposed borehole level, heritage impacts are generally very low, with the exception of a few cases. A summary of the impact assessment is presented in the table below.

| Impact                                      | Pre-mitigation: |                 |                           |                       |             |                     | Post-mitigation: |              |                           |                      |                 |                       |
|---|-----------------|-----------------|---------------------------|-----------------------|-------------|---------------------|------------------|--------------|---------------------------|----------------------|-----------------|-----------------------|
|   | Duration        | Extent          | Intensity                 | Consequence           | Probability | Significance        | Duration         | Extent       | Intensity                 | Consequence          | Probability     | Significance          |
| Direct impacts to farming community sites   | Permanent       | National        | Extremely high - negative | Extremely detrimental | Certain     | Major - negative    | Immediate        | Very limited | Very low - negative       | Negligible           | Highly unlikely | Negligible - negative |
| Direct impacts to Stone Age resources       | Project Life    | Province/Region | Extremely high - negative | Highly detrimental    | Certain     | Major - negative    | Permanent        | National     | Extremely high - positive | Extremely beneficial | Highly probable | Major - positive      |
| Direct impacts to burial grounds and graves | Permanent       | National        | Extremely high - negative | Extremely detrimental | Probable    | Moderate - negative | Immediate        | Limited      | High - positive           | Slightly beneficial  | Highly unlikely | Negligible - positive |

It is therefore recommended that the PRA be considered and approved from of a heritage resources point of view provided that the management and mitigation measures contained in this report are implemented. This includes:

- Abandonment of prospecting locations 3B, 4A, 4D and 4E to avoid any potential direct impacts to LFC stonewalled settlements with a high Cultural Significance (CS) in accordance with the recommended mitigation measures outlined in the South African Heritage Resources Agency (SAHRA) minimum standards (SAHRA, 2007);
- Development and implementation of project specific Chance Find Protocols (CFPs) as a condition of authorisation that at a minimum include:
  - Definitions as defined by Section 2 and 38(1) of the NHRA;
  - Proactive archaeological monitoring procedures;
  - 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;
- Undertaking of a Watching Brief (i.e. on-site monitoring) by a qualified and accredited archaeologist during the Establishment Phase for prospecting locations 1A, 1B, 1C, 2C, 3A, 3E, 5A, 5B and 5E.





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## 1 Introduction

Rustenburg Platinum Mines Limited (hereinafter RPM), a subsidiary of Anglo American Platinum Limited (Anglo), intends to prospect for Platinum Group Metals (PGMs) and associated minerals on the farms Groningen 779 LR and Inhambane 802 LR in Limpopo Province, South Africa.

To comply with the requirements of the South African national legal framework, RPM has appointed Digby Wells Environmental (hereinafter Digby Wells) to undertake the necessary studies in support of the Basic Assessment (BA) process as part of the application for Environmental Authorisation (EA) for a Prospecting Right.

This report constitutes the specialist Heritage Basic Assessment Report (HBAR) in support of the BA process and the requirements of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).

## 2 Project background

The Limpopo Province is underlain by lithologies<sup>1</sup> associated with, amongst others, the Bushveld Complex. The Bushveld Complex is both the world's largest mafic-layered intrusive complex and hosts the greatest resources of PGMs, extending over 67 000 km<sup>2</sup> (see Table 2-1). To secure access to these potential resources, RPM has undertaken the EA process associated with a Prospecting Right Application (PRA) for PGMs.

**Table 2-1: PGMs and associated minerals**

| PGMS           |               |              |
|----------------|---------------|--------------|
| Palladium (Pd) | Rhodium (Rh)  | Iridium (Ir) |
| Osmium (Os)    | Platinum (Pt) | Gold (Au)    |
| Copper (Cu)    | Nickel (Ni)   | Chrome (Cr)  |

One PRA was submitted to the Department of Mineral Resources (DMR) for approval for the farms Groningen 779 LR and Inhambane 802 LR.

### 2.1 Project overview

The proposed PRA area is situated to the west of the current Mogalakwena Mine mining permit area owned and operated by Anglo. The site-specific study area is approximately 33 km north-west of the closest town, Mokopane, in the Mogalakwena Local Municipality (MLM), and can be characterised as a rural setting. Surrounding settlements include

<sup>1</sup> Refer to Section 8 for detailed geological context of the PRA site specific study area.

Ditlotswana, Malokong, Mošate and Sepharane. Detailed project location information is summarised in Table 2-2.

**Table 2-2: Project location details**

|   |                                     |
|---|-------------------------------------|
| <b>Province</b>   | Limpopo Province                    |
| <b>Magisterial District / Local Authority</b>                     | Mokerong Magisterial District       |
| <b>District Municipality</b>                                      | Waterberg District Municipality     |
| <b>Local Municipality</b>   | Mogalakwena Local Municipality      |
| <b>Tribal Authorities</b>   | Bakenburg and Mapela                |
| <b>Nearest Town</b>   | Mokopane                            |
| <b>Property Name and Number<sup>2</sup></b>                       | Gronigen 779 LR<br>Inhambane 802 LR |
| <b>1: 50 000 Map Sheet</b>  | 2328 DD                             |
| <b>GPS Co-ordinates<br/>(relative centre point of study area)</b> | -23.904680<br>28.836598             |

Proposed prospecting activities will be undertaken through non-invasive and invasive methodologies. Non-invasive methodologies will include the following:

- Review and analysis of all relevant geological data; and
- Geophysical survey which utilises digital data to confirm proposed drill locations.

Invasive methodologies will comprise creating temporary access roads off existing roads to reduce distances as far as possible, site clearance and topsoil removal, construction / excavation of three sumps / trenches for the separation and storage of oil, sludge and water, and diamond core drilling to ascertain the specific stratigraphic sequence and reef horizons of the various ore bodies at each prospecting borehole.

It is anticipated that a maximum of five boreholes will be drilled per year over a five year period. The total areal extent of each individual prospecting site will cover approximately 100 m<sup>2</sup> (0.01 ha).

<sup>2</sup> Properties under the Bakenberg Tribe land claim include: Klein Galakwin 712 LR, Ruigtevley 710 LR, Galelia 675 LR, Rietfontein 665 LR, Kafferboom 664 LR, Lagerplaats 451 LR, Vianen 450 LR, **Inhambane 802 LR**, Mozambique 807 LR, Jackhalskuil 754 LR, Zwartkop 742 LR, Elandsfontein 760, LR, EersteGeluk 741 LR, Cleremont 738 LR, Vlakfontein 739, LR, Haaspan 739 LR, Haaspan 724 LR, Buffelshoek 722 LR, Madamefontein 721 LR, Hermasdal 789 LR, Schuurmanshoogte 792 LR, Esselsdrift 788 LR, Bastaardspad 790 LR, Galakwyn Stroom 745 LR, Wydhoek 746 LR, Haakdoordraai 758 LR, Skrikfontein 715 LR, Schoonoord 786 LR, Rietfontein 665 LR, Vlakfontein 763 LR, Bellevue 808 LR, Kiss Me Quick 794 LR, Malokongskop 780 LR, **Groningen 779 LR**, Vogelstruisfontein 765 LR, Goedehoop 762 LR, Hellem Bricks 761 LR, Krom Kloof 744 LR, Paulus 743 LR, Sterkloop 720 LR, Raadslid 718 LR, Haakdoordraai 711 LR, Klipplaatdrift 787 LR, Wydhoek 746 LR, Vlakfontein 763 LR, Molokong 784 LR.



No permanent infrastructure will be constructed as part of the proposed prospecting activities. Proposed rehabilitation following prospecting activities includes:

- Backfilling of boreholes;
- Spreading of topsoil over the prospecting site;
- Ripping of the area to ensure land is not compacted; and
- Monitoring of prospecting sites to determine if re-vegetating is required.

## 2.2 Terms of reference

As stated in the introduction, RPM requested Digby Wells to provide specialist services to complete the required BA process. The suite of specialist studies needed to include a HRM process that adhered to the legal framework discussed under Section 3 below.

## 3 Legal 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 3-1: Applicable legislation for the HRM process**

| Applicable legislation used to compile the report  | Reference where applied   |
|--|---|
| <p><b><u>Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</u></b></p> <p>Article 24 of the Bill of Rights contained in Chapter 2 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –</p> <ol style="list-style-type: none"> <li>i. Prevent pollution and ecological degradation;</li> <li>ii. Promote conservation; and</li> <li>iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development</li> </ol> | <p>The BA 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 Constitution.</p> |
| <p><b><u>Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)</u></b></p> <p>The MPRDA stipulates under Section 5(4) no person may prospect for or remove, mine, conduct technical co-operation operations, reconnaissance operations, explore for and produce any mineral or petroleum or commence with any work incidental thereto on any area without (a) an approved environmental management programme or approved environmental management</p>   | <p>The application for the Project has been lodged with the DMR on 29 July 2016.</p> <p>This HBAR, which relates specifically to the Project has been compiled in accordance with the MPRDA read with the Environmental Impact Assessment (EIA) Regulations, 2014.</p>  |



| Applicable legislation used to compile the report   | Reference where applied  |
|---|--|
| <p>plan, as the case may be.</p> <p>According to Section 39(3)(b)(iii), any applicant who is to complete an EMP must investigate, assess and evaluate the impact of the proposed prospecting or mining operation on a national estate referred to in Section 3 (2) of the NHRA.</p>   |  |
| <p><b><u>National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)</u></b></p> <p>The NEMA, as amended was set in place in accordance with Article 24 of the Bill of Rights. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that:</p> <p><i>The potential impact on the environment and socio-economic conditions 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 BA process is being undertaken in accordance with the principles of Section 2 of NEMA.</p> <p>Based on the activities listed, it has been identified that a BA process is required for the Project. An application for the listed activities will be submitted to the DMR who is the relevant Competent Authority in terms of this application for Environmental Authorisation.</p> |
| <p><b><u>Government Notice Regulation (GN R) 982 of 4 December 2014 (EIA Regulations)</u></b></p> <p>The EIA Regulations to regulate integrated environmental management as contemplated in the NEMA. The Minister also published three Listing Notices together with these Regulations.</p>  | <p>The BA is required and being conducted in terms of the EIA Regulations. The Listing Notices were reviewed against the project activities to determine the likely triggers. The listed activities which are potentially triggered under the Listing Notices are provided in Table 4-1.</p>   |
| <p><b><u>GN R 983 of 4 December 2014 (Listing Notice 1)</u></b></p> <p>This listing notice provides a list of various activities which require environmental authorisation and which must follow a BA process.</p>  | <p>Activity 20 of this Listing Notice requires this BA process to be conducted. Refer to Table 4-1 for details.</p>  |



| Applicable legislation used to compile the report  | Reference where applied   |
|--|---|
| <p><b><u>National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></b></p> <p>The NHRA is the overarching legislation that protects and regulates the management of heritage resources in South Africa, with specific reference to the following Sections:</p> <ul style="list-style-type: none"> <li>▪ 5. General principles for HRM</li> <li>▪ 6. Principles for management of heritage resources</li> <li>▪ 7. Heritage assessment criteria and grading</li> <li>▪ 38. Heritage resources management</li> </ul> <p>The Act requires that Heritage Resources Authorities (HRAs), in this case the SAHRA and HFS, be notified as early as possible of any developments that may exceed certain minimum thresholds in terms of Section 38(1), or when assessments of impacts on heritage resources are required by other legislation in terms of Section 38(8) of the Act.</p> | <p>A Notification of Intent to Develop (NID) will be submitted, as part of this HBAR, to the SAHRA and LIHRA. The HBAR was compiled to comply with the following parts of subsection 3(3)(a) and (b) of the NHRA.</p> |
| <p><b><u>Extension of Security of Tenure Act (ESTA) (Act No. 62 of 1997)</u></b></p> <p>This Act confers certain rights to non-landowning residents of a property, where such rights are linked to the period of time in which persons have been resident on the land. The Act applies to all rural areas in South Africa, regardless of whether the land is used for farming or mining purposes.</p>  | <p>The application of this Act to this Project is specific to provisions regarding burial grounds and graves.</p>   |

**Table 3-2: Applicable policies for the HRM process**

| Applicable policies used to compile the report   | Reference where applied   |
|--|---|
| <p><b><u>South African Heritage Resources Agency (SAHRA) Archaeology, Palaeontology and Meteorites (APM) Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports (2007)</u></b></p> <p>The guidelines provide the minimum standards that must be adhered to for the compilation of a Heritage Impact Assessment (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"> <li>▪ Background information on the Project;</li> <li>▪ Background information on the cultural baseline;</li> <li>▪ Description of the properties or affected environs;</li> <li>▪ Description of identified sites or resources;</li> <li>▪ Recommended field rating of the identified sites to comply with Section 38 of the NHRA;</li> <li>▪ A statement of Cultural Significance in terms of Section 3(3) of the NHRA; and</li> <li>▪ Recommendations for mitigation or management of identified heritage resources.</li> </ul> | <p>The HBAR was compiled to adhere to the minimum standards as defined by Chapter II of the SAHRA APM Guidelines (2007)</p>                         |
| <p><b><u>Anglo American Management System Standards: The Anglo Social Way (2009)</u></b></p> <p>The operational standards outline the Anglo American principles and policies with regards to social responsibility and management.</p> <p>As part of the policy, Anglo American (and by association their subsidiaries) will respect and protect the culture, beliefs and heritage of the communities within which they operate. Furthermore, as part of the requirements of this standard, it is stipulated as follows:</p> <p>Anglo American seeks to protect and, where possible, enhance the value of the cultural heritage of associated communities. Anglo also seeks to ensure that benefits arising from the use of cultural heritage for Anglo's business purposes are equitably shared.</p> <p>The management of cultural heritage must meet or exceed the requirements set out in IFC Performance Standard Number 8 on Cultural Heritage.</p>   | <p>The HBAR was compiled to adhere and consider the requirements of the Anglo American Management System Standards: The Anglo Social Way (2009)</p> |

## 4 Description of Listing Notice and specific activities

The NEMA provides the regulatory environmental legal framework for South Africa. Certain regulated activities require EA to be obtained following assessment processes outlined in the EIA Regulations, 2014. The EIA Regulations and activities applicable to this Project is GN R 983 – Listing Notice 1. This listing notice contains a list of activities that require EA for which a BA process must be conducted as described in Regulation 19 and Regulation 20 of the EIA Regulations, 2014.

The Listed Activities applicable to the proposed prospecting activities, as defined in the EIA Regulations, 2014 are outlined in Table 4-1 below.

**Table 4-1: Listing Notice 2 and specified activities for the Project**

| Activity  | Aerial extent of the activity                                    | Listed Activity | Applicable Listing Notice |
|---|--|-----------------|---------------------------|
| <b>Listing Notice activity</b>  |  |                 |                           |
| Drilling of prospecting boreholes.                                    | 100 m <sup>2</sup> per borehole<br>2 500 m <sup>2</sup> in total | X – Activity 20 | GN R 983                  |
| <b>Specific activity</b>  |  |                 |                           |
| Site clearance and vegetation removal.                                | 100 m <sup>2</sup> per borehole<br>2 500 m <sup>2</sup> in total | Not Listed      |                           |
| Establishment of access roads/tracks.                                 | Dependant on<br>Prospecting site location.                       |                 |                           |
| Topsoil stockpiling.  | 3 m <sup>3</sup>   |                 |                           |
| Development of three sumps (oil-sludge-water separation).             | 3 m <sup>3</sup>   |                 |                           |
| Rehabilitation (topsoil cover, ripping and vegetation establishment). | 100 m <sup>2</sup> per borehole<br>2 500 m <sup>2</sup> in total |                 |                           |

For the purposes of the compilation of the BAR and assessment of potential impacts, the invasive project activities listed in Table 4-1 are summarised in Table 4-2 below.

**Table 4-2: Project activities**

| Activity No.               | Activity  |
|----------------------------|---|
| <b>Establishment Phase</b> |   |
| 1                          | Site clearance and topsoil removal prior to the commencement of physical construction activities. Topsoil will be stored in stockpiles no greater than 1 m in height. |



| Activity No.                 | Activity   |
|------------------------------|--|
| <b>Operational Phase</b>     |  |
| 2                            | Drilling of prospecting boreholes.                                     |
| <b>Decommissioning Phase</b> |  |
| 3                            | Rehabilitation of topsoil cover, ripping and vegetation establishment. |

## 5 Expertise of the specialist

The relevant expertise of the specialist involved in the HRM process are summarised in Table 5-1.

**Table 5-1: Expertise of specialists**

|   |   |
|---|---|
| <p><b>Justin du Piesanie</b><br/>ASAPA Member 270<br/>ICOMOS Member<br/>14274</p> | <p>Justin holds the position of Heritage Management Consultant: Archaeologist at Digby Wells, after joining the company in August 2011. He obtained his Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2008, specialising in the Southern African Iron Age. Justin also attended courses in architectural and urban conservation through the University of Cape Town's Faculty of Engineering and the Built Environment Continuing Professional Development Programme in 2013. Justin is a professional member of the Association of Southern African Professional Archaeologists (ASAPA), and accredited by the association's Cultural Resources Management (CRM) section. He is also a member of the International Council on Monuments and Sites (ICOMOS), an advisory body to the UNESCO World Heritage Convention. He has over 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.</p> |
| <p><b>Johan Nel</b><br/>ASAPA Member 095<br/>ICOMOS Member<br/>13839</p>          | <p>Johan is the manager of the HRM unit. He joined Digby Wells in June 2010 as an archaeologist and was subsequently made unit manager of the HRM unit in the Social Department. Johan holds an Honours degree in Archaeology from the University of Pretoria. He is a professional member of the ASAPA, and accredited by the association's CRM section. He is also a member of the ICOMOS. He has more than 17 years' experience in undertaking HRM projects, including archaeological mitigation and grave relocation. Johan has diverse international HRM experience in various African countries including Botswana, the Democratic Republic of Congo, Liberia, Sierra Leone and South Africa. This experience includes archaeological surveys, excavations, community consultation and grave relocations completed to IFC and other international standards. He has also acted as an expert reviewer of HRM projects undertaken in, amongst other countries, Malawi and Tanzania. Johan's present focus at Digby Wells is to develop the HRM unit into an integrated vehicle for assessing impacts on heritage resources through multidisciplinary approaches, following international HRM principles and standards.</p>  |



## 6 Methodology

This Section describes the activities completed to compile this HBAR, including the following:

- Defining study areas;
- Data collection;
- Developing CS and field ratings; and
- Impact assessment.

These activities are discussed separately below.

### 6.1 Defining study areas

As heritage resources do not exist in isolation from the wider natural, social, cultural and heritage landscape, assessment of potential impacts on heritage resources are complicated by the fact that diverse heritage impacts may manifest in different geographical areas and affect different communities.

Defined study areas are necessary to develop statements of CS, predict the types and intensity of impacts, and develop management plans. The general definition for a “study area” in terms of an impact assessment is the area most likely to experience impacts arising from, or to exert an influence on, the project or activity being assessed.

For the purposes of this study, three ‘concentric’ study areas were defined to enable CS to be determined that informed the assessment of impacts and guided appropriate management measures. The defined study areas are:

- **The regional study area**, defined by the district municipality, in this instance the Waterberg District Municipality (WDM). 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 (Plan 1).
- **The local study area**, defined as the area most likely to be influenced by any changes to heritage resources, or where project development could cause heritage impacts. This area was defined as the immediate surrounding properties / farms, as well as the affected local municipality, in this instance the MLM (Plan 2).
- **The site-specific study area**, defined as the bounded project area i.e. the farm portions, within which the proposed prospecting activities will be undertaken (Plan 3).

### 6.2 Data collection

Data collection was aimed at information gathering relating to known heritage resources within and surrounding the site specific study area defined in Section 6.1 above. Individual data collection activities are described in more detail below.

## 6.2.1 Literature review

Relevant information was sourced from a diverse range of information repositories including:

- South African Heritage Resources Information System;
- University of the Witwatersrand Archaeological Site Database;
- Online / electronic journals and platforms, and
- Certain internet sources.

A summary of the reviewed literature is presented in Table 6-1.

**Table 6-1: Summary of reviewed literature, reports and databases**

| <b>Geology &amp; Palaeontology</b> |                               |   |
|------------------------------------|-------------------------------|---|
| Baker, 2006                        | Longridge, 2013               | SAHRA, 2013b                                    |
| Barker, et al., 2006               | Longridge, 2014               | SAHRA, 2013c                                    |
| Cawthorn, et al., 2006             | McCarthy, et al., 2011        | SAHRA, 2013d                                    |
| Colarossi, 2013                    | Martini, 2006                 | SAHRIS, 2014                                    |
| Eriksson, et al., 2006             | Robb, et al., 2000            | Sinclair, et al., 2003                          |
| Esterhuysen, 2010                  | Robb, et al., 2006            |   |
| Knight, et al., 2014               | SAHRA, 2013a                  |   |
| <b>Stone Age</b>                   |                               |   |
| Deacon & Deacon, 1999              | Goodwin & Van Riet Lowe, 1929 | Mitchell, 2002                                  |
| Esterhuysen, 2003(a)               | Latham & Herries, 2004        |   |
| Esterhuysen & Smith, 2007          | Lombard, et al., 2012         |   |
| <b>Rock Art</b>                    |                               |   |
| Henry, 2010                        | Prins & Hall, 1994            | Smith & van Schalkwyk, 2002                     |
| Namono & Eastwood, 2005            | Smith & Ouzman, 2004          |   |
| <b>Farming Community</b>           |                               |   |
| Dalby, 1975                        | Huffman, 2004                 | Mitchell, 2002                                  |
| Huffman, 1980                      | Huffman, 2007                 |   |
| <b>Colonial / Historical</b>       |                               |   |
| Bonner, 1983                       | Hofmeyr, 1988                 | Saccaggi, 2012                                  |
| Delius, 1983                       | Hofmeyr, 1989                 | Skosana, 2012                                   |
| Esterhuysen, 2003(a)               | Hofmeyr, 1992                 | Skosana, 2013                                   |
| Esterhuysen, 2003(b)               | Huffman, 2004                 | Tobias, 1945                                    |
| Esterhuysen, 2006                  | Jackson, 1969                 | Transvaal Native Affairs<br>Department, 1905(a) |
| Esterhuysen, 2007                  | Jackson, 1982                 | Transvaal Native Affairs<br>Department, 1905(b) |
| Esterhuysen, et al., 2009          | Kopytoff, 1987                |   |



| Esterhuysen, 2012                       |             | Naidoo, 1987        |                 |  |                 |
|---|-------------|---------------------|-----------------|--|-----------------|
| <b>Planning documents</b>               |             |                     |                 |  |                 |
| Mogalakwena Local Municipality,<br>2012 |             | Statistics SA, 2011 |                 | Waterberg District Municipality,<br>2014 |                 |
| <b>Databases</b>                        |             |                     |                 |  |                 |
| GSSA                                    |             | SAHRIS              |                 | Wits Archaeological Site Database        |                 |
| <b>Relevant assessment reports</b>      |             |                     |                 |  |                 |
| Author                                  | Report type | SAHRA Reference     | Author          | Report type                              | SAHRA Reference |
| Coetzee, 2011                           | HIA         | Case ID 1799        | Pistorius, 2002 | HIA                                      | 2002-SAHRA-0085 |
| du Piesanie, et al., 2015               | HIA         | Case ID 7331        | Pistorius, 2008 | HIA                                      | Case ID: 1574   |
| Hutten, 2013                            | HIA         |                     | Roodt, 2008(a)  | HIA                                      | 2008-SAHRA-0246 |
| Kusel, 2005                             | HIA         | 2005-SAHRA-0053     | Roodt, 2008(b)  | HIA                                      | 2008-SAHRA-0263 |
| Kusel, 2007                             | HIA         | 2007-SAHRA-0506     | Roodt, 2008(c)  | HIA                                      | 2008-SAHRA-0324 |
| Munyai & Roodt, 2006                    | HIA         | 2006-SAHRA-0202     | Roodt, 2008(d)  | HIA                                      | 2008-SAHRA-0529 |
| Murimbika, 2006                         | HIA         | 2006-SAHRA-0354     |                 |  |                 |

Historical layering was undertaken. This 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.

Aerial imagery utilised in this report are presented Table 6-2.

**Table 6-2: Aerial imagery relevant to this assessment**

| <b>Aerial photographs</b> |             |                            |                        |      |           |
|---------------------------|-------------|----------------------------|------------------------|------|-----------|
| Job no.                   | Flight plan | Photo nos.                 | Area                   | Date | Reference |
| 321                       | 8           | 21797                      | North of Potgietersrus | 1953 | 321/1953  |
|                           | 9           | 21860; 21862               |                        |      |           |
|                           | 10          | 24850; 24852; 24854; 24855 |                        |      |           |
|                           | 11          | 11551; 11552; 11553; 11554 |                        |      |           |
| 527                       | 10          | 229; 230                   | Steilloopbrug          | 1965 | 527/1965  |
|                           | 11          | 74; 75; 76                 |                        |      |           |



| Aerial photographs |             |                        |               |      |           |
|--------------------|-------------|------------------------|---------------|------|-----------|
| Job no.            | Flight plan | Photo nos.             | Area          | Date | Reference |
| 682                | 20          | 8706; 8707             | Steilloopbrug | 1972 | 682/1972  |
|                    | 21          | 9115; 9117; 9119       |               |      |           |
|                    | 22          | 8567; 8569; 8571; 8572 |               |      |           |
|                    | 23          | 8492; 8493; 8494; 8496 |               |      |           |
| 842                | 4           | 2320                   | Pietersburg   | 1980 | 842/1980  |
| 868                | 22          | 8933; 8934             | Swartwater    | 1983 | 868/1983  |
|                    | 23          | 8888; 8890             |               |      |           |
| 946                | 4           | 1036                   | Pietersburg   | 1991 | 946/1991  |
| 1002               | 10          | 9489                   | Pietersburg   | 1997 | 1002/1997 |
|                    | 11          | 226; 228               |               |      |           |

## 6.2.2 Pre-disturbance survey

Field based data was collected through a pre-disturbance survey of selected proposed prospecting footprint areas in the site specific study area. The survey was undertaken by Justin du Piesanie, a qualified and accredited archaeologist, between 4 and 5 August 2016.

A total of 25 prospecting locations are considered as part of this assessment. The prospecting locations occur throughout the site-specific study area in disturbed and undisturbed areas. Focus was given to nine prospecting locations in previously undisturbed areas to identify a representative sample of tangible heritage resources that may be present in the landscape. These areas were subjected to pedestrian surveys (i.e. walk downs), recorded through GPS track logs. Identified tangible heritage resources were recorded as GPS waypoints and documented through both photographic and written records.

## 6.3 Developing cultural significance and field ratings

### 6.3.1 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 summarise the CS and other values described in subsection 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. These attributes were based on the data collected and collated into the cultural heritage baseline profile presented in Section 8 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.

### 6.3.2 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>3</sup>.

## 6.4 Impact assessment

Impacts to heritage resources can be broadly divided into three categories – direct, indirect and cumulative. The assessments of these impacts are done by assigning a numerical value to the significance of the identified impacts.

### 6.4.1 Impact terminology

Project activities can impact on heritage resources in a number of ways. For instance, although identified heritage resources may not be physically (i.e. directly) affected by project activities, the same activities could impact on the intangible nature of heritage resources.

An example that best illustrates the complexity of heritage impacts is where burial grounds occur within the site-specific project area, but will not be physically affected by any project activities. Access to such sites by descendants of the deceased or other parties may be restricted or lost; the intangible heritage associated with graves as places of memory, ritual, identity, etc., can therefore be impacted without actual, physical impact on the sites. Such impacts may manifest in social repercussions.

Heritage impacts are further compounded when the intensity of predicted impacts and the assigned CS of heritage resources differ significantly. Again, burial grounds are the best example. These resources are generally considered to be of very high CS; even low ranked impacts may therefore be detrimental to their tangible and intangible conservation.

Predicted heritage impacts were therefore placed into the following three broad categories:

- **Direct or primary effects** on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work.
- **Indirect, induced or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access.

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<sup>3</sup> Currently the LIHRA 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.



- **Cumulative effects** on heritage resources result from in-combination effects on heritage resources acting with 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 new buildings within a historical rural landscape.
  - **Synergistic:** effects interact to produce a total effect greater than the sum of the individual effects, e.g. the visual effect of the increase of new buildings within a historical rural landscape.
  - **Time crowding:** frequent, repetitive impacts on a particular resource at the same time, e.g. the high rate of increase of new buildings within a historical rural landscape.
  - **Neutralizing:** where the effects may counteract each other to reduce the overall effect, e.g. the effect of changes in patterns of cultivation could reduce the overall visual impact of additional new buildings within a historical rural landscape.
  - **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.

(adapted from Winter & Baumann, 2005: 36)

#### 6.4.2 Assessment methodology

The assessment of impacts inherently considered the CS and Field Ratings. The consequence of the potential impact was 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.

#### 6.5 Risk versus impacts

Risk is defined as the 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 measures and monitoring were provided for low risks and unplanned events, however, they **were not assessed in detail** (i.e., with significance ratings). In general monitoring is an accepted form of mitigation for low risks.





## 7 Constraints and limitations

The results reported on in this HBAR are limited to information obtained through the methodologies described in Section 6.2 above. Due to the large number of proposed prospecting locations and undefined access routes, the field based data collection focussed primarily on nine prospecting locations in previously undisturbed areas to identify a representative sample of expected tangible heritage resources within the landscape only.

As a result, not all proposed prospecting locations were subject to a pre-disturbance survey. This restriction is considered in the proposed recommendations detailed under Section 11 below.

## 8 Cultural heritage baseline description

### 8.1 Geology and palaeontological context

The lithostratigraphic units of the larger regional and local study area summarised in Figure 8-1, and comprise the following:

- Waterberg Group;
- Bushveld Complex;
- Transvaal Supergroup; and
- Archaean Granite and Gneisses.

Briefly, the Waterberg Group is considered to be of the Kheisian period dating to between 1 700 million years (Ma) to 2 000 Ma old. The typical rocks associated with the group are arenite and rudite – sedimentary rocks deposited by large braided rivers (Barker, Brandl, Callaghan, Erikson, & van der Neut, 2006, p. 314). **These lithostratigraphic units do not occur within the site-specific study area and are not considered further.**

The Waterberg Group is underlain by the Bushveld Complex, dominated by the Lower, Critical, Main and Upper Zones of the Rustenburg Layered Suite that date from ~2 050 Ma - ~2 000 Ma (Eoproterozoic Era). The Bushveld Complex comprises felsic and mafic igneous rocks in which fossils are not identified (Cawthorn, Eales, Walraven, Uken, & Watkeys, 2006, pp. 263-264; SAHRA, 2013c). The site-specific study area overlays a part of the northern limb of this complex (Baker, 2006; Cawthorn, Eales, Walraven, Uken, & Watkeys, 2006; Longridge, 2014), that according to annual prospecting reports from relevant previous studies (Longridge, 2013; Longridge, 2014) is underlain by a floor of Archaean basement granites, gneiss and schist. **A review of the SAHRIS Palaeontological Sensitivity Map demonstrates that the site-specific study area comprises zero palaeontological significance (Figure 8-1), primarily due to the nature of the igneous rocks.**

Lithologies associated with the Transvaal Supergroup, and specifically the Malmani Subgroup of the Chuniespoort Group is known to occur within the region. The Transvaal Supergroup forms one of three main karst areas in South Africa, as karst landscapes

developed on hardened insoluble chert-rich, iron and manganese dolomite of the Malmani Subgroup (Martini, 2006, pp. 661-662). The most significant example of a karst landscape in the region is the Makapan Valley World Heritage Site (WHS)<sup>4</sup>. A review of the SAHRIS Palaeontological Sensitivity Map suggests that small expressions of the Malmani Subgroup occur to the west of the site-specific study area, some 7 km from the most southern proposed borehole location (*Application 1 5E*). **No expressions of the Malmani Subgroup are identified within the site-specific study area, and this geological stratum is not considered further in this assessment.**

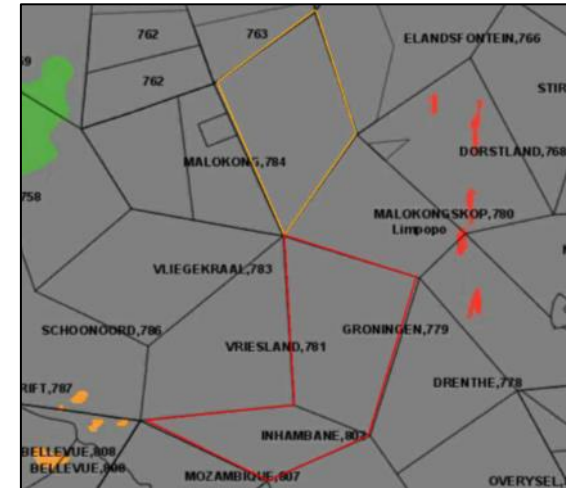
The basal geological lithostratigraphic unit comprises magmatic, Archaean Granite and Gneisses (~2 800 Ma - ~2 500 Ma) (Robb, Brandl, Anhaeusser, & Puojol, 2006). **As with the Bushveld Complex, the inherent magmatic igneous origin of the Neoproterozoic granitoids precludes fossil taphonomy** (SAHRA, 2013b).

Commensurate with the abovementioned findings of the palaeontological assessment, i.e. the nature of igneous rock and absence of expressions of the Malmani Subgroup, no palaeontologically sensitive geological strata occur within the site-specific study area and no palaeontological impacts through project related activities are expected.

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<sup>4</sup> The author acknowledges that the Makapan Valley WHS is listed as part of the official Fossil Hominid Sites of South Africa. It is referred to as Makapan Valley WHS within this report for the purposes of differentiation from other sites as part of the official UNESCO listing.

| Ma            | Eon           | Era                      | Period  | Lithostratigraphic units  | Lithology   | Sensitivity             | Fossils   |      |   |
|---------------|---------------|--------------------------|---|---------------------------|---|-------------------------|---|------|---|
| 1 600-        | PROTEROZOIC   | Palaeoproterozoic        | Mokollan  | Kheislian                 | Waterberg Group   | Mogalakwena Formation   | Continental "red beds" - predominantly braided stream deposits (sandstones, conglomerates with minor mudrocks), also beach, tidal flat, lacustrine, aeolian and possible marine shelf sediments | Low  | Terrestrial cyanobacterial mats recorded from playa lake deposits. Earliest known terrestrial cyanobacterial mats recorded from playa lake deposits of the Makgabeng Formation on the Makgabeng Plateau. Early Proterozoic "red beds" provide evidence for the development of an oxygenated atmosphere after c. 2Ga |
| 2 000-2 050-  |               |                          |   |                           |   |                         |   |      |   |
| Upper Zone    |               | Subzone C                | Molendraai Magnetite Gabbro (Vmo)                                 |                           |   |                         |   |      |   |
|               |               | Subzone B                |   |                           |   |                         |   |      |   |
| Main Zone     |               | Subzone A                | Mapela Gabbro (Vm)  |                           |   |                         |   |      |   |
|               |               | Upper Subzone            |   |                           |   |                         |   |      |   |
| Critical Zone |               | Lower Subzone            | Grasvally Norite-Anorthosite (Rooipoort Norite-Anorthosite (Vro)) |                           |   |                         |   |      |   |
|               |               | Upper Subzone            |   |                           |   |                         |   |      |   |
| Lower Zone    |               | Lower Subzone            | Zoetveld Subsuite (Vz)  |                           |   |                         |   |      |   |
|               |               | Upper Pyroxenite Subzone |   |                           |   |                         |   |      |   |
| 2 500-        | Eoproterozoic | Vaalian                  | Transvaal Supergroup  | Chuniespoort Group        | Malmalm Sub-group                                       | Frisco Formation        | Mainly stromatolitic dolomites, 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 Makapan karst topography         |
|               |               |                          |   |                           |   | Eccles Formation        | Cherty dolomites, erosion breccias  |      |   |
|               |               |                          |   |                           |   | Lyttelton Formation     | Shales, quartzites and stromatolitic dolomites  |      |   |
|               |               |                          |   |                           |   | Monte Christo Formation | Erosive breccia, stromatolitic and oolitic platform dolomites   |      |   |
|               |               |                          |   |                           |   | Oaktree Formation       | Carbonaceous shales, stromatolitic dolomites, locally developed quartz  |      |   |
| 2 640-        | ARCHAEOAN     | Neoproterozoic           | Randian   | Archaean Granite & Gneiss | Granitoids including igneous granite, gneiss and schist | Zero                    | None  |      |   |
| 2 800-        |               |                          |   |                           |   |                         |   |      |   |



| Sensitivity          | Required actions   |
|----------------------|--|
| Very High            | Field assessment and finds protocol                      |
| High                 | Desktop study to determine necessity of field assessment |
| Moderate             | Desktop study  |
| Low                  | No palaeontological studies necessary, but a chance find |
| Insignificant / zero | No palaeontological studies or chance finds required     |
| Unknown              | Minimum desktop study                                    |

Figure 8-1: Lithostratigraphic units and fossil sensitivity (adapted from Longridge 2014, Johnson et al 2006 and SAHRIS<sup>5</sup>)

<sup>5</sup> Available from <http://www.sahra.org.za/fossil-heritage-layer-browser> [Accessed 14/04/2016]

## 8.2 Archaeological context

### 8.2.1 Stone Age<sup>6</sup>

The Stone Age denotes the period in which hominids, primarily of the genus *Homo*, produced stone tools, also referred to as lithics. The characteristics of this Age have been influenced through time, to some extent, by environmental variations including geology, geomorphology, climate, fauna and flora (Lombard, et al., 2012). In South Africa this Age is divided into three periods, name the Early (ESA), Middle (MSA) and Later Stone Age (LSA) after Goodwin and Van Riet Lowe (1929). Evidence for all three Stone Ages exists within the regional study area, and the principle characteristics of these periods are briefly presented here.

Large hand axes and cleavers produced from coarse-grained material dominate the ESA assemblage, dated to between ~2 Ma - 250 000 year ago (Ka) (Esterhuysen & Smith, 2007). The ESA is generally associated with the first *Homo* species (e.g. *H. habilis*), and possibly with some *Australopithecus* species. The most significant are perhaps sites in the Makapan Valley to the south-east of present day Mokopane. Here, the Cave of Hearths is considered the most prolific Stone Age site in the region and is one of the most deeply stratified archaeological sites in the South Africa (Esterhuysen A. B., 2003a). The Makapan Valley WHS includes a 2 220 ha core area and a 48 065 ha surrounding buffer zone of 48 065 ha, as gazetted in Government Notice 1197 of 2007.

No evidence for ESA accumulations, however, has been identified in the site-specific study area.

The MSA dates from approximately 300 Ka to 20 Ka. Early MSA industries are characterised by high proportions of minimally modified blades, represented by the Levallois technique (Clark, 1982). Other diagnostic stone tool identifiers including convergent flake scars, multi-faceted platforms, retouched points and backing (Hodgskiss & du Piesanie, 2015). The MSA is generally associated with archaic *H. sapiens* (e.g. *H. rhodesiensis*) through to early anatomically modern *H. sapiens sapiens*. In general the MSA can be broadly defined by the occurrence of blades and points produced from good quality raw material. (Deacon & Deacon, 1999).

Within the local and portions of the site-specific study area, scattered surface occurrences of MSA stone tools were recorded (Pistorius, 2002; Kusel, 2005; Roodt, 2008(c); Roodt, 2008(b); Hodgskiss & du Piesanie, 2015), with the majority occurring in visibly disturbed areas.

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<sup>6</sup> Digby Wells acknowledges that the Stone Age is intimately linked with the geological and hydrological features of the landscape, specifically the natural processes of progradation, aggradation and sedimentation of the Mogalakwena River in this instance. Furthermore, it is acknowledge that a significance presence of Middle and Later Stone Age exists on the farm Rietfontein 2 KS some 20 km south east of the site-specific study area, however, to date no published literature on these accumulations could be identified.



**Figure 8-2: Example of MSA accumulation in the site-specific study area**

The LSA dates from approximately 40 Ka to the historical period and is wholly associated with anatomically modern *H. sapiens sapiens*. Lithics associated with the LSA are specialised: specific tools being created for specific purposes, and the inclusion of bone tools into the assemblages (Mitchell, 2002). Briefly, these may include microlithic (bladelet) production technology, increased practice of ritual, long-distance movement and the widening of social relations, complex societies and rock art (Deacon & Deacon, 1999).

LSA deposits have also been recorded within the local study area some 16 km south of the project (Kusel, 2007); however, none have been recorded within the site-specific study area.

### 8.2.2 Farming community

The Stone Age, in a southern African context, is followed by the Farming Community period, associated with various Bantu-speaking groups and their migration through the landscape. Southern African Farming Community archaeology is subdivided into primarily two periods to distinguish between widespread events:

- Early Farming Communities (EFC) (200 CE – 1000 CE); and
- Late Farming Communities (LFC) (1000 CE – 1840 CE).

The primary visible indicators for the presence of Farming Community sites are material cultural remains<sup>7</sup>, and stonewalled settlements. Regionally, several Farming Community period sites have been identified primarily through identification of ceramic scatters, metal working sites and stonewalled settlements (Kusel, 2005; Kusel, 2007; Roodt, 2008(c); du

<sup>7</sup> Material culture remains are discussed in terms of ceramic distribution in the region. To this end the works of Huffman (1980; 2007) are used as the primary text to identify ceramics that in turn provide relative temporal markers for occupation in the region. Although ceramics are used as broad cultural and/or linguistic markers as well, it is acknowledged that ceramics do not necessarily equate to narrowly defined ethnic groups.

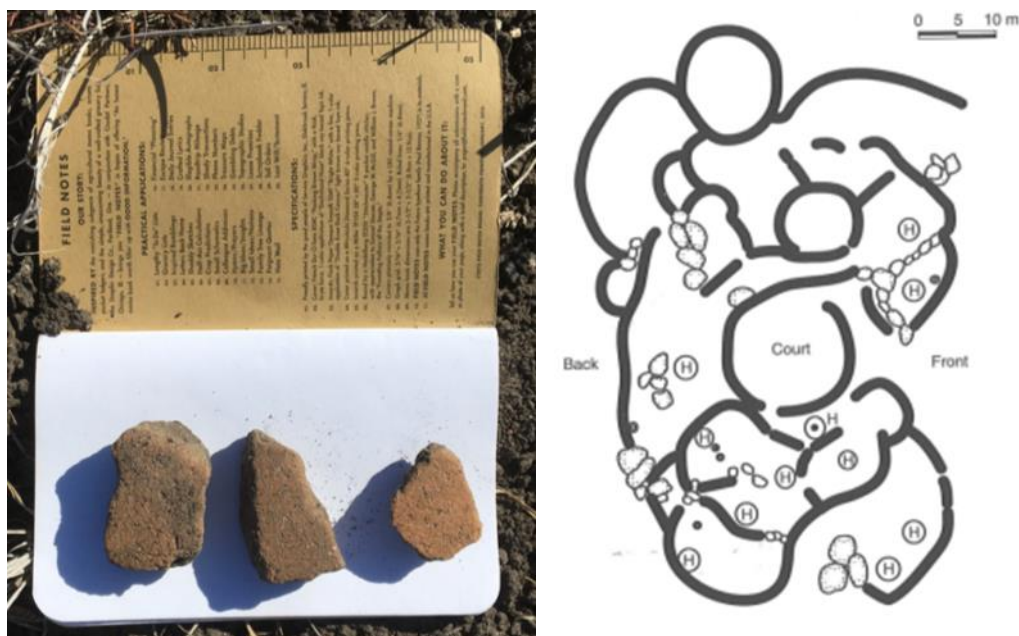




Piesanie & Nel, 2015). These sites have been attributed to the LFC period through the identification of ceramic scatters affiliated with the Moloko Branch. The earliest recorded facies of Moloko is *Icon* dating to 1300 CE – 1500 CE and geographically limited to the Limpopo and Mpumalanga Provinces. From this, we can see in the ceramic record that *Madikwe facies* of the North-West and Limpopo Provinces is derived from *Icon*. In addition, ceramics associated with the *Madikwe facies* have also been reported (Roodt, 2008a).

Stonewalled settlements within the regional context are primarily associated with the Moor Park cluster, accepted as being of Nguni origin and associated with the migrations of Nguni-speakers into the Waterberg region between the 17<sup>th</sup> and 18<sup>th</sup> centuries. These Nguni-speakers constructed defensive hilltop stonewalled settlements similar to Moor Park stonewalled sites, where this regional expression was named after the type-site of Melora. Melora stonewalled settlements are characterised by beehive huts at the back of small terrace platforms with defensive walling that encompasses the settlement (Huffman, 2007).

Within the site-specific study area, Kusel (2005) reports on the findings of an archaeological assessment of Malokong Hill where a large stonewalled settlement was identified where the spatial layout conforms to the defined expressions of Melora (Figure 8-3).



**Figure 8-3: Example of surface scatters in site-specific study area and a plan of Melora-type stonewalled site at Buffelsfontein (Huffman 2007)**





### 8.3 Historical and colonial period<sup>8</sup>

**It is acknowledged that the recent historical landscape is complex. Issues associated with succession disputes are representative of an inherent complex and conflicted heritage that is the subject of much research and debate. Comprehensive study of these issues is, however, outside of the scope of this HBAR.**

There is sufficient evidence that prove the continuity of LFC settlements into the historical period that deems the division of the periods largely artificial. This section focusses on the histories<sup>9</sup> of the Southern ([Musij] Ndzundza, Manala and Kekana) and Northern Ndebele ([Hlubij] Langa), most of whom are believed to have left Kwa-Zulu Natal between 1630 – 1670 (Skhosana, 2010; Jackson, 1982; Esterhuysen A. B., 2007).

The Langa entered the region toward the end of the 17<sup>th</sup> century, settling between the Matlotlo Mountains, the Sandsloot River and Mogalakwena River (Esterhuysen A. B., 2003a; Pistorius, 2002). The Langa moved throughout the region over time, settling in various locations with numerous hills known to contain several Langa settlements, including Segopa, Magope, Fothane, Matlhogo and Ditlotswane within the site-specific study area.

After the death of Seitarita in 1795, the sons Mapela, Mamoala and Masoge entered into a succession dispute that resulted in the splitting of the chiefdom. Mapela took over as chief, even though his brothers were of higher ranking, and moved the chiefdom from Moumon-wa-Matswaka on the farm Zuid Holland 773 LR to Fothane Hill.

It is suggested through oral histories that the Kekana trace their ancestry to the succession dispute between the Ledwaba and Gegana after the death of Madidzi. The Gegana relocated to Muledlana until a disruption in the lineage with the death of Tjhumana sometime in the 18<sup>th</sup> century (Esterhuysen A. B., 2003a). A succession dispute erupted between Mugombane I (Kxhaba) and Kxhumbha, culminating in the defeat of Mugombane I and his relocation to the Makapan Valley.

These groups through time established trade networks in the region that, for the Boers, could possibly contribute to wealth creation and independence from the British (Esterhuysen A. B., 2007). This economic prospect facilitated the settlement of Boers in the region; however, it contributed to increased tensions with the Ndebele chiefdoms over land, labour

<sup>8</sup> The historical period is commonly regarded as successive to the LFC, dated from approximately the mid-19<sup>th</sup> century with the permanent settlement of Europeans within the interior and contact with the indigenous peoples. This distinction however, is now largely considered artificial in many ways, and the current definition of the historical period includes the past 500 years (Swanepoel, Esterhuysen, & Bonner, 2008).

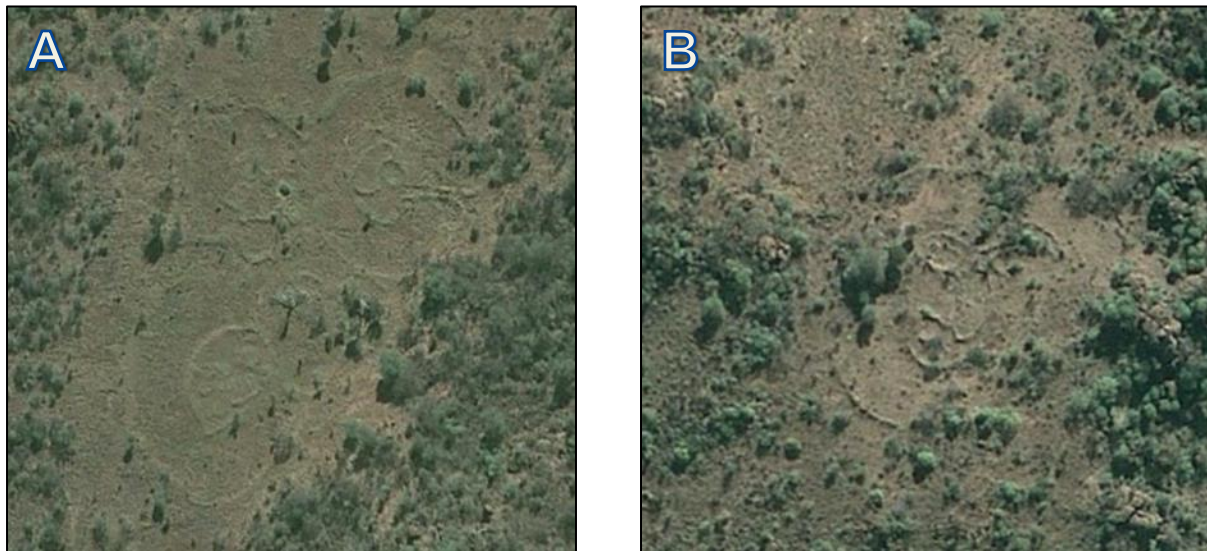
<sup>9</sup> Much of the history of these Ndebele groups is accessible through oral history (Huffman, 2004). However, 17<sup>th</sup> and 18<sup>th</sup> century oral histories that have been collected do not necessarily provide coherent descriptions of events that led to the current populace and political environment (Delius, 1983). Missionary documents from the 19<sup>th</sup> century provide only a slightly more lucid record of the movements and fission of various chiefdoms (Esterhuysen A. B., 2003a). Primary interpretations on the origins of the South African Ndebele based on available oral histories recorded in the 19<sup>th</sup> century have been summarised (Skosana D. E., 2012, pp. 20-23). This clearly illustrates divergent perspectives about the history of these two groups and blatant inconsistencies in the oral records. Having noted this, it must be taken into consideration that the presentation and interpretation of this information is also subject to these same inconsistencies.

and allegations of Boer slaving. Esterhuysen (2012) asserts the Kekana facilitated alliances with the Mmakau and Langa Ndebele to ensure their survival and economic interests.

The tensions culminated in a series of killings of Boers by the Kekana and Langa during 1854, and the retaliation of the Boers that resulted in the death of Mapela. After the death of Mapela, under their new chief Maleya, the Langa relocated from Fothane Hill to Ditlotswana (Jackson, 1969; Jackson, 1982; Pistorius, 2002) in the site-specific study area (Figure 8-4). Maleya was ousted by his uncle Mankopane who was succeeded by his son Masibi around 1890.

The latter's death resulted in another succession dispute between his two sons, Hans and Backenberg (Hendrik). However, unlike earlier disputes, the *Zuid-Afrikaansche Republiek* (ZAR) government under President Paul Kruger played a role. As both laid claim to the chieftainship (Native Affairs Department, 1905), to settle the dispute the ZAR stepped in and proclaimed that they recognised both as chief, dividing the tribe and location (Massie, 1905).

This division saw the ZAR demarcate the three dominant polities, namely the Valtyn, Mapela and Bakenberg chiefdoms, into a 17 km long and 5 km wide narrow solid block that housed some 30 000 people. The site-specific study area is located within the historic Bakenberg Location (*also known as the Hendrik Masibi Location*).



**Figure 8-4: Aerial view of stonewalled<sup>10</sup> settlements on (A) Malokong Hill and (B) Ditlotswana Hill respectively**

<sup>10</sup> Note the conformity to the defined expressions of Melora type stonewalling as presented in Figure 8-3. This provides tangible evidence for the association of the Langa with the archaeologically defined Moor Park cluster of Nguni origins.

## 9 Heritage impact assessment

This chapter considers the potential impacts to heritage resources based on the results of the desktop study and pre-disturbance survey, relative to the assigned CS of the identified resources. The CS of the identified resources is first discussed, followed by the potential impacts to the resources per phase of the proposed Project.

### 9.1 Cultural significance assessment

Within the site-specific study area, a number of protected heritage resource types have been recorded in the baseline as presented in Section 8 above. These types include:

- MSA accumulations;
- LFC stonewalled settlements;
- Isolated LFC surface scatters; and
- Burial grounds and graves.

Based on the results of the baseline research, and that of the pre-disturbance screening survey, the cultural landscape has a designated CS value ranging from negligible to very high. The assessment of the potential impacts to these heritage resource types are considered in Section 9.2 below.

**Table 9-1: CS assessment of various heritage resource types in the site-specific study area**

| Resource ID                 | Aesthetic   | Historic   | Scientific  | Social   | INTEGRITY  | VALUE | Designation | Recommended Field Rating |
|-----------------------------|---|--|---|--|--|-------|-------------|--------------------------|
| Burial grounds and graves   | -<br>Burial grounds and graves are not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA                   | -<br>Burial grounds and graves are not assessed against historic criteria as defined in Section 3(3) of the NHRA                             | -<br>Burial grounds and graves are not assessed against scientific criteria as defined in Section 3(3) of the NHRA                          | <b>5</b><br>Burial grounds and graves have specific connections to communities or groups for spiritual reasons. The significance is universally accepted | <b>7</b><br>The integrity of burial grounds is considered to be excellent with the fabric preserved.             | 20    | Very High   | <b>Grade I</b>           |
| LFC stonewalled settlements | <b>4</b><br>These sites are considered to principle characteristics that are rare and uncommon for the region                       | <b>4</b><br>These sites are associated with the Langa who played a role in events associated with the Siege of Makapansgat                   | <b>4</b><br>Identified stonewalled settlements can yield information to contribute to an understanding of the historic events of the region | <b>4</b><br>These sites have specific connections to the surrounding communities and groups for ancestral and spiritual reasons                          | <b>4</b><br>These sites are considered to have high information potential and their meaning is well established. | 16    | High        | <b>Grade II</b>          |
| LFC surface scatters        | <b>1</b><br>The principle characteristics and technical skill for the periods of ceramic production are common and well represented | <b>1</b><br>Ceramics outside of discernible context provide limited information that can contribute to understanding of the historic context | <b>1</b><br>The information potential of surface scatters is limited  | <b>3</b><br>These finds may have specific importance to communities associated with the historic settlement of the region                                | <b>1</b><br>The fabric of surface scatters is considered to be poor with limited information potential           | 2     | Negligible  | General Protection IV C  |

| Resource ID       | Aesthetic  | Historic   | Scientific   | Social   | INTEGRITY  | VALUE | Designation | Recommended Field Rating |
|-------------------|--|--|--|--|--|-------|-------------|--------------------------|
| MSA accumulations | <b>1</b><br>The identified stone tools can be considered to have some information pertaining to the technical skill of a particular period, but this is common and well represented in diverse landscapes. | -<br>MSA accumulations are not assessed against historic criteria as defined in Section 3(3) of the NHRA | <b>1</b><br>While individual stone tools may demonstrate principle characteristics, these are considered common and well represented in diverse cultural landscapes. | -<br>MSA accumulations are not assessed against historic criteria as defined in Section 3(3) of the NHRA | <b>0</b><br>Isolated accumulations are considered to have no information potential that can contribute to the understanding of the prehistoric landscape. The fabric is degraded and the original setting is lost. | 0     | Negligible  | General Protection IV C  |

## 9.2 Impact assessment

This chapter considers the potential direct and indirect impacts to identified heritage resources in relation to the project related activities summarised in Table 4-2. It is envisaged that the majority of potential impacts to heritage resources will be limited to the establishment phase of the Project.

### 9.2.1 Establishment phase

#### 9.2.1.1 Direct impacts to Stone Age resources

Scattered surface occurrences of MSA stone tools have been identified within the local and site-specific study area. The assessment of the CS of surface accumulations considered the artefacts in terms of aesthetic and scientific criteria, specifically:

- The degree of technical skill that the artefacts and / or sites exhibit for the particular period, i.e. MSA;
- The possession of uncommon or rare cultural heritage aspects relative to other examples;
- The inherent information potential of the sites;
- The importance of demonstrating principle characteristics relative to other examples; and
- The lack of contextual integrity of isolated or low density MSA accumulations in providing information relative to original settings.

MSA accumulations identified through the desktop review and pre-disturbance survey comprised isolated find-spots or low density scatters without any of primary context or stratification. No habitation or factory sites were identified. Based on this understanding, the individual accumulations have been designated with a negligible CS, and in accordance with the SAHRA minimum standards (SAHRA, 2007), these have been sufficiently recorded and no further mitigation of these resources is required.

#### 9.2.1.2 Direct impacts to Farming Community sites

Stonewalled settlements have been recorded on both Malokong and Ditlotswana Hills within the site-specific study area. These settlements are associated with the historical settlement of the region by the Langa, and conform to the Moor Park archaeological settlement cluster. The settlement on Malokong Hill was previously identified by Kusel<sup>11</sup>, where it was noted the largest concentration of stonewalling occurred on the south-western portion of the hill.

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<sup>11</sup> An excavation permit (Permit ID: 453 / Permit No: 80/05/06/008/51) regulated under Section 35(4) of the NHRA was issued to Dr. U. Kusel by SAHRA on 19 July 2005 for the mitigation of the Late Iron Age Settlements on Malokong Hill. The permit is available on SAHRIS (Case ID: 2927) at the following link: <http://www.sahra.org.za/sahris/cases/excavations-malokong-hill-mokopane>. Beyond the identification of the



The stonewalled settlements were assigned high CS based on the following criteria:

- The stonewalling demonstrates characteristic technical skill for the LFC period contributing to the aesthetic character of the sites in comparison to other identified LFC sites in the region;
- The sites have a historic association with the local Langa in the study area, and consequently social aspects associated with descendent communities;
- The potential for these sites to provide scientific and historical information that contributes to an understanding of the larger cultural landscape and historical events is high when compared to isolated LFC findspots or low density scatters;
- The significance of the settlements within the localised context is well established; and
- The integrity of the settlements is considered high, stonewalling remains largely intact with limited encroachment on the complexes.

Project activities during the establishment phase of the Project will have a direct impact on these sites. This includes Activity 1 - Site clearance and topsoil removal prior to the commencement of physical construction activities.

The assessment of potential direct impacts to farming community sites is summarised in Table 9-2.

**Table 9-2: Summary of direct impacts to farming community sites**

| <b>IMPACT DESCRIPTION: Direct impacts to farming community sites</b> |                                |  |   |                                       |
|--|--------------------------------|--|---|---------------------------------------|
| <b>PRE-MITIGATION</b>  |                                |  |   |                                       |
| Duration   | Permanent (7)                  | Planned drill positions will result in the clearing of top soil that will permanently damage and / or destroy stonewalled settlements on Malokong and Ditlotswana Hills  | Consequence:<br>Extremely detrimental (-20) | Significance: Major - negative (-140) |
| Extent   | National (6)                   | The damage to or destruction of these sites will remove tangible remains of historic Langa settlements, a community actively involved in the events associated with the Siege of Makapan, a significant event in our national history. |   |                                       |
| Intensity x type of impact   | Extremely high - negative (-7) | The negative impact will be extremely high, as it will be a major change to a resource with high significance  |   |                                       |

issued permit, no other information regarding the mitigation of the stonewalled settlement on Malokong Hill was identified during was identified as part of this assessment. A request for a copy of the excavation report to SAHRA was made on 06 January 2015. This was not received.



| <b>IMPACT DESCRIPTION: Direct impacts to farming community sites</b>  |                          |  |                                 |   |
|---|--------------------------|--|---------------------------------|---|
| Probability   | Certain (7)              | Based on the location of boreholes it is certain that this impact will manifest if not mitigated             |                                 |   |
| <b>MITIGATION:</b>  |                          |  |                                 |   |
| Proposed borehole locations on Malokong and Ditlotswana Hills should be abandoned, and a buffer of 100m from the bases of these hills should be maintained to avoid any potential direct impacts to stonewalled settlements or material cultural remains associated with the LFC sites.<br>Furthermore, project specific Chance Find Protocols (CFP) must be developed and included into the EMP as a condition of authorisation. |                          |  |                                 |   |
| <b>POST-MITIGATION</b>  |                          |  |                                 |   |
| Duration  | Immediate (1)            | Where mitigation is applied, negative impacts to identified heritage resources will be removed or minimised. | Consequence:<br>Negligible (-3) | Significance:<br>Negligible - negative (-3) |
| Extent  | Very limited (1)         | Where an impact does occur, this will be limited in time and extent.   |                                 |   |
| Intensity x type of impact  | Very low - negative (-1) | Damage to these resources if mitigation measures are implemented will be very low                            |                                 |   |
| Probability   | Highly unlikely (1)      | It is highly unlikely that these resources will be impacted upon where mitigation measures are implemented.  |                                 |   |

### 9.2.1.3 Direct impacts to burial grounds and graves

Burial grounds and graves are known to occur within the site-specific study area, both within and outside of cemeteries. The assessment of the CS of burial grounds and graves only considered social criteria: these resources have specific connections to communities or groups for spiritual reasons and their significance is universally accepted.

Project activities during the establishment phase of the Project, specifically Activity 1 - Site clearance and topsoil removal prior to the commencement of physical construction activities, may have a direct impact on these sites.

The assessment of potential direct impacts to burial grounds and graves is summarised in Table 9-3.

**Table 9-3: Summary of direct impacts to burial grounds and graves**

| <b>IMPACT DESCRIPTION: Direct impacts to burial grounds and graves</b> |               |  |   |  |
|--|---------------|--|---|--|
| <b>PRE-MITIGATION</b>  |               |  |   |  |
| Duration   | Permanent (7) | Unmitigated changes to burial grounds and graves may result in permanent damage to and / or destruction of graves, or very long term social repercussions that could continue well beyond the project life | Consequence:<br>Extremely detrimental (-20) | Significance:<br>Moderate - negative (-80) |





| <b>IMPACT DESCRIPTION: Direct impacts to burial grounds and graves</b>  |                                |   |  |  |
|---|--------------------------------|---|--|--|
| Extent  | National (6)                   | Social repercussions resulting from unmitigated changes to burial grounds and graves could affect descendant communities residing in the region or nationally. Furthermore, this may result in national media attention |  |  |
| Intensity x type of impact  | Extremely high - negative (-7) | Unmitigated changes to burial grounds and graves must be considered a major change to heritage resources with a very high significance  |  |  |
| Probability   | Probable (4)                   | If recommended mitigation measures are not implemented, it is probable that the identified impacts will manifest  |  |  |
| <b>MITIGATION:</b>  |                                |   |  |  |
| <p>Identified, known burial grounds and graves in proximity to proposed prospecting locations must be clearly demarcated, fenced and avoided to remove the potential for negative impacts manifesting. To further mitigate against the accidental damage to unknown or low visible burial grounds and graves, it is recommended that proposed access route alignments are planned in consultation with the immediate surrounding local communities.</p> <p>Project specific CFPs must be developed and included in the EMP as a condition of authorisation.</p> <p>Furthermore, a Watching Brief must be undertaken by a qualified and accredited archaeologist for prospecting locations in previously undisturbed areas during the Establishment Phase.</p> |                                |   |  |  |
| <b>POST-MITIGATION</b>  |                                |   |  |  |
| Duration  | Immediate (1)                  | Where mitigations measures are implemented, potential impacts should be transient / limited in duration   |  |  |
| Extent  | Limited (2)                    | The implementation of CFPs and Watching Brief should ensure that any potential impact will be limited to certain aspects of the heritage resources  | Consequence:<br>Slightly beneficial<br>(8) |  |
| Intensity x type of impact  | High - positive (5)            | Where mitigation measures are implemented, this will result in minor changes to heritage resources with a very high significance  |  |  |
| Probability   | Highly unlikely (1)            | It is unlikely that impacts will manifest if recommended mitigation measures are implemented  |  |  |

### 9.2.2 Operational phase

Activities associated with the establishment of the prospecting borehole locations will damage or destroy tangible surface remains if not mitigated. These impacts are considered to be permanent and no additional impacts to heritage resources are envisaged during the operational phase of the Project.



### 9.2.3 Decommissioning phase

No additional impacts to heritage resources are envisaged during the decommissioning phase of the Project.

## 9.3 Cumulative impacts

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

When one considers the proposed prospecting activities in isolation, the potential impacts to identified heritage resources and the greater cultural landscape can be considered as low. This notwithstanding, consideration of surrounding active and proposed mining activities in the local study area and their cumulative effects on the cultural landscape may result in negative cumulative impacts. This is further compounded in the event that prospecting rights are converted into mining rights. Potential negative cumulative impacts may include:

- Additive cumulative impacts;
- Synergistic cumulative impacts;
- Space crowding cumulative impacts; and
- Time crowding cumulative impacts.

These are summarised Table 9-4.

**Table 9-4: Summary of Potential Cumulative Impacts**

| Type                                      | Cumulative Impact   | Direction of Change | Extent of Impact                |
|---|---|---------------------|---------------------------------|
| Additive<br>Space crowding                | Change to sense-of-place  | Negative            | Local & Regional                |
| Additive<br>Synergistic<br>Space crowding | Sterilisation of land of tangible heritage such as archaeological sites and consequently possible effect on the integrity of local intangible heritage, e.g. Langa and Boer histories, identity, research potential, etc. | Negative            | Site Specific, Local & Regional |
| Additive<br>Synergistic                   | Increased significance of remaining <i>in situ</i> archaeological sites and accumulations regardless of integrity   | Negative            | Site Specific, Local & Regional |



| Type                        | Cumulative Impact  | Direction of Change | Extent of Impact                  |
|-----------------------------|--|---------------------|-----------------------------------|
| Synergistic<br>Neutralising | Project activities will destroy certain archaeological resources, but appropriate mitigation of archaeological sites could contribute to the understanding of the local, regional and national archaeological record | Positive            | Regional & National               |
| Time crowding               | Combined prospecting and mining activities from various developments will have a cumulative impact on tangible heritage resources in and around the site-specific study area that will remain <i>in situ</i> .       | Negative            | Resource specific & site specific |

## 9.4 Low risk and unplanned events

Unplanned events may occur on any project at any time. Based on the proposed project activities, potential unplanned events and the associated impacts and management measures have been identified and summarised in Table 9-5 below.

**Table 9-5: 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 34 to 36 of the NHRA | Project specific Chance Finds Protocols (CFPs) must be developed that clearly describes the reporting process and appropriate management of the exposure of previously unidentified heritage resources. And be included in the approved EMP as a condition of authorisation<br><br>The established and defined CFPs must be implemented prior to any development taking place as part of the prospecting activities |

## 10 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 10-1 and Table 10-2.

**Table 10-1: Impacts to be mitigated**

| Activity   | Aspects Affected | Phase         | Size and Scale of Disturbance     | Mitigation Measure  | Compliance with Standards | Time Period for Implementation |
|--|------------------|---------------|-----------------------------------|---|---------------------------|--------------------------------|
| Site clearance and topsoil removal prior to the commencement of physical construction activities | Heritage         | Establishment | 400 m <sup>2</sup><br>(0.04 ha)   | Avoid through abandoning prospecting locations 3B, 4A, 4D & 4E.   | NHRA Section 35           | Prior to establishment phase   |
|  |                  |               | 1 100 m <sup>2</sup><br>(0.11 ha) | Mitigate through developing project specific CFPs for prospecting locations 1D, 1E, 2A, 2B, 2D, 2E, 3C, 3D, 4B, 4C, & 5C ( <i>Previously disturbed areas</i> )<br>The CFPs must clearly describe the reporting process and appropriate management of the exposure of previously unidentified heritage resources. The CFPs must be included into the EMP as a condition of authorisation<br>The CFPs must be developed prior to any development taking place and implemented as required during prospecting activities | NHRA Section 35 & 36      |                                |
|  |                  |               | 900 m <sup>2</sup><br>(0.09 ha)   | Mitigate through implementing a Watching Brief (i.e. on-site monitoring) during the establishment phase for prospecting locations 1A,1B, 1C, 2C, 3A, 3E, 5A, 5B & 5E.<br>The Watching Brief will entail the presence on site of a qualified and accredited archaeologist during the establishment phase to monitor, record and guide operations to reduce possible negative impacts to previously unrecorded and / or subsurface tangible heritage resources.   |                           |                                |

**Table 10-2: Outcomes and objectives of the EMP**

| Activity   | Potential Impact   | Aspects Affected | Phase         | Mitigation Type   | Standards to be Achieved |
|--|--|------------------|---------------|---|--------------------------|
| Site clearance and topsoil removal prior to the commencement of physical construction activities | Damage and / or destruction of LFC stonewalled settlements                       | Heritage         | Establishment | Avoid through abandoning drill locations – 3B, 4A, 4D & 4E  | NHRA Section 35          |
|  | Damage and / or destruction of archaeological sites or burial grounds and graves |                  |               | Mitigate through developing project specific CFPs for prospecting locations 1D, 1E, 2A, 2B, 2D, 2E, 3C, 3D, 4B, 4C, & 5C ( <i>Previously disturbed areas</i> )<br>The CFPs must clearly describe the reporting process and appropriate management of the exposure of previously unidentified heritage resources. The CFPs must be included into the EMP as a condition of authorisation<br>The CFPs must be developed prior to any development taking place and implemented as required during prospecting activities | NHRA Section 35 & 36     |

| Activity | Potential Impact | Aspects Affected | Phase | Mitigation Type  | Standards to be Achieved |
|----------|------------------|------------------|-------|--|--------------------------|
|          |                  |                  |       | <p>Mitigate through implementing a Watching Brief (i.e. on-site monitoring) during the establishment phase for prospecting locations 1A,1B, 1C, 2C, 3A, 3E, 5A, 5B &amp; 5E.</p> <p>The Watching Brief will entail the presence on site of a qualified and accredited archaeologist during the establishment phase to monitor, record and guide operations to reduce possible negative impacts to previously unrecorded and / or subsurface tangible heritage resources.</p> |                          |

## 11 Recommendations and conclusion

The baseline results reported in this HBAR demonstrated that the proposed PRA study area has little to negligible evidence for palaeontological sensitivity, but that the cultural landscape in general is sensitive and comprised of diverse heritage resources. The most significant identified heritage resources that were identified included archaeological LFC stonewalled sites associated with the Langa Ndebele history and burial grounds and graves.

However, when considered on an individual proposed borehole level, heritage impacts are generally very low, with the exception of a few cases. It is therefore recommended that the PRA be considered and approved from of a heritage resources point of view provided that the management and mitigation measures contained in this report are implemented. This includes:

- Abandonment of prospecting locations 3B, 4A, 4D & 4E to avoid any potential direct impacts to LFC stonewalled settlements with a high CS in accordance with the recommended mitigation measures outlined in the SAHRA minimum standards (SAHRA, 2007);
- Development and implementation of project specific CFPs as a condition of authorisation that at a minimum include:
  - Definitions as defined by Section 2 and 38(1) of the NHRA;
  - Proactive archaeological monitoring procedures;
  - 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;
- Undertaking of a Watching Brief (i.e. on-site monitoring) by a qualified and accredited archaeologist during the Establishment Phase for prospecting locations 1A, 1B, 1C, 2C, 3A, 3E, 5A, 5B & 5E.



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Heritage Basic Assessment Report

Environmental Authorisation in Support of the Prospecting Right Application for Farms  
Groningen 779 LR and Inhambane 802 LR

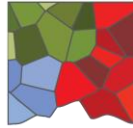
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**DIGBY WELLS**  
ENVIRONMENTAL

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## **Appendix A: Specialist CV**



# DIGBY WELLS

## ENVIRONMENTAL

Mr. Justin du Piesanie  
Heritage Management Consultant: Archaeologist  
Social Sciences Department  
Digby Wells Environmental

### 1 Education

| Date | Degree(s) or Diploma(s) obtained   | Institution                     |
|------|--|---------------------------------|
| 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                                |
|--------------------|---------------------------|---|
| 08/2011 to present | Digby Wells Environmental | Heritage Management Consultant: Archaeologist |

Digby Wells and Associates (South Africa) (Pty) Ltd (Subsidiary of Digby Wells & Associates (Pty) Ltd). Co. Reg. No. 2010/008577/07. Fern Isle, Section 10, 359 Pretoria Ave Randburg Private Bag X10046, Randburg, 2125, South Africa  
Tel: +27 11 789 9495, Fax: +27 11 789 9498, [info@digbywells.com](mailto:info@digbywells.com), [www.digbywells.com](http://www.digbywells.com)

Directors: A Sing\*, AR Wilke, DJ Otto, GB Beringer, LF Koeslag, AJ Reynolds (Chairman) (British)\*, J Leaver\*, GE Trusler (C.E.O)  
\*Non-Executive

| Period    | Company  | Title/position                  |
|-----------|--|---------------------------------|
| 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 Professional Affiliations

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

#### 5 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

#### 6 Experience

I have 5 years experiences in the field of heritage resources management (HRM) including archaeological and heritage assessments, grave relocation, social consultation and mitigation of archaeological sites. During my studies I was involved in academic research projects associated with the Stone Age, Iron Age, and Rock Art. These are summarised below:

- Wits Fieldschool - Excavation at Meyersdal, Klipriviersberg Johannesburg (Late Iron Age Settlement).
- Wits Fieldschool - Phase 1 Survey of Prentjiesberg in Ugie / Maclear area, Eastern Cape.
- Wits Fieldschool – Excavation at Kudu Kopje, Mapungubwe National Park Limpopo Province.

- Wits Fieldschool – Excavation of Weipe 508 (2229 AB 508) on farm Weipe, Limpopo Province.
- Survey at Meyerdal, Klipriviersberg Johannesburg.
- Mapping of Rock Art Engravings at Klipbak 1 & 2, Kalahari.
- Survey at Sonop Mines, Windsorton Northern Cape (Vaal Archaeological Research Unit).
- Excavation of Kudu Kopje, Mapungubwe National Park Limpopo Province.
- Excavation of KK (2229 AD 110), VK (2229 AD 109), VK2 (2229 AD 108) & Weipe 508 (2229 AB 508) (Origins of Mapungubwe Project)
- Phase 1 Survey of farms Venetia, Hamilton, Den Staat and Little Muck, Limpopo Province (Origins of Mapungubwe Project)
- Excavation of Canteen Kopje Stone Age site, Barkley West, Northern Cape
- Excavation of Khami Period site AB32 (2229 AB 32), Den Staat Farm, Limpopo Province

Since 2011 I have been actively involved in environmental management throughout Africa, focusing on heritage assessments in compliance with International Finance Corporation (IFC) Performance Standards and other World Bank Standards and Equator Principles. This exposure to environmental, and specifically heritage management has allowed me to work to international best practice standards in accordance with international conservation bodies such as UNESCO and ICOMOS. In addition, I have also been involved in the collection of quantitative data for a Relocation Action Plan (RAP) in Burkina Faso. The exposure to this aspect of environmental management has afforded me the opportunity to understand the significance of integration of various studies in the assessment of heritage resources and recommendations for feasible mitigation measures. I have worked throughout South Africa, as well as Burkina Faso, the Democratic Republic of Congo, Liberia and Mali.

## 7 Project Experience

Please see the following table for relevant project experience:



| Project Title  | Project Location   | Date:     | Description of the Project   | Role of Firm in the Project       | Own Role in the Project              | Time involved (man months) | Name of Client | Contract Outcomes                                 | Reference   |
|--|--|-----------|--|-----------------------------------|--------------------------------------|----------------------------|----------------|---|---|
| Klipriviersberg Archaeological Survey                  | Meyersdal, Gauteng, South Africa                         | 2005 2006 | Survey of residential development in Meyersdal. This included the recording of identified stone walled settlements through detailed mapping and photographs. Included was the Phase 2 Mitigation of two stone walled settlements | Archaeological Impact Assessments | Researcher, Archaeological Assistant | 2 Months                   |                | Completed survey, excavations and reporting       | Archaeological Resource Management (ARM)<br>Prof T.N. Huffman<br>thomas.huffman@wits.ac.za  |
| Sun City Archaeological Site Mapping                   | Sun City, Pilanesberg, North West Province, South Africa | 2006 2006 | Recording of an identified Late Iron Age stonewalled settlement through detailed mapping   | Mapping                           | Archaeological Assistant, Mapper     | 1 Month                    | Sun City       | Completed mapping                                 | Archaeological Resources Management (ARM)<br>Prof T.N. Huffman<br>thomas.huffman@wits.ac.za |
| Witbank Dam Archaeological Impact Assessment           | Witbank, Mpumalanga, South Africa                        | 2007 2007 | Archaeological survey for proposed residential development at the Witbank dam  | Archaeological Impact Assessment  | Archaeological Assistant             | 1 Week                     |                | Completed Archaeological Impact Assessment report | Archaeological Resources Management (ARM)<br>Prof T.N. Huffman<br>thomas.huffman@wits.ac.za |
| Archaeological Assessment of Modderfontein AH Holdings | Johannesburg, Gauteng, South Africa                      | 2008 2008 | Archaeological survey and basic assessment of Modderfontein Holdings   | Archaeological Impact Assessment  | Archaeologist                        | 1 Month                    |                | Completed the assessment of 13 properties         | Heritage Contracts Unit<br>Jaco van der Walt<br>jaco.heritage@gmail.com                     |
| Heritage Assessment of Rhino Mines                     | Thabazimbi, Limpopo Province, South Africa               | 2008 2008 | Heritage Assessment for expansion of mining area at Rhino Mines  | Heritage Impact Assessment        | Archaeologist                        | 2 Weeks                    | Rhino Mines    | Completed the assessment                          | Archaeological Resources Management (ARM)<br>Prof T.N. Huffman<br>thomas.huffman@wits.ac.za |
| Cronimet Project                                       | Thabazimbi, Limpopo Province, South Africa               | 2008 2008 | Archaeological survey of Moddergat 389 KQ, Schilpadnest 385 KQ, and Swartkop 369 KQ,   | Archaeological Impact Assessment  | Archaeologist                        | 1 Weeks                    | Cronimet       | Completed field survey and reporting              | Heritage Contracts Unit<br>Jaco van der Walt<br>jaco.heritage@gmail.com                     |





| Project Title   | Project Location                     | Date:     | Description of the Project  | Role of Firm in the Project      | Own Role in the Project | Time involved (man months) | Name of Client                  | Contract Outcomes                | Reference   |
|---|--------------------------------------|-----------|---|----------------------------------|-------------------------|----------------------------|---------------------------------|----------------------------------|---|
| Eskom Thohoyandou SEA Project                             | Limpopo Province, South Africa       | 2008 2008 | Heritage Statement defining the cultural landscape of the Limpopo Province to assist in establishing sensitive receptors for the Eskom Thohoyadou SEA Project | Heritage Statement               | Archaeologist           | 2 Months                   | Eskom                           | Completed Heritage Statement     | Heritage Contracts Unit<br>Jaco van der Walt<br>jaco.heritage@gmail.com                     |
| Wenzelrust Excavations                                    | Shoshanguve, Gauteng, South Africa   | 2009 2009 | Contracted by the Heritage Contracts Unit to help facilitate the Phase 2 excavations of a Late Iron Age / historical site identified in Shoshanguve           | Excavation and Mapping           | Archaeologist           | 1 Week                     | Heritage Contracts Unit         | Completed excavations            | Heritage Contracts Unit<br>Jaco van der Walt<br>jaco.heritage@gmail.com                     |
| University of the Witwatersrand Parys LIA Shelter Project | Parys, Free State, South Africa      | 2009 2009 | Mapping of a Late Iron Age rock shelter being studied by the Archaeology Department of the University of the Witwatersrand                                    | Mapping                          | Archaeologist           | 1 Day                      | University of the Witwatersrand | Completed mapping of the shelter | University of the Witwatersrand<br>Karim Sadr<br>karim.sadr@wits.ac.za                      |
| Transnet NMPP Line  | Kwa-Zulu Natal, South Africa         | 2010 2010 | Heritage Survey of the Anglo-Boer War Vaalkrans Battlefield where the servitude of the NMP pipeline   | Heritage Impact Assessment       | Archaeologist           | 1 Week                     | Umlando Consultants             | Completed survey                 | Umlando Consultants<br>Gavin Anderson<br>umlando@gmail.com                                  |
| Archaeological Impact Assessment – Witpoortjie Project    | Johannesburg, Gauteng, South Africa  | 2010 2010 | Heritage survey of Witpoortjie 254 IQ, Mindale Ext 7 and Nooitgedacht 534 IQ for residential development project  | Archaeological Impact Assessment | Archaeologist           | 1 Week                     | ARM                             | Completed survey for the AIA     | Archaeological Resources Management (ARM)<br>Prof T.N. Huffman<br>thomas.huffman@wits.ac.za |
| Der Brochen Excavations                                   | Steelpoort, Mpumalanga, South Africa | 2010 2010 | Phase 2 archaeological excavations of Late Iron Age Site  | Archaeological Excavation        | Archaeologist           | 2 Weeks                    | Heritage Contracts Unit         | Completed excavations            | Heritage Contracts Unit<br>Jaco van der Walt<br>jaco.heritage@gmail.com                     |



| Project Title   | Project Location                                | Date:     | Description of the Project  | Role of Firm in the Project               | Own Role in the Project | Time involved (man months) | Name of Client                | Contract Outcomes                                  | Reference   |
|---|---|-----------|---|---|-------------------------|----------------------------|-------------------------------|--|---|
| De Brochen and Booyensdal Archaeology Project                           | Steelpoort, Mpumalanga, South Africa            | 2010 2010 | Mapping of archaeological sites 23, 26, 27, 28a & b on the Anglo Platinum Mines De Brochen and Booyensdal | Mapping                                   | Archaeologist           | 1 Week                     | Heritage Contracts Unit       | Completed Mapping                                  | Heritage Contracts Unit<br>Jaco van der Walt<br>jaco.heritage@gmail.com   |
| Eskom Thohoyandou Electricity Master Network                            | Limpopo Province, South Africa                  | 2010 2010 | Desktop study to identify heritage sensitivity of the Limpopo Province                                    | Desktop Study                             | Archaeologist           | 1 Month                    | Strategic Environmental Focus | Completed Report                                   | Strategic Environmental Focus (SEF)<br>Vici Napier<br>vici@sefsa.co.za    |
| Bathako Mine Expansion  | North-West Province, South Africa               | 2010 2010 | Mapping of historical sites located within the Bathako Mine Expansion Area                                | Mapping                                   | Archaeologist           | 1 Week                     | Heritage Contracts Unit       | Completed Mapping                                  | Heritage Contracts Unit<br>Jaco van der Walt<br>jaco.heritage@gmail.com   |
| Kibali Gold Project Grave Relocation Plan                               | Oriental Province, Democratic Republic of Congo | 2011 2013 | Implementation of the Grave Relocation Project for the Randgold Kibali Gold Project                       | Grave Relocation                          | Archaeologist           | 2 Years                    | Randgold Resources            | Successful relocation of approximately 3000 graves | Kibali Gold Mine<br>Cyrille Mutombo<br>Cyrille.c.mutombo@kibaligold.com   |
| Kibali Gold Hydro-Power Project   | Oriental Province, Democratic Republic of Congo | 2012 2014 | Assessment of 7 proposed hydro-power stations along the Kibali River                                      | ESIA                                      | Heritage Consultant     | 2 Years                    | Randgold Resources            | Completed Heritage Impact Assessment               | Randgold Resources<br>Charles Wells<br>Charles.wells@randgoldreources.com |
| Everest North Mining Project  | Steelpoort, Mpumalanga, South Africa            | 2012 2012 | Heritage Impact Assessment on the farm Vygenhoek  | EIA and EMP                               | Heritage Consultant     | 6 Months                   | Aquarius Resources            | Completed Heritage Impact Assessment               | Aquarius Resources  |
| Environmental Authorisation for the Gold One Geluksdal TSF and Pipeline | Gauteng, South Africa                           | 2012 2012 | Heritage impact Assessment for the proposed TSF and Pipeline of Geluksdal Mine                            | EIA and EMP                               | Heritage Consultant     | 4 Months                   | Gold One International        | Completed Heritage Impact Assessment               | Gold One International  |
| Platreef Burial Grounds and Graves Survey                               | Mokopane, Limpopo Province, South Africa        | 2012 2012 | Survey for Burial Grounds and Graves  | Burial Grounds and Graves Management Plan | Heritage Consultant     | 4 Months                   | Platreef Resources            | Project closed by client due to safety risks       | Platreef Resources<br>Gerick Mouton                                       |



| Project Title                               | Project Location                            | Date:     | Description of the Project  | Role of Firm in the Project | Own Role in the Project | Time involved (man months) | Name of Client       | Contract Outcomes   | Reference  |
|---|---|-----------|---|-----------------------------|-------------------------|----------------------------|----------------------|---|--|
| Resgen Boikarabelo Coal Mine                | Limpopo Province, South Africa              | 2012 2012 | Archaeological Excavation of identified sites   | Archaeological Excavation   | Heritage Consultant     | 4 Months                   | Resources Generation | Completed excavation and reporting, destruction permits approved                      | Resources Generation Louise Nicolai                        |
| Bokoni Platinum Road Watching Brief         | Burgersfort, Limpopo Province, South Africa | 2012 2012 | Watching brief for construction of new road   | Watching Brief              | Heritage Consultant     | 1 Week                     | Bokoni Platinum Mine | Completed watching brief, reviewed report   | Bokoni Platinum Mines (Pty) Ltd                            |
| SEGA Gold Mining Project                    | Burkina Faso                                | 2012 2013 | Socio Economic and Asset Survey   | RAP                         | Social Consultant       | 3 Months                   | Cluff Gold PLC       | Completed field survey and data collection  | Cluff Gold PLC   |
| SEGA Gold Mining Project                    | Burkina Faso                                | 2013 2013 | Specialist Review of Heritage Impact Assessment   | Reviewer                    | Heritage Consultant     | 1 Week                     | Cluff Gold PLC       | Reviewed specialist report and made appropriate recommendations                       | Cluff Gold PLC   |
| Consbrey and Harwar Collieries Project      | Breyton, Mpumalanga, South Africa           | 2013 2013 | Heritage Impact Assessment for the proposed Consbrey and Harwar Collieries                      | EIA and EMP                 | Heritage Consultant     | 2 Months                   | Msobo                | Completed Heritage Impact Assessments   | Msobo  |
| New Liberty Gold Project                    | Liberia                                     | 2013 2014 | Implementation of the Grave Relocation Project for the New Liberty Gold Project                 | Grave Relocation            | Heritage Consultant     | 5 Months                   | Aureus Mining        | Grave Relocation completed  | Aureus Mining  |
| Falea Uranium Mine Environmental Assessment | Falea, Mali                                 | 2013 2013 | Heritage Scoping for the proposed Falea Uranium Mine  | Environmental Assessment    | Heritage Consultant     | 2 Months                   | Rockgate Capital     | Completed scoping report and recommended further studies                              | Rockgate Capital   |
| Putu Iron Ore Mine Project                  | Petroken, Liberia                           | 2013 2014 | Heritage impact Assessment for the proposed Putu Iron Ore Mine, road extension and railway line | EIA and EMP                 | Heritage Consultant     | 6 Months                   | Atkins Limited       | Completed Heritage Impact Assessment and provided recommendations for further studies | Atkins Limited<br>Irene Bopp<br>Irene.Bopp@atkinglobal.com |



| Project Title   | Project Location                                 | Date:     | Description of the Project  | Role of Firm in the Project | Own Role in the Project              | Time involved (man months) | Name of Client      | Contract Outcomes  | Reference   |
|---|--|-----------|---|-----------------------------|--------------------------------------|----------------------------|---------------------|--|---|
| Sasol Twistdraai Project                                | Secunda, Mpumalanga, South Africa                | 2013 2014 | Notification of intent to Develop and Heritage Statement for the Sasol Twistdraai Expansion     | NID                         | Heritage Consultant                  | 2 Months                   | ERM Southern Africa | Completed NID and Heritage Statement   | ERM Southern Africa<br>Alan Cochran<br>Alan.Cochran@erm.com             |
| Daleside Acetylene Gas Production Facility              | Gauteng, South Africa                            | 2013 2013 | Project Management of the heritage study  | NID                         | Project Manager                      | 3 Months                   | ERM Southern Africa | Project completed  | ERM Southern Africa<br>Kasantha Moodley<br>Kasantha.Moodley@erm.com     |
| Exxaro Belfast, Paardeplaats and Eerstelingsfontein GRP | Belfast, Mpumalanga, South Africa                | 2013 2014 | Grave Relocation Plan for the Belfast, Paardeplaats and Eerstelingsfontein Projects             | GRP                         | Project Manager, Heritage Consultant | 2 Years                    | Exxaro              | Burial Grounds and Graves consultation complete and applications to authorities submitted for permitting | Exxaro<br>Johan van der Bijl<br>Johan.vanderbijl@exxaro.com             |
| Nzoro 2 Hydro Power Project                             | Orientele Province, Democratic Republic of Congo | 2014 2014 | Social consultation for the Relocation Action Plan component of the Nzoro 2 Hydro Power Station | RAP                         | Social Consultant                    | 2 Months                   | Randgold Resources  | Completed introductory meetings – project has been placed on hold  | Kibali Gold Mine<br>Cyrille Mutombo<br>Cyrille.c.mutombo@kibaligold.com |
| Eastern Basin AMD Project                               | Springs, Gauteng, South Africa                   | 2014 2014 | Heritage Impact Assessment for the proposed new sludge storage facility and pipeline            | EIA and EMP                 | Heritage Consultant                  | 2 Months                   | AECOM               | Completed HIA and submitted to the authorities   | AECOM   |
| Soweto Cluster Reclamation Project                      | Soweto, Gauteng, South Africa                    | 2014 2014 | Heritage Impact Assessment for reclamation activities associated with the Soweto Cluster Dumps  | EIA and EMP                 | Heritage Consultant                  | 3 Months                   | ERGO                | Completed HIA and submitted to the authorities   | ERGO<br>Greg Ovens<br>greg.ovens@drdgold.com                            |
| Klipspruit South Project                                | Ogies, Mpumalanga, South Africa                  | 2014 2014 | NID and Heritage Statement for the Section 102 Amendment of the Klipspruit Mine EMP             | EIA and EMP                 | Heritage Consultant                  | 6 Months                   | BHP Billiton        | HIA finalised and submitted to the authorities   | BHP Billiton  |



| Project Title                             | Project Location                                 | Date:     | Description of the Project  | Role of Firm in the Project | Own Role in the Project | Time involved (man months) | Name of Client              | Contract Outcomes   | Reference  |
|---|--|-----------|---|-----------------------------|-------------------------|----------------------------|-----------------------------|---|--|
| Klipspruit Extension: Weltevreden Project | Ogies, Mpumalanga, South Africa                  | 2014 2014 | NID and Heritage Statement for the expansion of the Klipspruit Mine       | EIA and EMP                 | Heritage Consultant     | 6 Months                   | BHP Billiton                | HIA finalised and submitted to authorities                                | BHP Billiton   |
| Ergo Rondebult Pipeline Basic Assessment  | Johannesburg, South Africa                       | 2014 2014 | NID and Heritage Statement for the construction of the Rondebult Pipeline | BA                          | Heritage Consultant     | 1 Week                     | ERGO                        | Completed screening assessment and NID                                    | ERGO<br>Greg Ovens<br>greg.ovens@drdgold.com                               |
| Kibali ESIA Update Project                | Orientele Province, Democratic Republic of Congo | 2014 2014 | Update of the Kibali ESIA for the inclusion of new open-cast pit areas    | ESIA                        | Heritage Consultant     | 1 Month                    | Randgold Resources          | Completed heritage assessment and input into the ESIA                     | Randgold Resources<br>Charles Wells<br>Charles.wells@randgoldresources.com |
| GoldOne EMP Consolidation                 | Westonaria, Gauteng, South Africa                | 2014 2014 | Gap analysis for the EMP consolidation of operations west of Johannesburg | Gap Analysis                | Heritage Consultant     | 1 Month                    | Gold One International      | Gap analysis complete and proposed way forward submitted                  | Gold One International   |
| Yzermite PIA                              | Wakkerstroom, Mpumalanga, South Africa           | 2014 2014 | Palaeontological Assessment for the Yzermite Project                      | PIA                         | Project Management      | 1 Month                    | EcoPartners                 | Completed report and submitted to authorities                             | EcoPartners<br>San Oosthuizen<br>san@ecopartners.co.za                     |
| Sasol Mooikraal Basic Assessment          | Sasolburg, Free State, South Africa              | 2014 2014 | Heritage Basic Assessment for the proposed Mooikraal Pipeline             | HBA                         | Heritage Consultant     | 4 Months                   | Sasol Mining                | Completed Heritage Basic Assessment and submitted to the authorities      |  |
| Everest North Mining Project              | Steelpoort, Mpumalanga, South Africa             | 2012 2015 | EIA and EMP for the Aquarius Everest North Mining Project                 | EIA and EMP                 | Project Manager         | 1 Year                     | Aquarius Resources          | EIA and EMP amended and submitted to authorities. Authorisation received. | Aquarius Resources<br>Robyn Mellett<br>Robyn.Mellett@aquariussa.co.za      |
| Oakleaf ESIA Project                      | Bronkhorstspuit, Gauteng, South Africa           | 2014 2015 | Heritage impact Assessment for the Oakleaf Project                        | EIA and EMP                 | Heritage Consultant     | 4 Months                   | Oakleaf Investment Holdings | HIA report finalised and submitted to the authorities                     |  |



| Project Title   | Project Location                    | Date:     | Description of the Project   | Role of Firm in the Project | Own Role in the Project | Time involved (man months) | Name of Client  | Contract Outcomes                                     | Reference   |
|---|-------------------------------------|-----------|--|-----------------------------|-------------------------|----------------------------|---|---|---|
| Rea Vaya Phase II C Project                               | Johannesburg, Gauteng, South Africa | 2014 2014 | Heritage Impact Assessment on 2 structures along Rea Vaya Routing        | HIA                         | Project Manager         | 1 year                     | Iliso Consulting  | HIA report finalised and submitted to the authorities | Iliso Consulting  |
| NTEM Iron Ore Mine and Pipeline Project                   | Cameroon                            | 2014 2015 | Review of Heritage Impact Assessment for the NTEM ESIA                   | EIA and EMP                 | Specialist Reviewer     | 1 Month                    | International Mining and Infrastructure Corporation plc | Specialist reports reviewed and comments provided     |   |
| Imvula Project  | Kriel, Mpumalanga, South Africa     | 2014 2015 | Heritage Scoping Report for Imvula EIA                                   | EIA and EMP                 | Heritage Consultant     | 1 Year 4 Months            | Ixia Coal   | Project completed and submitted                       |   |
| Sibanye WRTRP   | Gauteng, South Africa               | 2014 2016 | Heritage Impact Assessment for the Sibanye WRTRP                         | EIA and EMP                 | Heritage Consultant     | On-going                   | Sibanye   | Project is on-going                                   |   |
| VMIC Vanadium EIA Project                                 | Mokopane, Limpopo, South Africa     | 2014 2015 | Heritage Impact Assessment for the Vanadium Project                      | EIA and EMP                 | Heritage Consultant     | 1 Year                     | VM Investment Company                                   | HIA report finalised and submitted to the authorities |   |
| NLGM Constructed Wetlands Project                         | Liberia                             | 2015 2015 | Heritage Assessment for the proposed constructed wetlands                | HIA                         | Heritage Consultant     | 1 Month                    | Aureus Mining   | HIA report finalised and submitted                    |   |
| ERPM Section 34 Destruction Permits Applications          | Johannesburg, Gauteng, South Africa | 2015 2015 | Section 34 Destruction Permit Applications for the SEV and Cason Shafts  | HIA and S.34 Applications   | Project Manager         | 4 Months                   | Ergo Mining   | Application submitted and permits received            | Ergo Mining<br>Greg Ovens<br><a href="mailto:greg.ovens@drdgold.com">greg.ovens@drdgold.com</a>   |
| JMEP II EIA   | Botswana                            | 2015 2015 | Heritage Impact Assessment for the JMEP II Wellfields                    | HIA                         | Heritage Consultant     | 2 Months                   | Jindal  | HIA completed and submitted to authorities            |   |
| Gino's Building Section 34 Destruction Permit Application | Johannesburg, Gauteng, South Africa | 2015 2016 | Heritage Impact Assessment and Section 34 Destruction Permit Application | HIA and S. 34 Applications  | Project Manager         | On-going                   | Bigen Africa Services (Pty) Ltd                         | Project is on-going                                   | Bigen Africa Services (Pty) Ltd<br>Kamantha Veerasamy<br><a href="mailto:Kamantha.Veerasamy@bigenafrica.com">Kamantha.Veerasamy@bigenafrica.com</a> |
| EDC Block Refurbishment Project                           | Johannesburg, Gauteng, South Africa | 2015 2016 | Heritage Impact Assessment and Section 34 Permit Application             | HIA and S. 34 Applications  | Project Manager         | On-going                   | Bigen Africa Services (Pty) Ltd                         | Project is on-going                                   | Bigen Africa Services (Pty) Ltd<br>Taka Sande<br><a href="mailto:Taka.Sande@bigenafrica.com">Taka.Sande@bigenafrica.com</a>                         |



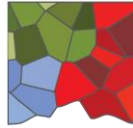
| Project Title                              | Project Location                            | Date:     | Description of the Project | Role of Firm in the Project | Own Role in the Project | Time involved (man months) | Name of Client             | Contract Outcomes   | Reference |
|--|---|-----------|----------------------------|-----------------------------|-------------------------|----------------------------|----------------------------|---------------------|-----------|
| Namane IPP and Transmission Line EIA       | Steenbokpan, Limpopo Province, South Africa | 2015 2016 | Heritage Impact Assessment | EIA and EMP                 | Heritage Consultant     | On-going                   | Namane Resources (Pty) Ltd | Project is on-going |           |
| Temo Coal Road Diversion and Rail Loop EIA | Steenbokpan, Limpopo Province, South Africa | 2015 2016 | Heritage Impact Assessment | EIA and EMP                 | Heritage Consultant     | On-going                   | Namane Resources (Pty) Ltd | Project is on-going |           |





DIGBY WELLS  
ENVIRONMENTAL





# DIGBY WELLS

## ENVIRONMENTAL

Mr Johan Nel

Unit manager: Heritage Resources Management

Social Sciences

Digby Wells Environmental

### 1 Education

| Date | Degree(s) or Diploma(s) obtained                                  | Institution            |
|------|---|------------------------|
| 2014 | Integrated Heritage Resources Management Certificate, NQF Level 6 | Rhodes University      |
| 2002 | BA (Honours) (Archaeology)  | University of Pretoria |
| 2001 | BA  | University of Pretoria |
| 1997 | Matric with exemption   | Brandwag Hoërskool     |

### 2 Language Skills

| Language  | Speaking  | Writing   | Reading   |
|-----------|-----------|-----------|-----------|
| English   | Excellent | Excellent | Excellent |
| Afrikaans | Excellent | Excellent | Excellent |

### 3 Employment

| Period               | Company                             | Title/position                              |
|----------------------|-------------------------------------|---|
| 2009/2011 to present | Digby Wells Environmental           | Manager: Heritage Resources Management unit |
| 2005/2010-2011       | Digby Wells Environmental           | Archaeologist                               |
| 2010/2005-2005/2010  | Archaic Heritage Project Management | Manager and co-owner                        |
| 2003-2007            |                                     | Freelance archaeologist                     |

|           |   |                                    |
|-----------|---|------------------------------------|
|           | Rock Art Mapping Project  | Resident archaeologist             |
| 2002-2003 | Department of Anatomy, University of Pretoria                                     | Special assistant:<br>Anthropology |
| 2001-2002 | Department of Anatomy, University of Pretoria                                     | Technical assistant                |
| 1999-2001 | National Cultural History Museum & Department of Anthropology and Archaeology, UP | Assistant: Mapungubwe Project      |

## 4 Experience

Johan Nel has 13 years of combined experience in the field of cultural heritage resources management (HRM) including archaeological and heritage assessments, grave relocation, social consultation and mitigation of archaeological sites. I have gained experience both within urban settings and remote rural landscapes. Since 2010 I have been actively involved in environmental management that has allowed me to investigate and implement the integration of heritage resources management into environmental impact assessments (EIA). Many of the projects since have required compliance with International Finance Corporation (IFC) requirements and other World Bank standards. This exposure has allowed me to develop and implement a HRM approach that is founded on international best practice and leading international conservation bodies such as UNESCO and ICOMOS. I have worked in most South African Provinces, as well as Swaziland, the Democratic Republic of the Congo, Liberia and Sierra Leone. I am fluent in English and Afrikaans, with excellent writing and research skills.

## 5 Project Experience

### 5.1 Archaeological Surveys and Impact Assessments

2003-2004. Freelance consulting archaeologist. Roodt & Roodt CC. RSA. Archaeological surveys. Specialist.

2004-2005. Resident archaeologist Rock Art Mapping Project. University of KwaZulu-Natal. Kwazulu-Natal, RSA. Rock art mapping & recording. Specialist.

### 5.2 Archaeological Mitigation

2007. Archaeological investigation of Old Johannesburg Fort. Johannesburg Development Agency. Gauteng, RSA. Archaeological mitigation. Project manager.



2008. Final consolidated report: Watching Brief on Soutpansberg Road Site for the new Head Offices of the Department of Foreign Affairs, Pretoria Gauteng. Imbumba-Aganang D & C Joint Venture. Gauteng, RSA. Watching Brief. Project manager.
2011. Sessenge archaeological site mitigation. Randgold Resources. Doko, DRC. Archaeological mitigation. Specialist.
2011. Mitigation of three sites, Koidu Kimberlite Project. Koidu Holdings SA. Koidu, Sierra Leone. Archaeological mitigation. Project manager.
2012. Boikarabelo Phase 2 Mitigation of Archaeological Sites. Ledjadja Coal (Pty) Ltd. Limpopo, RSA. Archaeological permitting and mitigation. Project manager.
2012. Additional Archaeology Mitigation of Sites. Ledjadja Coal (Pty) Ltd. Limpopo, RSA. Archaeological permitting and mitigation. Project manager.
2013. Archaeological Excavations of Old Well, Rhodes University, Grahamstown. Rhodes University. Eastern Cape, RSA. Archaeological mitigation. Specialist.
2014. Archaeological Site Destruction. Ledjadja Coal (Pty) Ltd. Limpopo, RSA. Archaeological permitting and mitigation. Project manager.

### 5.3 Heritage Impact Assessments

2005. Final consolidated Heritage Impact Assessment report: Proposed development of high-cost housing and filling station, Portion of the farm Mooiplaats 147 JT. Go-Enviroscience. Mpumalanga, RSA. Heritage Impact Assessment. Project manager.
2006. Final report: Heritage resources Scoping survey and preliminary assessment for the Transnet Freight Line EIA, Eastern Cape and Northern Cape. ERM Southern Africa (Pty) Ltd. Northern & Eastern Cape, RSA. Heritage Scoping Assessment. Project manager.
2007. Proposed road upgrade of existing, and construction of new roads in Burgersfort, Limpopo Province. AGES South Africa (Polokwane). Limpopo, RSA. Heritage Impact Assessment. Project manager.
2007. Recommendation of Exemption: Above-ground SASOL fuel storage tanks located at grain silos in localities in the Eastern Free State. Sasol Group Services (Pty) Ltd. Free State, RSA. Letter of Exemption. Project manager.
2008. Summary report: Old dump on premises of the new Head Offices, Department of Foreign Affairs, Pretoria, Gauteng. Imbumba-Aganang D & C Joint Venture. Gauteng, RSA. Archaeological Impact Assessment. Project manager.
2008. Van Reenen Eco-Agri Development Project. Go-Enviroscience. Kwazulu-Natal & Free State, RSA. Heritage Impact Assessment. Project manager.



2008. Heritage Impact Assessment for proposed water pipeline routes, Mogalakwena District, Limpopo Province. AGES South Africa (Polokwane). Limpopo, RSA. Heritage Impact Assessment. Project manager.
2008. Phase 1 Heritage and Archaeological Impact Assessment: Proposed establishment of an access road between Sapekoe Drive and Koedoe Street, Erf 3366 (Extension 22) and the Remainder of Erf 430 (Extension 4). AGES South Africa (Polokwane). Limpopo, RSA. Heritage Impact Assessment. Project manager.
2008. Heritage resources scoping survey and preliminary assessment: Proposed establishment of township on Portion 28 of the farm Kennedy's Vale 362 KT, Steelpoort, Limpopo Province. AGES South Africa (Polokwane). Limpopo, RSA. Heritage Scoping Assessment. Project manager.
2008. Randwater Vlakfontein-Mamelodi water pipeline survey. Archaeology Africa CC. Gauteng, RSA. Heritage Impact Assessment. Specialist.
2010. Heritage Impact Assessment for conversion of PR to MRA. Georock Environmental. Northwest, RSA. Heritage Impact Assessment. Project manager.
2010. Temo Coal Project. Namane Commodities (Pty) Ltd. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2011. Marapong Treatment Works. Ceenex (Pty) Ltd. Limpopo, RSA. Archaeological Impact Assessment. Project manager.
2011. Complete Environmental Authorisation. Rhodium Reefs Ltd. Limpopo, RSA. Archaeological Impact Assessment. Specialist.
2011. Big 5 PV Solar Plants. Orlight (Pty) Ltd. Western and Northern Cape, RSA. Heritage Impact Assessment. Specialist.
2011. Heritage Impact Assessment for Koidu Diamond Mine. Koidu Holdings SA. Koidu, Sierra Leone. Heritage Impact Assessment. Specialist.
2012. TSF and Pipeline. Gold One. Gauteng, RSA. Heritage Impact Assessment. Project manager.
2012. Kangra Coal Heritage Screening Assessment. ERM Southern Africa (Pty) Ltd. Mpumalanga, RSA. Heritage Screening Assessment. Project manager.
2012. Environmental and Social Studies. Platreef Resources (Pty) Ltd. Limpopo, RSA. Heritage specialist advice. Project manager.
2012. ESKOM Powerline EIA. Ledjadja Coal (Pty) Ltd. Limpopo, RSA. Notification of Intent to Develop. Project manager.
2012. Falea Project ESIA. Denison Mines Corp. (Rockgate Capital Corp). Falea, Mali. Heritage Impact Assessment. Specialist.



2012. EIA for Proposed Emergency Measures to Pump and Treat. AECOM SA (Pty) Ltd. Gauteng, RSA. Heritage Impact Assessment. Specialist.
2012. Tonguma Baseline Studies. Koidu Holdings SA. Tonguma, Sierra Leone. Heritage Impact Assessment. Specialist.
2012. Vedanta IPP. Black Mountain Mining (Pty) Ltd. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2012. Boikarabelo Railway Realignment. Ledjadja Coal (Pty) Ltd. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2012. Platreef ESIA. Platreef Resources (Pty) Ltd. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2012. Roodekop EIA. Universal Coal Development 4 (Pty) Ltd. Mpumalanga, RSA. Heritage Impact Assessment. Specialist.
2012. Kangala HIA. Universal Coal Development 1 (Pty) Ltd. Mpumalanga, RSA. Heritage Impact Assessment and permitting. Specialist.
2012. Roodepoort Strengthening. Eskom Holdings SOC Ltd. Gauteng, RSA. Notification of Intent to Develop. Specialist.
2012. Trichardtsfontein EIA / EMP. Xstrata Coal South Africa. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2012. Zandbaken EIA/EMPR. Xstrata Coal South Africa. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2013. ATCOM Tweefontein NID. Jones & Wagener (Pty) Ltd. Mpumalanga, RSA. Burial grounds and graves consultation, permitting and relocation. Project manager.
2013. Roodepoort Heritage Impact Assessment. Fourth Element Consulting (Pty) Ltd. Gauteng, RSA. Heritage Impact Assessment. Project manager.
2013. JHB BRT Phase 2 Heritage Impact Assessment. Iliso Consulting (Pty) Ltd. Gauteng, RSA. Heritage Impact Assessment. Project manager.
2013. Kangra Coal HIA. ERM Southern Africa (Pty) Ltd. Mpumalanga, RSA. Heritage Impact Assessment. Project manager.
2013. Slypsteen Bulk Sample Application. Summer Season Trading (Pty) Limited. Northern Cape, RSA. Heritage Impact Assessment. Project manager.
2013. Kempton Park Heritage Statement and NID. ERM Southern Africa (Pty) Ltd. Gauteng, RSA. Notification of Intent to Develop. Project manager.
2013. Sasol Twistdraai CFD. ERM Southern Africa (Pty) Ltd. Gauteng, RSA. Notification of Intent to Develop. Project manager.
2013. HRS & NID - River Crossings Upgrade. Iliso Consulting (Pty) Ltd. Gauteng, RSA. Notification of Intent to Develop. Project manager.



2013. Waterberg Prospecting Right Applications. Platinum Group Metals (Pty) Ltd. Limpopo, RSA. Notification of Intent to Develop. Project manager.
2013. Landau Waste Licence Application. Anglo Operations (Pty) Limited. Mpumalanga, RSA. Notification of Intent to Develop. Reviewer / specialist.
2013. Prospecting Right Consultation Report. Rustenburg Platinum Mines Limited. Mpumalanga, RSA. Notification of Intent to Develop. Reviewer / specialist.
2013. Witrand Prospecting EMP. Rustenburg Platinum Mines Limited. Mpumalanga, RSA. Notification of Intent to Develop. Reviewer / specialist.
2013. EMP Amendment for CST. Copper Sunset Trading (Pty) Ltd. Mpumalanga, RSA. Notification of Intent to Develop. Reviewer / specialist.
2013. Maseve IFC ESHIA. Maseve Investment (Pty) Ltd. Mpumalanga, RSA. Notification of Intent to Develop. Reviewer / specialist.
2013. Dalyshope ESIA. Anglo Operations (Pty) Limited. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2013. Klipfontein Opencast Project. Bokoni Platinum Mines (Pty) Ltd. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2013. Consbrey and Harwar MPRDA EIA/EMP. Msobo Coal (Pty) Ltd. Mpumalanga, RSA. Heritage Impact Assessment. Specialist.
2013. Slyphsteen 102 EMP Amendment. Summer Season Trading (Pty) Limited. Northern Cape, RSA. Heritage Impact Assessment. Specialist.
2013. Putu Iron Ore ESIA. Atkins Limited Incorporated. Putu, Liberia. Heritage Impact Assessment. Specialist.
2013. Ash backfilling at Sigma Colliery. Sasol Mining (Pty) Ltd. Gauteng, RSA. Notification of Intent to Develop. Specialist.
2013. Syferfontein Block 4 - Underground Coal Mining for Sasol. Sasol Mining (Pty) Ltd. Mpumalanga, RSA. Notification of Intent to Develop. Specialist.
2013. Prospecting Right Amendment to Include Bulk Sampling. Sikhuliso Resources (Pty) Ltd. Mpumalanga, RSA. Notification of Intent to Develop. Specialist.
2013. Nooitgedacht EIA, EMP Amendment & Gap Analysis. Xstrata Coal South Africa. Limpopo, RSA. Heritage Impact Assessment. Specialist.
2014. Gold One EMP Consolidation Phase 0. Gold One. Gauteng, RSA. Heritage Impact Assessment. Reviewer / specialist.
2014. Kilbarchan Audit and EIA. Eskom Holdings SOC Ltd. Kwazulu-Natal, RSA. Heritage Impact Assessment. Reviewer / specialist.



2014. Klipspruit Extension Environmental Assessment. BHP Billiton Energy Coal South Africa Limited. Mpumalanga, RSA. Heritage Impact Assessment. Reviewer / specialist.
2014. Klipspruit South BECSA EIA. BHP Billiton Energy Coal South Africa Limited. Mpumalanga, RSA. Heritage Impact Assessment. Reviewer / specialist.
2014. EIA/EMP Soweto Cluster. DRD GOLD ERGO (Ergo Mining (Pty) Ltd. Gauteng, RSA. Notification of Intent to Develop. Reviewer / specialist.
2014. London Road Heritage Statement. ERM Southern Africa (Pty) Ltd. Gauteng, RSA. Notification of Intent to Develop. Reviewer / specialist.
2014. Grootegeluk MPRDA, NEMA and IWULA. Exxaro Coal (Pty) Ltd. Limpopo, RSA. Notification of Intent to Develop. Reviewer / specialist.
2014. Kibali ESIA & EMP Update. Randgold Resources. Doko, DRC. Heritage Impact Assessment. Specialist.
2014. Nokuhle Colliery NEMA Process. HCI Coal (Pty) Ltd. Mpumalanga, RSA. Heritage Impact Assessment. Specialist.
2014. HRM Process for Hendrina Wet Ashing. Lidwala Consulting Engineers (Pty) Ltd. Mpumalanga, RSA. Heritage Impact Assessment. Specialist.
2014. Weltevreden NEMA. Northern Coal (Pty) Ltd. Mpumalanga, RSA. Heritage Impact Assessment. Specialist.
2014. Sasol Sigma Mooikraal Pipeline BA. Sasol Mining (Pty) Ltd. Mpumalanga, RSA. Notification of Intent to Develop. Specialist.

#### **5.4 Burial Grounds and Graves Consultation and Relocation**

2005. Report on exhumation, relocation and re-internment of 49 graves on Portion 10 of the farm Tygervallei 334 JR, Kungwini Municipality, Gauteng D Georgiades East Farm (Pty) Ltd. Gauteng, RSA. Burial grounds and graves consultation, permitting and relocation. Project manager.
2005. Southstock Collieries Grave Relocation. Doves Funerals, Witbank. Mpumalanga, RSA. Burial grounds and graves consultation, permitting and relocation. Project manager.
2005. Social consultation for Smoky Hills Platinum Mine Grave Relocation. PGS (Pty) Ltd. Limpopo, RSA. Stakeholder consultation on burial grounds and graves. Social consultant.
2005. Social consultation for Elawini Lifestyle Estate Grave Relocation. PGS (Pty) Ltd. Mpumalanga, RSA. Stakeholder consultation on burial grounds and graves. Social consultant.





2006. Social consultation for Zonkezizwe Grave Relocation. PGS (Pty) Ltd. Gauteng, RSA. Stakeholder consultation on burial grounds and graves. Social consultant.
2006. Social consultation for Motaganeng Residential Development Grave Relocation. PGS (Pty) Ltd. Mpumalanga, RSA. Stakeholder consultation on burial grounds and graves. Social consultant.
2006. Social consultation for Zondagskraal Coal Mine Grave (Pty) Ltd. Mpumalanga, RSA. Stakeholder consultation on burial grounds and graves. Social consultant.
2007. Exploratory excavation of an unknown cemetery at Du Preezhoek, Fountains Valley, Portion 383 of the farm Elandspoort 357 JR, Pretoria, Gauteng. Bombela Civil Joint Venture. Gauteng, RSA. Burial grounds and graves consultation, permitting and relocation. Project manager.
2007. Final consolidated report: Phase 2 test excavations ascertaining the existence of alleged mass graves, Tlhabane West, Extension 2, Rustenburg, Northwest Province. Bigen Africa Consulting Engineers. Northwest, RSA. Burial grounds and graves consultation, permitting and relocation. Project manager.
2007. Repatriation of Mapungubwe Human Remains. Department of Environmental Affairs and Tourism. Limpopo, RSA. Repatriation. Project manager.
2008. Report on skeletal material found at Pier 30, R21 Jones Street off-ramp, Kempton Park. Bombela Civil Joint Venture. Gauteng, RSA. Heritage Scoping Assessment. Project manager.
2011. Kibali Grave Relocation. Randgold Resources. Doko, DRC. International grave relocation. Specialist.
2012. Platreef Platinum Mine Burial Grounds and Graves Census. Platreef Resources (Pty) Ltd. Limpopo, RSA. Stakeholder consultation on burial grounds and graves. Project manager.
2013. New Liberty Grave Relocation Process. Aureus Mining Inc. Kinjor, Liberia. International grave relocation. Project manager.
2013. Bokoni Burial Grounds and Grave Census and Grave Relocation Plan. Bokoni Platinum Mines (Pty) Ltd. Limpopo, RSA. Stakeholder consultation on burial grounds and graves. Project manager.
2014. Arnot Colliery Grave Relocation Project. Exxaro Coal (Pty) Ltd. Mpumalanga, RSA. Burial grounds and graves consultation, permitting and relocation. Project manager.
2014. Paardeplaats and Belfast RAPs. Exxaro Coal (Pty) Ltd. Mpumalanga, RSA. Burial grounds and graves consultation, permitting and relocation. Reviewer / specialist.
2014. Thabametsi EIA, EMP, IWULA, IWWMP and PPP. Exxaro Coal (Pty) Ltd. Limpopo, RSA. Stakeholder consultation on burial grounds and graves. Specialist.

## 5.5 Research Reports and Reviews

2007. Research report on cultural symbols. Ministry of Intelligence Services. RSA. Research report. Project manager.
2007. Research report on the remains of kings Mampuru I and Nyabela. National Department of Arts and Culture. RSA. Research report. Project manager.
2012. Baseline Scoping and Pre-feasibility Songwe Rare Earth Element Project. Mkango Resources Limited. Songwe, Malawi. Heritage Impact Assessment. Reviewer / specialist.
2013. Fatal Flaw Analysis and EIA Process for AMD Man in Eastern Basin. AECOM SA (Pty) Ltd. Gauteng, RSA. Heritage Impact Assessment. Reviewer / specialist.

## 6 Professional Registration

| Position       | Professional Body  | Registration Number |
|----------------|--|---------------------|
| Council member | Association for Southern African Professional Archaeologists (ASAPA);<br>ASAPA Cultural Resources Management (CRM) section | 095                 |
| Member         | International Association of Impact Assessors (IAIA)   | N/A                 |
| Member         | International Council on Monuments and Sites (ICOMOS)  | 13839               |
| Member         | Society for Africanist Archaeologists (SAfA)   | N/A                 |

## 7 Publications

| Authors and Year | Title  | Published in/presented at   |
|------------------|--|---|
| Nel, J. (2001)   | Cycles of Initiation in Traditional South African Cultures.                        | South African Encyclopaedia (MWEB).   |
| Nel, J. 2001.    | Social Consultation: Networking Human Remains and a Social Consultation Case Study | Research poster presentations at the. Bi-annual Conference (SA3) Association of Southern African Professional Archaeologists the National Museum, Cape Town |



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|                          |  |   |
|--------------------------|--|---|
| Nel, J. 2002.            | Collections policy for the WG de Haas Anatomy museum and associated Collections.                                   | Unpublished. Department of Anatomy, School of Medicine: University of Pretoria.   |
| Nel, J. 2004.            | Research and design of exhibition for Eloff Belting and Equipment CC   | Institute of Quarrying 35th Conference and Exhibition on 24 – 27 March 2004   |
| Nel, J. 2004.            | Ritual and Symbolism in Archaeology, Does it exist?  | Research paper presented at the Bi-annual Conference (SA3) Association of Southern African Professional Archaeologists: Kimberley |
| Nel, J & Tiley, S. 2004. | The Archaeology of Mapungubwe: a World Heritage Site in the Central Limpopo Valley, Republic of South Africa.      | Archaeology World Report, (1) United Kingdom p.14-22.   |
| Nel, J. 2007.            | The Railway Code: Gautrain, NZASM and Heritage.  | Public lecture for the South African Archaeological Society, Transvaal Branch: Roedean School, Parktown.                          |
| Nel, J. 2009.            | Un-archaeologically speaking: the use, abuse and misuse of archaeology in popular culture.                         | The Digging Stick. April 2009. 26(1): 11-13: Johannesburg: The South African Archaeological Society.                              |
| Nel, J. 2011.            | 'Gods, Graves and Scholars' returning Mapungubwe human remains to their resting place.' In: Mapungubwe Remembered. | University of Pretoria commemorative publication: Johannesburg: Chris van Rensburg Publishers.                                    |
| Nel, J. 2012             | HIAs for EAPs.   | . Paper presented at IAIA annual conference: Somerset West.   |
| Nel, J. 2013.            | The Matrix: A proposed method to evaluate significance of, and change to, heritage resources.                      | Paper presented at the 2013 ASAPA Biennial conference: Gaborone, Botswana.  |
| Nel, J. 2013             | HRM and EMS: Uncomfortable fit or separate process.  | . Paper presented at the 2013 ASAPA Biennial conference:  |



Gaborone, Botswana.

Heritage Basic Assessment Report

Environmental Authorisation in Support of the Prospecting Right Application for Farms  
Groningen 779 LR and Inhambane 802 LR

AOL3685

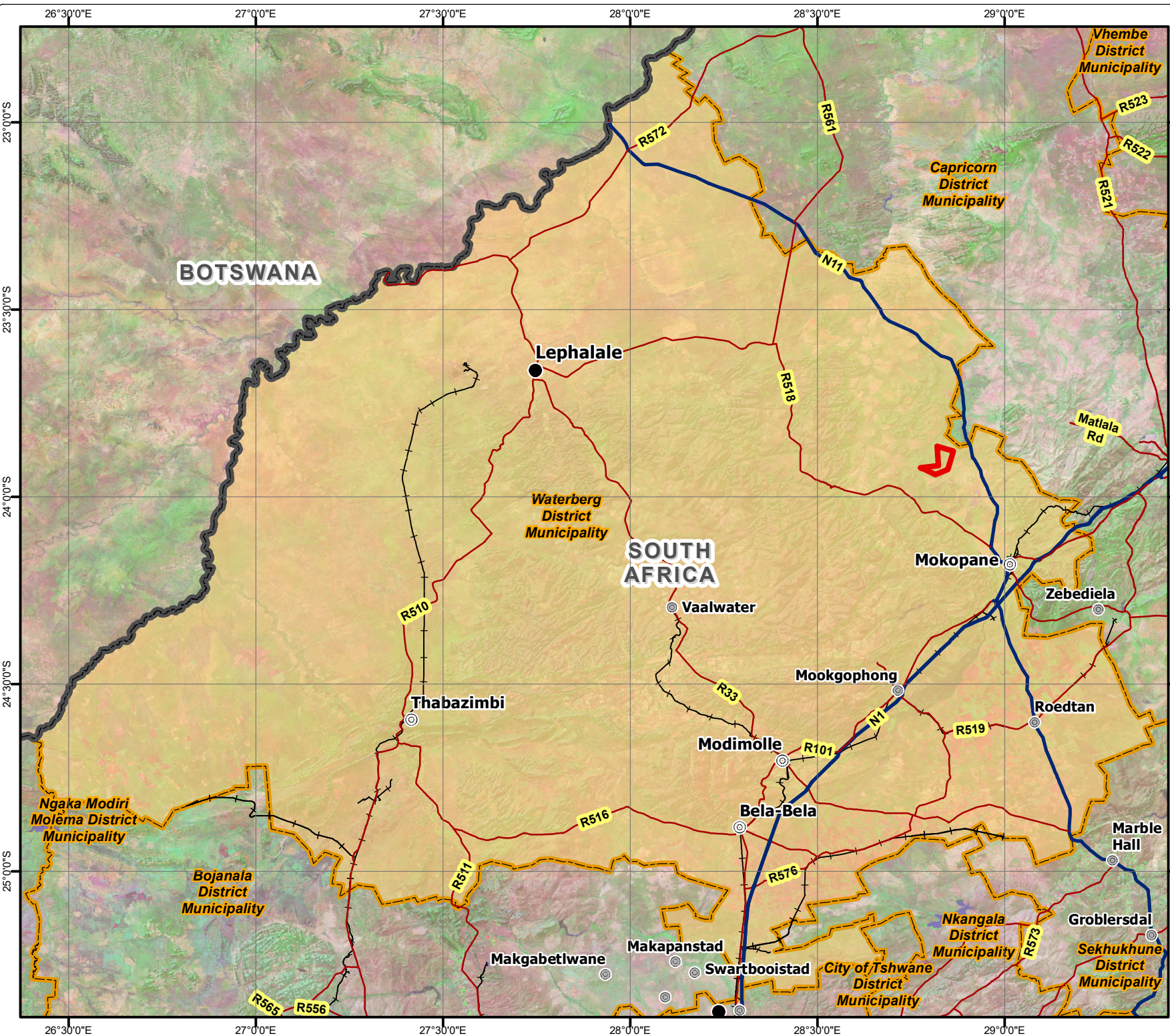


**DIGBY WELLS**  
ENVIRONMENTAL

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## Appendix B: Plans and site table















# Rustenburg Platinum Mines

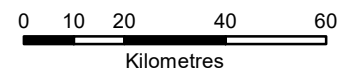
## Regional Study Area

### Legend

-  Project Area
-  Regional Study Area
-  Major Town
-  Secondary Town
-  Other Town
-  Main Road
-  National Road
-  Railway Line
-  International Boundary
-  District Municipal Boundary



Projection: Transverse Mercator  
 Datum: WGS 1984  
 Central Meridian: 29°E  
 Date: 21/04/2016  
 Ref #: kwt.AOL3685.201604.146
















# Rustenburg Platinum Mines

## Local Study Area

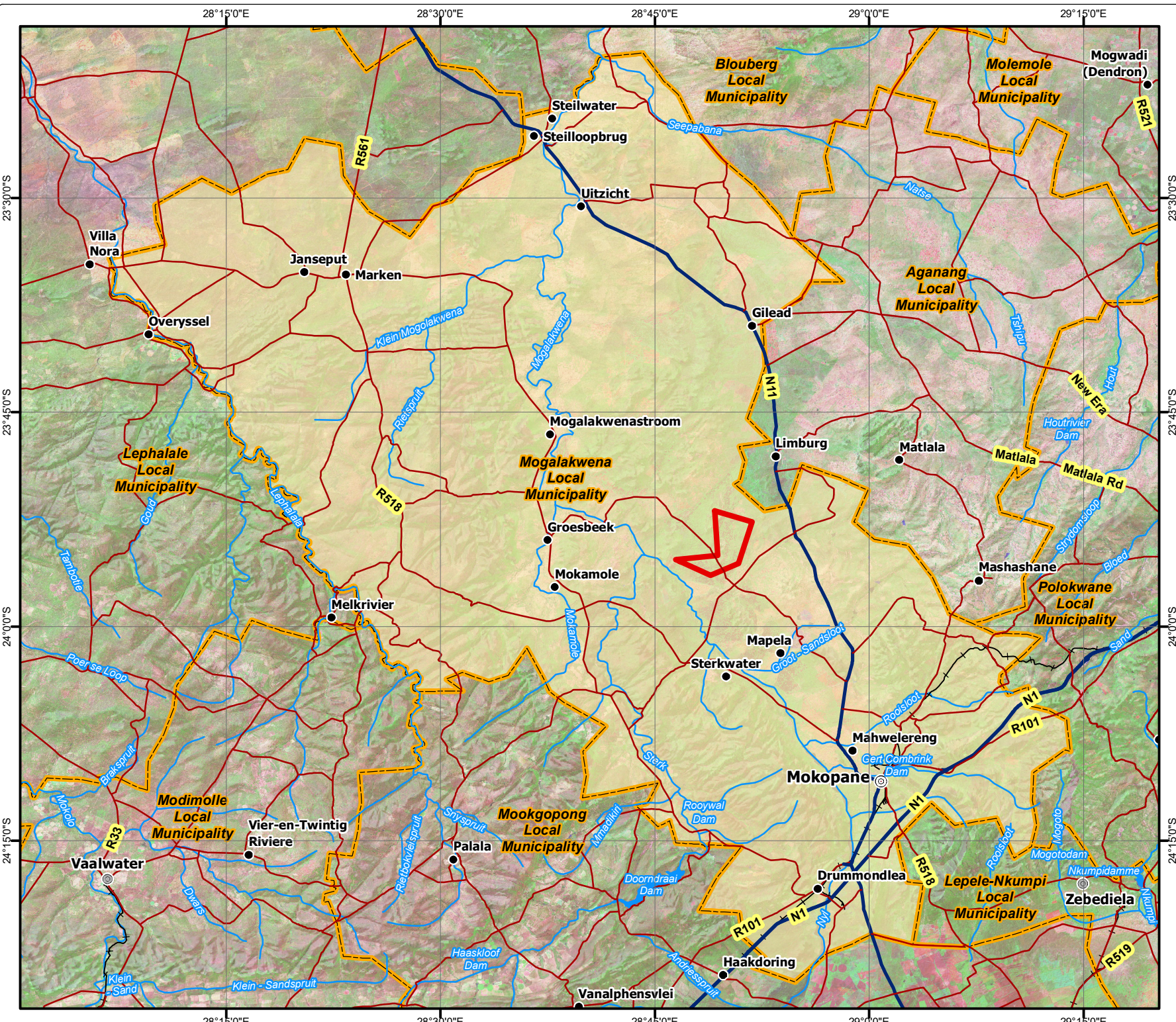
### Legend

-  Project Area
-  Local Study Area
-  Secondary Town
-  Other Town
-  Settlement
-  Main Road
-  National Road
-  Railway Line
-  River
-  Dam
-  Local Municipal Boundary

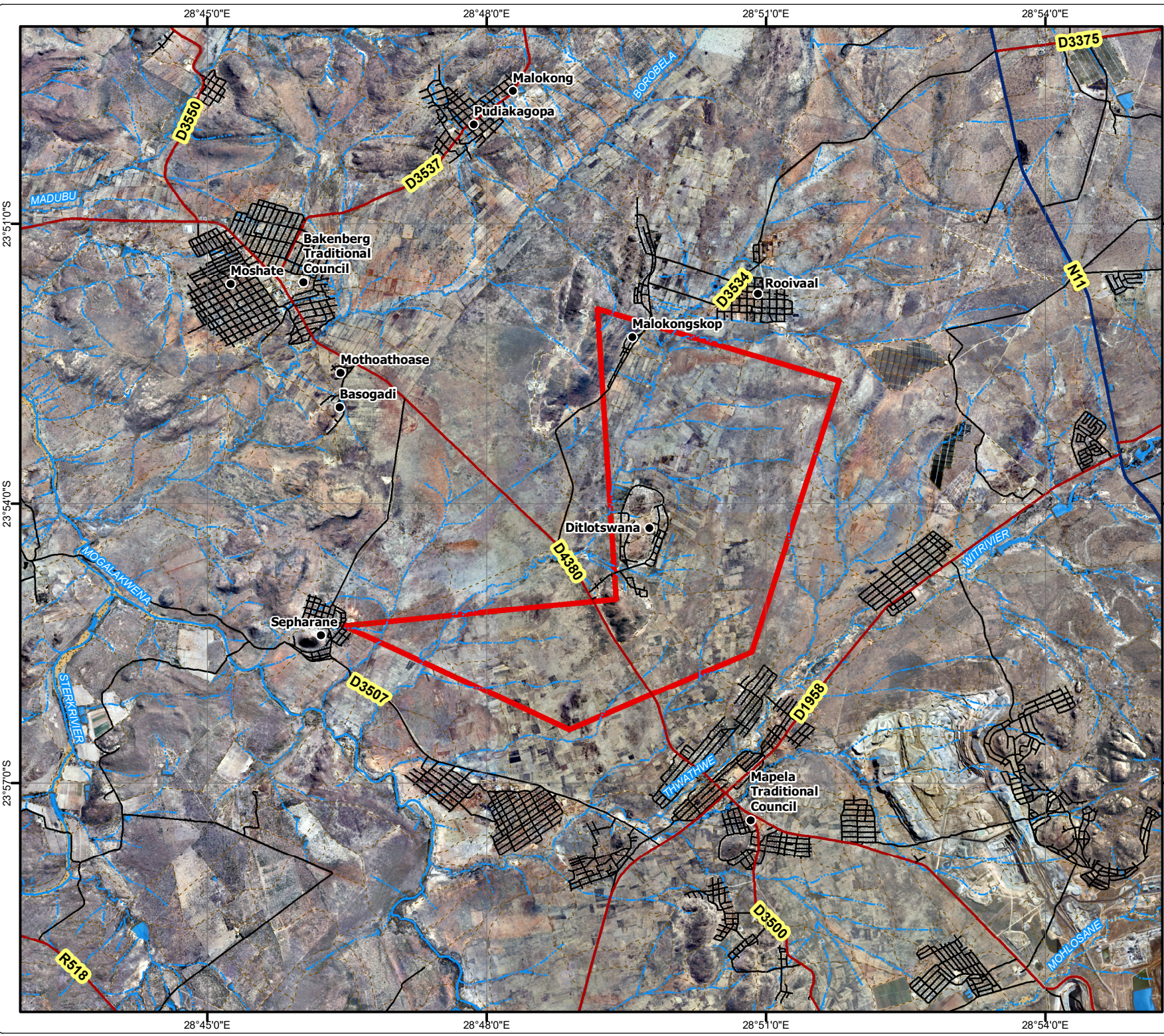


**DIGBY WELLS**  
ENVIRONMENTAL

Projection: Transverse Mercator  
Datum: WGS 1984  
Central Meridian: 29°E  
Date: 21/04/2016  
Ref #: kwt.AOL3685.201604.145







# Rustenburg Platinum Mines

## Site-Specific Study Area

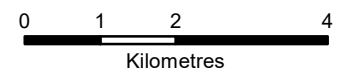
### Legend

- Project Area
- Settlement
- National / Arterial Route
- Main Road
- Minor Road
- Track
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam / Lake
- Non-Perennial Pan / Stream



**DIGBY WELLS**  
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Projection: Transverse Mercator  
 Datum: WGS 1984  
 Central Meridian: 29°E  
 Date: 21/04/2016  
 Ref #: kwt.AOL3685.201604.147








# Rustenburg Platinum Mines










## Regional Geology

### Legend

-  Project Area
-  National / Arterial Route
-  Main Road
-  Minor Road
-  Track
-  Dam Wall
-  Non-Perennial Stream
-  Perennial Stream
-  Dam / Lake

### Geology

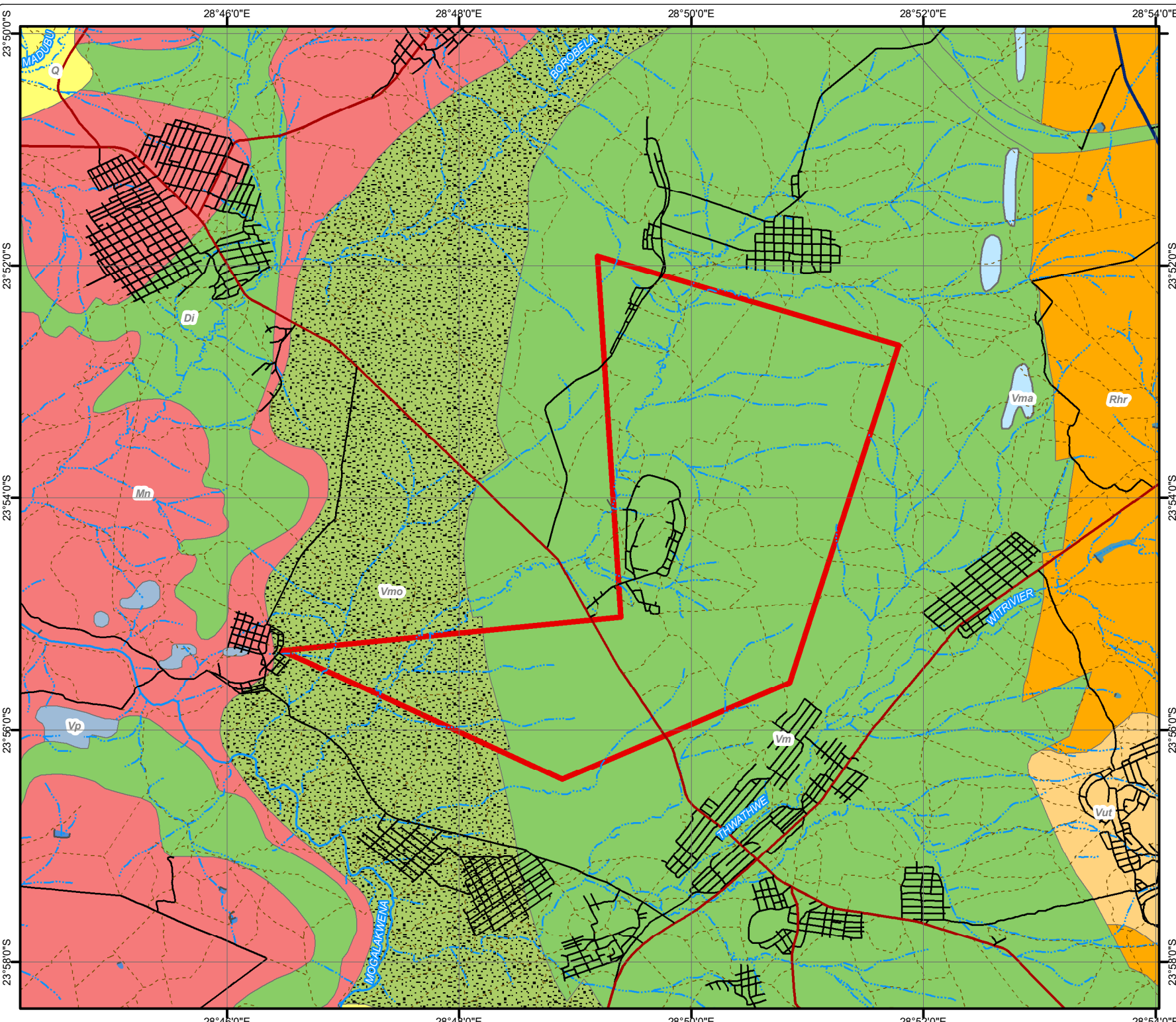
#### Type

-  Alluvium, Quaternary (Q)
-  Diabase, Mogolian (Di)
-  Chuniespoort Group (Vma)
-  Hout River Gneiss (Rhr)
-  Main zone, Rustenburg Layered Suite, Bushveld Complex (Vm)
-  Molendraai Magnetite Gabbro, Rustenburg Layered Suite, Bushveld Complex (Vmo)
-  Nebo-Granite, Lebowa Granite Suite, Bushveld Complex (Mn)
-  Pretoria Group (Vp)
-  Utrecht Granite (Vut)

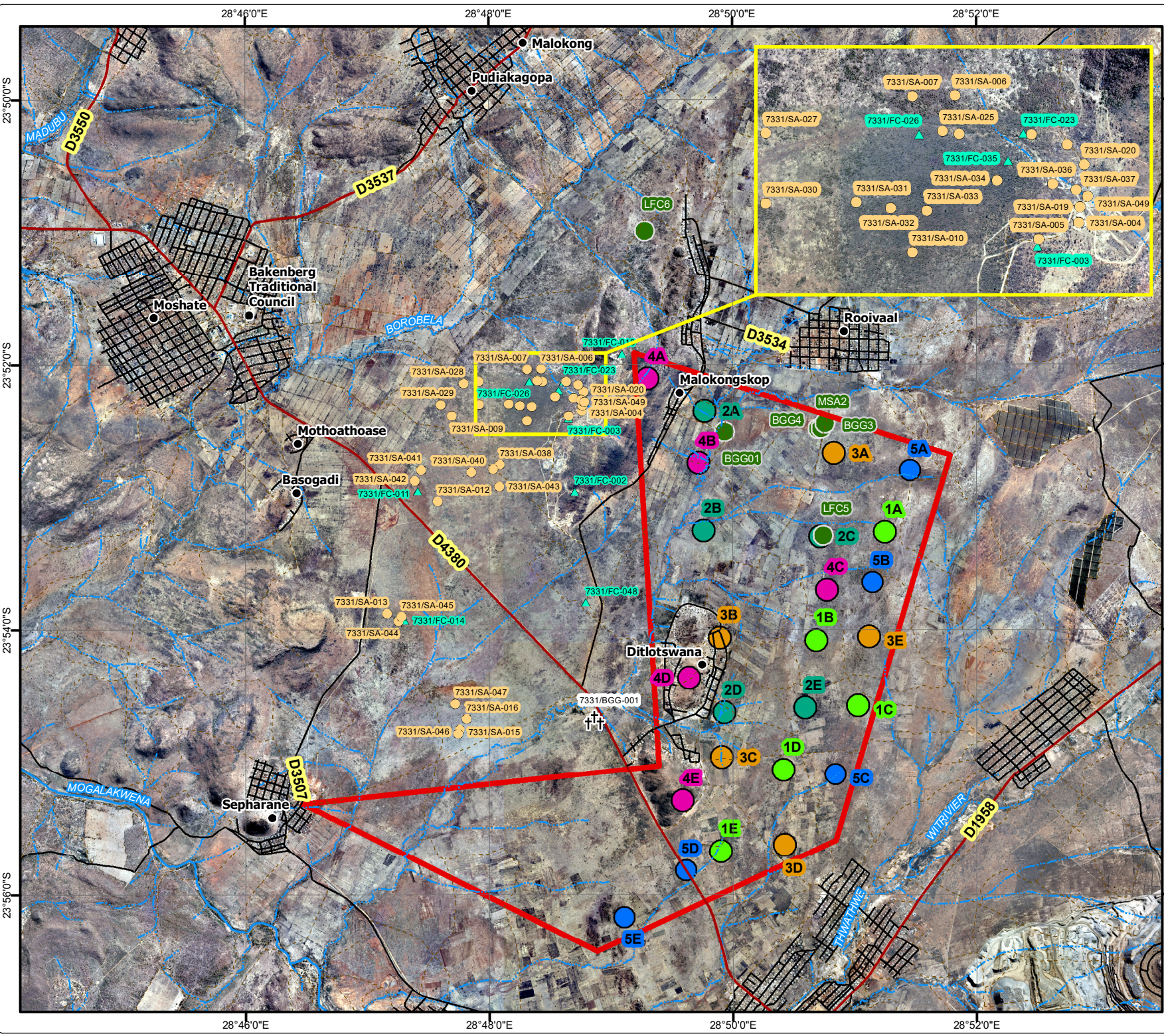


**DIGBY WELLS**  
ENVIRONMENTAL

Projection: Transverse Mercator  
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Central Meridian: 29°E  
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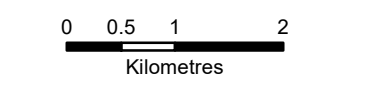
# Rustenburg Platinum Mines

## Identified Heritage Resources

- Legend**
- Project Area
  - Settlement
  - Road\_Labels
  - Main Road
  - Minor Road
  - Track
  - Dam Wall
  - Non-Perennial Stream
  - Perennial Stream
  - Dam / Lake
  - Pre-Disturbance Survey Points
- Identified Heritage Resource**
- ▲ Archaeological - LFC
  - Archaeological - MSA
  - †† Burial Grounds & Graves
- Prospecting Boreholes**
- Year 1
  - Year 2
  - Year 3
  - Year 4
  - Year 5



Projection: Transverse Mercator  
 Datum: WGS 1984  
 Central Meridian: 29°E  
 Date: 12/08/2016  
 Ref #: kwt.AOL3685.201608.048





| Identified heritage resources | Longitude  | Latitude  |
|-------------------------------|------------|-----------|
| <b>Archaeological - MSA</b>   |            |           |
| 7331/SA-004                   | -23.872497 | 28.81271  |
| 7331/SA-005                   | -23.873168 | 28.810916 |
| 7331/SA-006                   | -23.867225 | 28.807158 |
| 7331/SA-007                   | -23.867256 | 28.805235 |
| 7331/SA-009                   | -23.873157 | 28.794913 |
| 7331/SA-010                   | -23.873713 | 28.80522  |
| 7331/SA-012                   | -23.883897 | 28.793005 |
| 7331/SA-013                   | -23.898008 | 28.786075 |
| 7331/SA-015                   | -23.912548 | 28.795965 |
| 7331/SA-016                   | -23.911225 | 28.79694  |
| 7331/SA-019                   | -23.871836 | 28.812772 |
| 7331/SA-020                   | -23.870107 | 28.812971 |
| 7331/SA-021                   | -23.869276 | 28.812199 |
| 7331/SA-022                   | -23.868844 | 28.810585 |
| 7331/SA-024                   | -23.86882  | 28.807345 |
| 7331/SA-025                   | -23.868705 | 28.806603 |
| 7331/SA-027                   | -23.868788 | 28.798635 |
| 7331/SA-028                   | -23.869052 | 28.796542 |
| 7331/SA-029                   | -23.871723 | 28.793433 |
| 7331/SA-030                   | -23.871685 | 28.79864  |
| 7331/SA-031                   | -23.871639 | 28.802708 |
| 7331/SA-032                   | -23.871884 | 28.80426  |
| 7331/SA-033                   | -23.871984 | 28.805887 |
| 7331/SA-034                   | -23.870754 | 28.809044 |
| 7331/SA-036                   | -23.870894 | 28.811548 |
| 7331/SA-037                   | -23.871145 | 28.812595 |
| 7331/SA-038                   | -23.879236 | 28.801511 |
| 7331/SA-039                   | -23.879816 | 28.800595 |
| 7331/SA-040                   | -23.88019  | 28.797611 |
| 7331/SA-041                   | -23.87991  | 28.790712 |
| 7331/SA-042                   | -23.8813   | 28.789866 |
| 7331/SA-043                   | -23.882023 | 28.801441 |
| 7331/SA-044                   | -23.898937 | 28.787599 |
| 7331/SA-045                   | -23.898358 | 28.78803  |
| 7331/SA-046                   | -23.913081 | 28.795732 |
| 7331/SA-047                   | -23.909348 | 28.795362 |
| 7331/SA-049                   | -23.871406 | 28.813108 |
| MSA-02                        | -23.874749 | 28.845008 |
| <b>Archaeological - LFC</b>   |            |           |
| 7331/FC-002                   | -23.88267  | 28.81175  |
| 7331/FC-003                   | -23.873476 | 28.810861 |
| 7331/FC-011                   | -23.882601 | 28.790292 |
| 7331/FC-014                   | -23.898843 | 28.788459 |
| 7331/FC-018                   | -23.865365 | 28.818201 |

| Identified heritage resources      | Longitude  | Latitude  |
|------------------------------------|------------|-----------|
| 7331/FC-023                        | -23.86881  | 28.810236 |
| 7331/FC-026                        | -23.868833 | 28.805546 |
| 7331/FC-035                        | -23.869942 | 28.809537 |
| 7331/FC-048                        | -23.896603 | 28.813229 |
| LFC-05                             | -23.888188 | 28.845692 |
| LFC-06                             | -23.84988  | 28.821295 |
| <b>Burial Grounds &amp; Graves</b> |            |           |
| 7331/BGG-001                       | -23.911369 | 28.814409 |
| BGG-01                             | -23.875104 | 28.8322   |
| BGG-03                             | -23.874687 | 28.845384 |
| BGG-04                             | -23.874044 | 28.845913 |