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## Phase 2 of the Proposed Re-alignment of the P141-1 Provincial Road, Tweefontein Mine Complex, Mpumalanga Province

### Heritage Impact Assessment



**Reference No:** MP30/5/1//2/2/ 289 MR

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Glencore Operations South Africa (Pty) Ltd

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## DECLARATION OF INDEPENDENCE

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## EXECUTIVE SUMMARY

### Introduction

Digby Wells Environmental has been requested by Glencore Operations South Africa (Pty) Ltd (Glencore) to conduct a Heritage Resources Management (HRM) process component for the required environmental authorisation process for Phase 2 of the Tweefontein Road Re-alignment Project.

### Project Background

Glencore— previously Xstrata South Africa (Pty) Ltd – currently mines its Tweefontein Complex in Mpumalanga Province through both underground and open pit coal mining methods.

The Tweefontein Optimisation Project (TOP) was initiated in 2008 to recover the remaining coal reserves within the Tweefontein Complex. This project includes the expansion of current underground and surface mining operations as well as the construction of the required support infrastructure.

A portion of the strategic coal reserves within the Tweefontein Complex are located beneath a section of provincial road P141-1 that forms part of Mpumalanga's strategic public transport network. As a result a Road Re-alignment Project was proposed in 2010 that was planned in two phases: Phase 1 and Phase 2.

Phase 1 included the re-alignment of the P141-1 road from the north-eastern portion of the Tweefontein Dam from where it will continue in a south-easterly direction to just beyond the Phoenix Dam. Clean Stream Environmental Consultants conducted the Environmental Impact Assessment (EIA) and Water Use Licence (WUL) processes for Phase 1. A Heritage Impact Assessment (HIA) was also commissioned as one of the specialist studies required for Environmental Authorisation. The HIA was completed by Dr J. C. C. Pistorius in 2013.

Environmental Authorisation was granted in November 2014 for Phase 1. Digby Wells visited the SAHRIS to obtain relevant Statutory Comments on the 2013 HIA for the TOP. However, there is no record that the 2013 HIA was submitted to the responsible heritage resources authorities, and therefore no Statutory Comment was made in terms of section 38(8) of the NHRA.

Phase 2 involves a re-alignment of the P141-1 Provincial Road from the D2769 extension road (currently under construction as Part of Phase 1) following a north westerly direction for approximately 3.4 km to join the existing P 141-1 road. As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed.

## Terms of Reference

The HRM process needed to comply with section 38(8) of the National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA), as well as adhered to the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and the EIA Regulations, 2014.

## Scope of Work

The Scope of Work that was required to ensure that the HRM complies with the relevant Acts included:

- A review and gap analysis of the 2013 HIA;
- A pre-disturbance survey of the Phase 2 proposed road re-alignment; and
- Compiling an HIA to report any findings on the Phase 2 road re-alignment.

## Project Setting

The Tweefontein Complex is situated approximately 8 km east of Ogies and 20 km south-west of Witbank in Mpumalanga Province. The Tweefontein Complex lies within the Emalahleni Local Municipality and the larger Nkangala District Municipality. The existing and proposed route alignment of the provincial road P141-1 falls within the Tweefontein Complex mine boundary.

The proposed Project is located upon the Remaining Extent and Portion 1 of the Farm Tweefontein 13 IS. The sections of the proposed roads to be closed are located on the following properties:

- Remaining Extent and Portion 1 of the Farm Tweefontein 13 IS
- Portion 1 of the Farm Vlaklaagte 330 JS
- Portion 2 of the Farm Vlaklaagte 330 JS
- Portion 40 of the Farm Vlaklaagte 330 JS
- Portion 41 of the Farm Vlaklaagte 330 JS
- Portion 2 of the Farm Waterpan 8 IS

## Project Description

The proposed P141-1 Provincial Road originates from the intersection with the D2769 extension road (currently under construction). The proposed re-alignment follows a north-westerly direction from the D2769 extension road and crosses over the existing mine haul road over which a proposed bridge will be constructed. The road will then cross over the Waterpan No 1a dump which will be removed prior to construction of the proposed road re-alignment. **The proposed route is slightly curved eastward to avoid an existing graveyard.** The proposed route for the road continues in a north-westerly direction, with a golf course to the north-east and an opencast mining area to the south-west. The proposed re-alignment crosses over an unnamed tributary for which a culvert will be constructed to

allow for the continued flow of water within this watercourse. The proposed re-alignment then proceeds to join the existing P 141-1 Provincial Road at the point where it intersects the mine access road. The proposed realigned P141-1 Provincial Road will be 3.4 km in length with a 40 m wide road reserve. It is important to note that the proposed route described above refers only to phase 2 of the TRRP and that the road re-alignment will be located entirely within the Tweefontein Mine Complex.

As mentioned this re-alignment is necessary to enable the exploitation of the coal reserves which lie beneath the existing alignment of the P141-1 Provincial Road.

As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed off. These road closures will only occur once the construction of the new route alignment is complete, as the re-alignment which is to be completed in Phase 1 will allow for the successful by-pass of the D2770 (R547). The N12 highway and R555 will operate as per normal and will not be impacted on by the proposed road re-alignment Project.

### **Project Schedule**

The project schedule is inclusive of Phase 2 only and will comprise two activity phases – Construction and Operations.

The Construction Phase will take approximately 1 year.

The Operational Phase, i.e. when the realigned Provincial Road P141-1 will be in operation, will be from the fourth quarter of 2016 when the construction phase has been completed. The Tweefontein Road Re-alignment Project is considered to be a permanent project, thus the alterations to the road network are not to be replaced after the completion of the mining activities at the Tweefontein Complex.

### **Consultation**

A formal Stakeholder Engagement Process was, and is being, conducted for the Project. To date public meetings and other means of engagement have been undertaken as part of the Scoping Phase, including:

- Public Meeting held on Wednesday, 22 April from 11:00 – 13:00 at the Tweefontein Golf Club (see Photo 1); and
- Written submissions from stakeholders.

No comments or issues specifically relating to HRM have been recorded.

The only record of more informal consultation is contained in the 2013 HIA report.

### **Identified Heritage Resources**

A total of 30 heritage resources were identified in the 2013 HIA, comprising 24 burial grounds and six historical structures. Only burial ground GY01 is relevant to this Project. The current HIA also considered the Vryheid Formation as a heritage resource due to its



palaeontological potential and sensitivity. A summary of the types of identified heritage resources, including cultural significance and field ratings is provided in the table below:

Description	Cultural Significance	Field Rating
Vryheid Formation	Very High	Grade I
A single burial ground containing three graves associated with the South African War, and possibly containing graves of victims of conflict.	High	Grade I
Historical through to contemporary community burial grounds amounting to 23 burial grounds and near 2000 individual graves.	High	Grade III A
Six historical structures older than 60 years.	Low	General Protection IV B

### Gap Analysis

The 2013 HIA was reviewed and subjected to a gap analysis. The purpose of the gap analysis was to highlight information gaps. The gap analysis indicated that the HIA only partially complies with the seven criteria required in terms of section 38(3) of the NHRA: the report did not consider heritage impacts relative to socio-economic benefits nor did it consider any alternatives. These gaps are addressed in the current HIA as far as possible.

In addition, the 2013 Heritage Impact Assessment was not submitted to the responsible Heritage Resources Authorities in terms of sections 38(4) and (8) of the National Heritage Resources Act, 1999.

### Potential Impacts

Of relevance to the Phase 2 road re-alignment are the potential direct and indirect impacts to the burial ground and graves GY 01.

These can be summarised as follows:

- Damage to or destruction of surface dressings of graves caused by diverse actions during the construction phase of the project; and
- Loss or restricted access to gravesites, degradation of the intrinsic cultural significance (CS) of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties

## Recommendations

To mitigate these potential impacts to the burial ground and graves GY 01, the following recommendations apply:

- GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a Conservation Management Plan (CMP) that includes:
  - Establishing a buffer of 25 m around the burial ground and graves;
  - Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and
  - Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.
- An extensive Burial Grounds and Graves Consultation (BGGC) process must be implemented in accordance with NHRA Regulations to identify bona fide Next-of-Kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.

In addition to the identified heritage resources, this assessment also considered the Vryheid Formation. Notwithstanding the inherent very high palaeontological sensitivity of the Vryheid Formation, surface activities associated with the Phase 2 re-alignment were not considered to have any impacts on fossils, and therefore no further palaeontological assessments are required.





Code	Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
BGG-Dir	Physical changes to Burial Grounds & Graves	Permanent	National	Extremely high - negative	Extremely detrimental	Likely	Moderate - negative	GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of: Establishing a buffer of 25 m around the burial ground and graves; Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.	Short term	Very limited	Moderately high - negative	Slightly detrimental	Unlikely	Negligible - negative



Code	Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
		Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
BGG-Ind	Effects on communities	Project Life	National	Extremely high - negative	Extremely detrimental	Likely	Moderate - negative	An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding the future of the graves. Gravesties should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.	Project Life	Municipal Area	Very high - positive	Highly beneficial	Likely	Moderate - positive

## Heritage Impacts vs Sustainable Socio-Economic Benefits

The sustainable socio-economic benefits to the surrounding communities that could derive from the Tweefontein Project and Phase 2 road re-alignment arguably outweigh the significance of heritage impacts. This assumption is based on the following:

- The identified heritage resources are not unique;
- The historical structures are of low cultural significance;
- Although burial grounds and graves are highly significant, all potential impacts these sites can be managed through appropriate mitigation plans; and
- Coal mining heritage has over the years already become an aspect of the cultural environment.

## Cumulative Impacts on the Cultural Landscape

Cumulative heritage impacts that could be associated with the overall Tweefontein Project include the following:

- The continued development and operation of the Tweefontein Project will have an additive effect on the cultural landscape;
- Various activities associated with coal mining, such as blasting, may also have 'time crowding' cumulative effects; and
- Additive effects will contribute to 'space crowding' cumulative effects.



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## LIST OF ACRONYMS

<b>AIA</b>	Archaeological Impact Assessment
<b>ASAPA</b>	Association of Southern African Professional Archaeologists
<b>BA</b>	Bachelor of Arts
<b>BGG</b>	Burial Ground and Graves
<b>BGGC</b>	Burial Ground and Graves Consultation
<b>c.</b>	circa, meaning approximately
<b>CE</b>	Common Era
<b>CFPs</b>	Chance Find Procedures
<b>cHIA</b>	Community Health Impact Assessment
<b>CMP</b>	Conservation Management Plan
<b>CRR</b>	Comments and Response Report
<b>DEA</b>	Department of Environmental Affairs
<b>Digby Wells</b>	Digby Wells Environmental
<b>DMR</b>	Department of Mineral Resources
<b>EA</b>	Environmental Authorisation
<b>EAP</b>	Environmental Assessment Practitioner
<b>EMP</b>	Environmental Management Programme
<b>ESA</b>	Early Stone Age
<b>ESIA</b>	Environmental and Social Impact Assessment
<b>ESI</b>	Evolutionary Studies Institute
<b>GIS</b>	Geographical Information System
<b>GRP</b>	Grave Relocation Plan
<b>HIA</b>	Heritage Impact Assessment
<b>Hons</b>	Honours degree
<b>HRM</b>	Heritage Resources Management
<b>HSR</b>	Heritage Scoping Report
<b>ICOMOS</b>	International Council on Monuments and Sites
<b>IFC</b>	International Finance Corporation
<b>IKS</b>	Indigenous Knowledge Systems
<b>km</b>	Kilometres
<b>LIHRA</b>	Limpopo Heritage Resources Authority
<b>LoM</b>	Life of Mine

<b>LRE</b>	Letter of Request for Exemption
<b>LSA</b>	Late Stone Age
<b>MA</b>	Master of Arts
<b>MPRDA</b>	Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
<b>MSA</b>	Middle Stone Age
<b>MSc</b>	Master of Science
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No. 107 of 1998)
<b>NHRA</b>	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
<b>NID</b>	Notification of Intent to Develop
<b>NoK</b>	Next-of-Kin
<b>PhD</b>	Doctoral degree
<b>PPV</b>	Peak Particle Velocity
<b>RoD</b>	Record of Decision
<b>RoM</b>	Run of Mine
<b>SAfA</b>	Society of Africanist Archaeologists
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SAHRIS</b>	South African Heritage Resources Information System
<b>SCF</b>	Statutory Comment Feedback
<b>SEP</b>	Stakeholder Engagement Process
<b>SIA</b>	Social Impact Assessment
<b>SoW</b>	Scope of Work
<b>STP</b>	Shovel Test Pit
<b>ToR</b>	Terms of Reference
<b>UP</b>	University of Pretoria
<b>Wits</b>	University of the Witwatersrand
<b>ZAR</b>	Zuid Afrikaanse Republiek





## GLOSSARY OF TERMS

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



Term	Definition
<b>Cultural significance (CS)</b>	<p>The aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. A heritage may have cultural significance or other special value because of its:</p> <ul style="list-style-type: none"> <li>Importance in the community, or pattern of South Africa's history.</li> <li>Possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage</li> <li>Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.</li> <li>Importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects.</li> <li>Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.</li> <li>Importance in demonstrating a high degree of creative or technical achievement at a particular period.</li> <li>Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.</li> <li>Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.</li> <li>Significance relating to the history of slavery in South Africa.</li> </ul>
<b>Development</b>	<p>Any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including:</p> <ul style="list-style-type: none"> <li>Construction, alteration, demolition, removal or change of use of a place or a structure at a place.</li> <li>Carrying out any works on or over or under a place.</li> <li>Subdivision or consolidation of land comprising, a place, including the structures or airspace of a place.</li> <li>Constructing or putting up for display signs or hoardings.</li> <li>Any change to the natural or existing condition or topography of land.</li> <li>Any removal or destruction of trees, or removal of vegetation or topsoil.</li> </ul>
<b>Early Farming Community/ies</b>	<p>The first Farming Communities (also known as Early Iron Age) that appear in the southern archaeological record during the early first millennium CE. The EFC period is generally dated from c. 200 CE to 1000 CE.</p>
<b>Early Stone Age</b>	<p>The South African ESA dates from ~3 Mya to c. 250 Kya. This period is associated with later <i>Australopithecus</i> and early <i>Homo</i> species. The lithic industries that characterise the ESA include Oldowan and Early Acheulian, typically as simple core tools, choppers handaxes and cleavers.</p>
<b>Excavation</b>	<p>The scientific excavation, recording and retrieval of archaeological deposit and objects through the use of accepted archaeological procedures and methods, and excavate has a corresponding meaning.</p>



Term	Definition
<b>Farming Community/ies</b>	Term signifying the appearance in the southern African archaeological of Bantu-speaking agricultural based societies from the early first millennium CE. The term replaces the <i>Iron Age</i> as a more accurate description for groups who practiced agriculture and animal husbandry, extensive manufacture and use of ceramics, and metalworking. The Farming Community period is divided into an Early and Late phase. The use of Later Farming Communities especially removes the artificial boundary between archaeology and history.
<b>Field Rating</b>	SAHRA requires heritage resources to be provisionally rated in accordance with Section 7 of the NHRA that provides a three tier grading system of resources that form part of the national estate. The rating system distinguishes between four categories: Grade I: Heritage resources with qualities so exceptional that they are of special national significance. Grade II: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region. Grade III: Other heritage resources worthy of conservation. General Protected: i.e. generally protected in terms of Sections 33 to 37 of the NHRA.
<b>Formal protection</b>	Places with qualities so exceptional that they are of special national significance as national heritage sites or that have special qualities as provincial heritage sites.
<b>General protection</b>	General protections are afforded to: Objects protected in terms of laws of foreign states. Structures older than 60 years. Archaeological and palaeontological sites and material and meteorites. Burial grounds and graves. Public monuments and memorials.
<b>Grave</b>	A place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
<b>Heritage Impact Assessment (HIA)</b>	An assessment of the cultural significance of, and possible impacts on, diverse heritage resources that may be affected by a proposed development. A HIA may include several specialist elements such as archaeological, built environment and palaeontological studies. The HIA must supply the heritage authority with sufficient information about the sites to assess, with confidence, whether or not it has any objection to a development, indicate the conditions upon which such development might proceed and assess which sites require permits for destruction, which sites require mitigation and what measures should be put in place to protect sites that should be conserved. The content of HIA reports are clearly outlined in Section 38(3) of the NHRA and SAHRA Minimum Standards.



<b>Term</b>	<b>Definition</b>
<b>Heritage resource</b>	Any place or object of cultural significance.
<b>Heritage resources management</b>	<p>Process required when development is intended categorised as:</p> <p>Any linear development exceeding 300m in length.</p> <p>Construction of a bridge or similar structure exceeding 50 m in length.</p> <p>Any activity which will change the character of a site exceeding 0.5 hectares in extent or involving three or more existing erven or subdivisions thereof or that have been consolidated within the past five years or costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority.</p> <p>Re-zoning of a site exceeding one hectare in extent.</p> <p>Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.</p>
<b>Heritage site</b>	Any place declared to be a national heritage site by SAHRA or a place declared to be a provincial heritage site by a provincial heritage resources authority.
<b>Late Farming Community/ies</b>	Farming Communities who either developed / evolved from EFC groups, or who migrated into southern African from the late first millennium / early second millennium CE. The LFC period evidences distinct changes in socio-political organisation, settlement patterns, trade and economic activities, including extensive trade routes. The LFC period is generally dated from c. 1000 CE well into the modern historical period of the nineteenth century.
<b>Late Stone Age</b>	The South African LSA dates from ~30 Kya. This period is associated with modern <i>Homo sapiens sapiens</i> and the complex hunter-gatherer societies, ancestral to the Bushmen / San and Khoi. The LSA lithic assemblage contains microlithic technology and composite tools such as arrows commonly produced from fine-grained cryptocrystalines, quartz and chert. The LSA is also associated with archaeological rock art including both paintings and engravings.
<b>Living / intangible heritage</b>	The intangible aspects of inherited culture that could include cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems, the holistic approach to nature, society and social relationships.
<b>Management</b>	In relation to heritage resources, includes the conservation, presentation and improvement of a place protected in terms of the NHRA.



Term	Definition
<b>Middle Stone Age</b>	<p>The South African MSA dates from ~300 Kya to c. 30 Kya. This period is associated with the changing behavioural patterns and the emergence of modern cognitive abilities in early <i>Homo sapiens</i> species. The lithic industries that characterise the MSA are typically more complex tools with diagnostic identifiers, including convergent flake scars, multi-faceted platforms, retouch and backing. Assemblages are characterised as refined lithic technologies such as prepared core techniques, retouched blades and points manufactured from good quality raw material.</p>
<b>National estate</b>	<p>The national estate as defined in Section 3 of the NHRA, i.e. heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations. The national estate may include:</p> <ul style="list-style-type: none"> <li>Places, buildings, structures and equipment of cultural significance.</li> <li>Places to which oral traditions are attached or which are associated with living heritage.</li> <li>Historical settlements and townscapes.</li> <li>Landscapes and natural features of cultural significance.</li> <li>Geological sites of scientific or cultural importance.</li> <li>Archaeological and palaeontological sites.</li> <li>Graves and burial grounds, including ancestral graves, royal graves and graves of traditional leaders, graves of victims of conflict, graves of individuals designated by the Minister by notice in the Gazette, historical graves and cemeteries, and other human remains which are not covered in terms of the National Health Act, 2003.</li> <li>Sites of significance relating to the history of slavery in South Africa.</li> <li>Movable objects, including objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; objects to which oral traditions are attached or which are associated with living heritage; ethnographic art and objects; military objects; objects of decorative or fine art; objects of scientific or technological interest.</li> <li>Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).</li> </ul>
<b>Palaeontological</b>	<p>Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.</p>
<b>Palaeontologist</b>	<p>A trained professional who uses scientific methods to excavate, collect, record and study palaeontological sites and fossils.</p>
<b>Pedestrian survey</b>	<p>A method of examining a site in which surveyors, spaced at regular intervals, systematically walk over the area being investigated.</p>



Term	Definition
<b>Phase 1 Archaeological Impact Assessment (AIA)</b>	Phase 1 AIAs generally involve the identification and assessment of sites during a field survey of a portion of land that is going to be affected by a potentially destructive or landscape-altering activity.
<b>Phase 2 Archaeological Impact Assessment (AIA)</b>	Phase 2 AIAs are primarily based on salvage or mitigation excavations preceding development that will destroy or impact on a site. This may involve collecting of artefacts from the surface and / or excavation of representative samples of the artefactual material to allow characterisation of the site and the collection of suitable materials for dating the sites. Phase 2 AIAs aim to obtain a general idea of the age, significance and meaning of the site that is to be lost and to store a sample that can be consulted at a later date for research purposes. Phase 2 excavations can only be done under a permit issued by SAHRA, or other appropriate heritage agency, to the appointed archaeologist.
<b>Phase 3 Management Plan / Conservation Management Plan (CMP)</b>	On occasion, a site may require a Phase 3 programme involving the modification of the site or the incorporation of the site into the development itself as a site museum, a special conservation area or a display. Alternatively it is often possible to relocate or plan the development in such a way as to conserve the archaeological site or any other special heritage significance the place may have. For example, in a wilderness area or open space when sites are of public interest the development of interpretative material is recommended and adds value to the development. Permission for the development to proceed can be given only once the heritage resources authority is satisfied that measures are in place to ensure that the archaeological sites will not be damaged by the impact of the development or that they have been adequately recorded and sampled. Careful planning can minimise the impact of archaeological surveys on development projects by selecting options that cause the least amount of inconvenience and delay. The process as explained above allows the rescue and preservation of information relating to our past heritage for future generations. It balances the requirements of developers and the conservation and protection of our cultural heritage as required of SAHRA and the provincial heritage resources authorities (ASAPA).
<b>Pre-disturbance survey (syn. reconnaissance)</b>	A survey to record a site as it exists, with all the topographical and other information that can be collected, without excavation or other disturbance of the site.



Term	Definition
<b>Reconnaissance</b>	A broad range of techniques involved in the location of archaeological sites, e.g. surface survey and the recording of surface artefacts and features, the sampling of natural and mineral resources, and sometimes testing of an area to assess the number and extent of archaeological resources. However, in terms of South African practice, reconnaissance during a so-called Phase 1 AIA never includes sampling as this is a permitted activity, usually undertaken during so-called Phase 2 AIAs (ASAPA).
<b>Site</b>	Any area of land, including land covered by water, and including any structures or objects thereon.
<b>Structure</b>	Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.
<b>Tangible heritage</b>	Physical heritage resources such as archaeological sites, historical buildings, burial grounds and graves, fossils, etc. Tangible heritage may be associated with intangible elements, e.g. the living cultural traditions, rituals and performances associated with burial grounds and graves and deceased persons.



## 1 Introduction

Digby Wells Environmental (hereafter Digby Wells) has been requested by Glencore Operations South Africa (Pty) Ltd (hereafter Glencore) to conduct a Heritage Resources Management (HRM) process component for the required Environmental Authorisation (EA) process for Phase 2 of the Tweefontein Road Re-alignment Project.

This document constitutes the following:

- A gap analysis of the a previously completed Heritage Impact Assessment (HIA) report;
- Updated baseline information;
- Assessment of impacts on identified heritage resources relevant to the Phase 2 road re-alignment project including evaluation of cultural significance (CS) and cumulative impacts; and
- Recommended mitigation plans.

### 1.1 Project Background

Glencore – previously Xstrata South Africa (Pty) Ltd – currently mines its Tweefontein Complex in Mpumalanga Province through both underground and open pit coal mining methods.

In 2008, Glencore initiated the Tweefontein Optimisation Project (TOP) which aims to recover the remaining coal reserves within the Tweefontein Complex. This project includes the expansion of current underground and surface mining operations as well as the construction of the required support infrastructure.

As part of this project, Glencore found that a portion of the strategic coal reserves within the Tweefontein Complex are located beneath a section of provincial road P141-1. This road forms part of Mpumalanga's strategic public transport network. As a result, Glencore proposed a Road Re-alignment Project in 2010 that was planned in two phases: Phase 1 and Phase 2.

Phase 1 includes the re-alignment of the P141-1 road from the north-eastern portion of the Tweefontein Dam from where it will continue in a south-easterly direction to just beyond the Phoenix Dam. The Environmental Impact Assessment (EIA) and Water Use Licence (WUL) process for this phase was conducted by Clean Stream Environmental Consultants (Clean Stream), who also commissioned a HIA as one of the specialist studies required for Environmental Authorisation (EA). The HIA was completed by Dr J. C. C. Pistorius in 2013.

The EA was granted in November 2014 for Phase 1. However, there is no record that the 2013 HIA was submitted to the responsible heritage resources authorities (HRAs), and therefore no Statutory Comment was made in terms of section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).





Phase 2 involves the re-alignment of the P141-1 Provincial Road from the D2769 extension road (currently under construction as Part of Phase 1) following a north westerly direction for approximately 3.4 km to join the existing P 141-1 road. As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed. The proposed Phase 2 road re-alignment required the compilation of a HIA in terms of section 38(1) of the NHRA.

## 1.2 Terms of Reference

The HRM process needed to comply with section 38(8) of the NHRA, as well as adhered to the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) EIA Regulations, 2014.

## 1.3 Scope of Work

The Scope of Work that was required to complete this HIA included:

- A review and gap analysis of the 2013 HIA;
- A pre-disturbance survey of the Phase 2 proposed road re-alignment; and
- Compiling an HIA to report on the Phase 2 road re-alignment.

## 1.4 Policy and Legal Framework

### 1.4.1 National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) and EIA Regulations (December 2014)

The NEMA, as amended was set in place in accordance with Section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that:

*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.*

The EIA Regulations, Government Notice Regulation (GN) R982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R 983 (Listing Notice No. 1), GN 984 (Listing Notice No. 2) and GN R 985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended.

### 1.4.2 National Heritage Resources Act, 1999 (NHRA)

The NHRA is the overarching legislation that protects and regulates the management of heritage resources in South Africa. This Act considers various heritage resources as forming



part of the national estate, contemplated in Section 3. In addition, certain other categories are afforded automatic formal or general protection. Sections considered relevant to this project are outlined below:

- Formal protection:
  - National and provincial heritage sites, Section 27;
  - Certain types of protected areas, Section 28; and
  - Heritage areas, Section 32.
- General protection:
  - Certain structures with demonstrable cultural significance or that are older than 60 years, Section 34;
  - Archaeological and palaeontological resources, Section 35;
  - Certain categories of burial grounds and graves, Section 36; and
  - All public monuments and memorials, Section 37.

Section 5 of the NHRA encapsulates general principles for HRM that this specialist heritage component of the WRTRP aims to adhere to. Section 38 outlines the HRM process and minimum requirements that need to be complied with namely:

- Subsection (8) requires a Heritage Impact Assessment (HIA) study to be conducted if an impact assessment is required in terms of any other Act. In this instance impact assessments are required by several Acts, but notably the NEMA and MPRDA; and
- Subsection (3) outlines the minimum information that must be included in a HIA report.

## 1.5 Expertise of the Specialists

**Johan Nel compiled this HIA.** He has more than 13 years of combined experience in the field of HRM including archaeological and heritage assessments, grave relocation, social consultation and mitigation of archaeological sites. He has gained experience both within urban settings and remote rural landscapes. Since 2010 he has been actively involved in environmental management that has allowed me to investigate and implement the integration of heritage resources management into EIAs. Many of the projects since have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage. This exposure has allowed Johan to develop and implement a HRM approach that is founded on international best practice, leading international conservation bodies such as the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and ICOMOS and aligned to the South African legislation. Johan has worked in most South African Provinces, as well as Swaziland, the Democratic Republic of the Congo, Liberia and Sierra Leone.



Johan is a professional member of ASAPA (*Member No. 095*) and ICOMOS South Africa (*Member No. 13839*).

**Natasha Higgitt completed the pre-disturbance survey and report.** She obtained her Bachelor of Arts (BA) Honours degree in Archaeology in 2010 from the University of Pretoria. She currently holds the position of Assistant Heritage Consultant: Archaeology Specialist at Digby Wells. She has more than 4 years' experience in archaeological survey and gained further generalist heritage experience since her appointment at Digby Wells in South Africa and Liberia.

Natasha is a professional member of the Association of Southern African Archaeologists (ASAPA) (*Member No. 335*).

**Justin du Piesanie undertook the technical review of the HIA report.** 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. He currently holds the position of Heritage Management Consultant: Archaeologist at Digby Wells. He has over 6 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 International Finance Corporation (IFC) requirements such as Performance Standard 8: Cultural Heritage.

Justin is a professional member of ASAPA (*Member No. 270*) and the International Council on Monuments and Sites (ICOMOS) South Africa (*Member No. 14274*).

Dr J. C. C. Pistorius – please refer to the 2013 HIA attached as Appendix B.

## 1.6 Constraints and Limitations

The following constraints and limitations influenced the compilation of the report:

- With the exception of the Phase 2 road re-alignment, this HIA is primarily based on fieldwork and research undertaken by Pistorius in 2013;
- No record that the 2013 HIA was submitted to the responsible HRAs, and therefore it is assumed that no Statutory Comment was issued to inform this HIA. In addition, there is also no record on whether the recommended mitigation plans have been implemented. While the gaps have been identified, these are outside of the scope for the Phase 2 road re-alignment project, but should be considered for the TOP Environmental Management Plan (EMP);
- The inherent nature of palaeontological and material cultural remains including archaeological and historical material is such that evidence are usually located below surface and not identified during field surveys;



- To date no HRM specific comments have been recorded through the formal Stakeholder Engagement Process (SEP); and
- No rocky outcrops were recorded during the survey, therefore no palaeontological material was found.

## 1.7 Project Setting

The Tweefontein Complex is situated approximately 8 km east of Ogies and 20 km south-west of Witbank in Mpumalanga Province. The Tweefontein Complex lies within the Emalahleni Local Municipality and the larger Nkangala District Municipality. The existing and proposed route alignment of the provincial road P141-1 falls within the Tweefontein Complex mine boundary.

The properties that will be directly and indirectly affected during Phase 2 of the Tweefontein Road re-alignment Project are listed in Table 1-1 below.

**Table 1-1: Property Details**

	<b>Farm</b>	<b>Portion</b>	<b>Registered Landowner</b>
New Road	Tweefontein 13 IS	1	Glencore Operations South Africa (Pty) Ltd
	Tweefontein 13 IS	RE	Glencore Operations South Africa (Pty) Ltd
Road Closures	Tweefontein 13 IS	RE	Glencore Operations South Africa Pty Ltd
	Vlaklaagte 330 JS	1	South African National Roads Agency Ltd
	Vlaklaagte 330 JS	2	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Vlaklaagte 330 JS	41	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Vlaklaagte 330 JS	40	Xstrata South Africa Pty Ltd (merged with Glencore in May 2013)
	Waterpan 8 IS	2	Glencore Operations South Africa Pty Ltd

Although the areas within the mine boundary are earmarked for mining and associated activities, once completed the area within the defined road servitude area will fall within the mandate of the Mpumalanga Provincial Department of Public Works, Roads and Transport (MPDPWRT). As such the road servitude area may not be altered without consent from the provincial roads authority. Therefore, once the road re-alignment is complete, the road servitudes associated with the provincial road will no longer be considered to form part of the Mining Area (i.e. no undermining of the servitude will be undertaken whatsoever).



## 2 Project Description

The proposed P141-1 Provincial Road originates from the intersection with the D2769 extension road (currently under construction). The proposed re-alignment follows a north-westerly direction from the D2769 extension road and crosses over the existing mine haul road over which a proposed bridge will be constructed. The road will then cross over the Waterpan No 1a dump which will be removed prior to construction of the proposed road re-alignment. **The proposed route is slightly curved eastward to avoid an existing graveyard (GY01)** (refer to Plan 1). The proposed route for the road continues in a north-westerly direction, with a golf course to the north-east and an opencast mining area to the south-west. The proposed re-alignment crosses over an unnamed tributary for which a culvert will be constructed to allow for the continued flow of water within this watercourse. The proposed re-alignment then proceeds to join the existing P 141-1 Provincial Road at the point where it intersects the mine access road. The proposed realigned P141-1 Provincial Road will be 3.4 km in length with a 40 m wide road reserve. It is important to note that the proposed route described above refers only to phase 2 of the TRRP and that the road re-alignment will be located entirely within the Tweefontein Mine Complex.

As mentioned in the sections above, this re-alignment is necessary to enable the exploitation of the coal reserves which lie beneath the existing alignment of the P141-1 Provincial Road.

As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed off. These road closures will only occur once the construction of the new route alignment is complete, as the re-alignment which is to be completed in Phase 1 will allow for the successful by-pass of the D2770 (R547). The N12 highway and R555 will operate as per normal and will not be impacted on by the proposed road re-alignment Project.

***For detailed descriptions of the proposed infrastructure, reference is made to the EIA report.***

## 3 Listed Activities and Project Schedule

### 3.1 Listed Activities



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Table 3-1 below outlines the listed activities triggered and thus requiring authorisation in terms of the new EIA Regulations, 2014 promulgated in terms of the NEMA. In addition, these activities are also integrated with section 38(1) of the NHRA.


**Table 3-1: Listed Activities for Phase 2**

<b>NEMA Listing Notice &amp; Activity No. / NHRA section 38</b>	<b>Activity Description</b>	<b>Project Relevance</b>
Listed Activity 12(xii) Listing Notice 1 GN R.983 (2014) NHRA section 38(8)	The development of infrastructure or structures with a physical footprint of 100 square meters or more where such development occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	The realigned road will cross a watercourse.  In terms of HRM, heritage resources such as archaeological or palaeontological material may be exposed from river banks during construction.
	Impact assessment required in terms of the NEMA and EIA Regulations, 2014.	
Listed Activity 19(i) Listing Notice 1 GN R.983 (2014) NHRA section 38(8)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from a watercourse but excluding where such infilling, depositing, dredging, excavation, removal or moving, is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority or occurs behind the development setback line.	The realigned road will cross a watercourse and include the construction of a culvert.  In terms of HRM, heritage resources such as archaeological or palaeontological material may be exposed from river banks during construction.
	Impact assessment required in terms of the NEMA and EIA Regulations, 2014.	
Listed Activity 30 of Listing Notice 1 GN R.983 (2014) NHRA section 38(8)	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	Site clearance will occur during the construction phase and may result in the loss of species of special concern.  In terms of HRM, heritage resources may be damaged, destroyed or exposed during site clearance construction.
	Impact assessment required in terms of the NEMA and EIA Regulations, 2014.	



<b>NEMA Listing Notice &amp; Activity No. / NHRA section 38</b>	<b>Activity Description</b>	<b>Project Relevance</b>
Listed Activity 27 (ii), (iii), and (iv) Listing Notice 2 GN R.984 (2014) NHRA section 38(1)(a)	The development of: ii. a road administered by a provincial authority. iii. a road with a reserve wider than 30 metres; or iv. a road catering for more than one lane of traffic in both directions. but excluding the development and related operation of a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010, in which case activity 24 in Listing Notice 1 of 2014 applies. Impact assessment required due to construction of road exceeding 300 m in length.	This project entails the re-alignment of a provincial road which is administered by the MPDPWRT. The proposed road reserve is 40 meters wide. In terms of HRM, heritage resources may be damaged, destroyed or exposed during site clearance construction.
Listed Activity 12 Listing Notice 3 GN R.985 (2014) NHRA section 38(1)(c)(i)	The clearance of an area of 300 square meters or more of vegetation where 75% or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. Impact assessment required due to changing the character of a site exceeding 5 000 m <sup>2</sup> in extent.	Site clearance will occur during the construction phase and may result in the loss of species of special concern. In terms of HRM, heritage resources may be damaged, destroyed or exposed during site clearance construction.

## 3.2 Project Schedule

The project schedule is inclusive of Phase 2 only and will comprise two activity phases – Construction and Operations– discussed in more detail below including project activities per phase.

### 3.2.1 Construction Phase

The contractor camp developed during Phase 1 will remain for the duration of Phase 2. The contractor is currently making use of the old Makause School as site offices. During the construction phase of the proposed Project, the following activities are proposed to be undertaken:





- Site clearance: the proposed route will be cleared of all vegetation and or structures. Stumps and roots will be removed to a depth of 600 mm below the planned road level;
- Earthworks, cut and fill activities: the excavated soil and earth material from the clearing process will be transported to the neighbouring zones where embankments are required. The fill areas on the road reserve will be built up by depositing the earth material and using bulldozers to place it in layers. The ground will later be compacted using rollers. This process will continue until the ground is levelled;
- Sourcing of materials for the proposed road pavements: these will be sourced from borrow pits already associated with the Tweefontein Mine Complex. No new borrow pits will be constructed as part of the proposed Project;
- Construction of the culvert, at the wetland crossing, which will involve the digging of a trench for the placement of the concrete foundation and box culvert. Stones and gabions will also be placed at the inlet and outlet of the culvert;
- Construction of the bridge over the mine haul road, the purpose of this bridge is to separate mine traffic from public traffic. The bridge will be constructed in phases with the base being placed first, then the piers being erected. The mine traffic on the existing haul road will not be impacted on, as one lane will be closed at a time as construction of the bridge commences and to ensure that traffic can still be accommodated on the haul road;
- Layering of the road foundation and overlying materials: once the road surface has a uniform grade, a machine is used to heat the binder and aggregate and distribute the hot asphalt mixture at an even depth across the surface. Asphalt concrete provides a durable surface on which motor vehicles and pedestrians may travel; and
- Road safety measures: the lanes will be demarcated with paint and the required road markers and signboards will be erected. Furthermore the associated guardrails and fencing will be erected where required.

### 3.2.2 Operation Phase

The proposed road alignment, once completed will be handed over to the MPWRT, if the Department is satisfied with the design and condition of the road and associated infrastructure. The design of the road has been approved in principle. The Department will therefore assume responsibility for the maintenance of the proposed road and associated infrastructure.

During the operational phase of the proposed Project, the following activities, as listed below, are foreseen to be undertaken:

- Regular inspection of the culvert and clearing of any debris accumulated at the outlet, inlet and inside the culvert;
- Monitor effectiveness of erosion control measures at the culvert;



- Check for damage to culvert to ensure the structural integrity thereof;
- Resurface the road with an asphalt overlay, as necessary;
- Repaint the lines, replace signage and repair potholes, as necessary; and
- Removal of alien vegetation along the shoulders of the road as well as within the road reserve.

### 3.2.3 Decommissioning Phase

Once the construction of the new realigned P141-1 Provincial Road is complete, the responsibility of road maintenance will be handed over to the MPWRT. The realigned P141-1 Provincial Road will therefore remain a permanent activity and **no decommissioning phase is applicable** to the proposed road re-alignment.

The P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. In addition, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed off. It should be noted that these road closures are related to the planned open cast mining activities, which have been approved as part of the TOP. The properties that will be affected as part of the proposed road closures (Table 3-1) will therefore be rehabilitated in accordance with the approved EMP Report for the TOP.

## 4 Aims and Objectives

The primary aim of this HIA report was to furnish the responsible HRAs with details regarding the location, nature and extent of the proposed road re-alignment, and the possible impacts associated. A secondary aim was to integrate the 2013 HIA into this report to ensure the overall project complies with the NHRA.

Specific objectives of the HIA report were to enable the responsible HRAs to:

- Timeously decide, in consultation with the proponent, i.e. Glencore, whether or not the development may proceed;
- Stipulate any limitations or conditions to be applied to the development;
- Determine what general protections apply in terms of the NHRA, and what formal protections may be consequently be applied;
- Determine if any compensatory action is required in respect of any heritage resources damaged or destroyed as a result of the development; and
- Determine the need to appoint specialists as a condition of approval of the proposed development.



## 5 Methodology

### 5.1 Gap Analysis

The 2013 Pistorius HIA was subjected to a gap analysis that employed a simple matrix based on certain criteria contained in section 38 of the NHRA (see Box 1). The report was reviewed against minimum HIA report and HRM process requirements.

In terms of minimum HIA report requirements, the report was reviewed against criteria listed in section 38(3) and to the HRM process outlined in section 38. Compliance was based on whether the report addressed each criterion. If addressed, consideration was given to the adequacy of information to enable appropriate decisions to be made. However, determining adequacy of information is too subjective to rate, and was included in the analyses as recommended additional information that should be included in the report.

38(3)(a)	Identification and mapping of heritage resources
38(3)(b)	Evaluation of significance
38(3)(c)	Heritage impact on resources
38(3)(d)	Heritage impact relative to sustainable social and economic benefits
38(3)(e)	Results of consultation
38(3)(f)	Consideration of alternatives
38(3)(g)	Mitigation plans
38(4)	Report submission to responsible HRA
38(4)	Statutory Comment issued by responsible HIA

**Box 1: NHRA section 38 criteria**

The formula used to determine compliance was based on the sum of a simple yes-no rating of each criterion. The total sum was divided by nine to provide the compliance rating. Non-compliance was considered as a total less than 1, partial compliance as a total rating from 1 to 8, and full compliance as a rating of 9.

### 5.2 Quantitative Data Collection

**For a detailed description of the data collected and reported on previously, reference to the 2013 HIA report is made, attached to this report as Appendix B.**

Digby Wells undertook field-based data collection for the road re-alignment. Field based data collection was undertaken by Natasha Higgitt, a qualified and accredited archaeologist on 11 May 2015. The project area was assessed through vehicular and pedestrian survey methodologies. Identified heritage resources were recorded using GPS technology, photographs and detailed notes. The survey was recorded as a GPS track log depicted in Plan 1

### 5.3 Mitigation Measures and Recommendations

The desired outcome of an impact assessment is the removal of negative impacts on heritage resources through the implementation of feasible mitigation measures. The mitigation and management measures recommended in this section comply with the General Principles set out under Section 5 of the NHRA. The recommendations further considered the cultural significance of heritage resources and the recommended minimum level of



mitigation as published in the South African Heritage Resources Agency (SAHRA) Minimum Standards<sup>1</sup> (See Box 2).

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

- Project-related mitigation requires changes or amendments to project design, planning and siting of

infrastructure to avoid or reduce physical impacts on heritage resources. Project-related mitigation measures are always the preferred option, especially where heritage resources with higher cultural significance will be impacted on. Project-related mitigation may include:

- *In situ* preservation (i.e. no-development) of heritage resources for which Conservation Management Plans (CMPs) are required; and
- Conservation of heritage resources through, for example, incorporating the resources into project design and planning, for which CMPs are also required.
- Mitigation of heritage resources may be necessary where project-related mitigation will not sufficiently conserve or preserve heritage resources, thus resulting in partial or complete changes (including destruction) to a resource. Such resources need to be mitigated to ensure that they are fully recorded, documented and researched before any negative change occurs. This may require mitigation such as:
  - Intensive detailed recording of sites through various non-intrusive techniques to create a documentary record of the site – “preservation by record”;
  - Intrusive recording and sampling such as shovel test pits (STPs) and excavations, relocation (usually burial grounds and graves, but certain types of sites may be relocated), restoration and alteration. Any form of intrusive mitigation is a regulated permitted activity for which permits need to be issued by the relevant heritage authorities. Such mitigation may result in a reassessment of the value of a resource that could require conservation measures to be implemented. Alternatively, an application for a destruction permit may be made if the resource has been sufficiently sampled; and

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

**Box 2: Recommended minimum level of required mitigation**

<sup>1</sup> It must be noted that these minimum standards serve as a guide, and the recommendations provided in this HIA are project specific.



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

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

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

## 6 Consultation

### 6.1 Records of Formal Stakeholder Engagement

A formal Stakeholder Engagement Process (SEP) was, and is being, conducted for the Project. To date public meetings and other means of engagement have been undertaken as part of the Scoping Phase, including:

- Public Meeting held on Wednesday, 22 April from 11:00 – 13:00 at the Tweefontein Golf Club (see Photo 1); and
- Written submissions from stakeholders.

No comments or issues specifically relating to HRM have been recorded.

### 6.2 Records of Informal Consultation

The only record of more informal consultation is contained in the 2013 HIA report. According to the author two people were consulted regarding the location of burial grounds and previous settlements.

- Mr Samuel Makhatswa provided information on a large farm labour community settlement that could be associated with burial ground GY 04 (Pistorius 2013: 35); and
- Unnamed persons provided information on burial ground GY 18 (Pistorius 2013: 48).

Two additional 'spokespersons' are referred to in the 2013 HIA, but no context provided as to information provided:

- Mr Philip Makgoka. Environmental Coordinator. Xstrata Tweefontein; and
- Mr Tshepo Makgoloko. Cattle herder in the proposed mining area. Xstrata Tweefontein.



## 7 Updated Baseline Environment

### 7.1 2013 TOP HIA Summary

#### 7.1.1 Cultural Heritage Baseline

The 2013 HIA described the study area as “a cultural landscape that is marked by heritage remains dating from the pre-historical to the historical period” (Pistorius 2013: 21). This cultural landscape includes the following elements:

- Stone Age and rock art sites (Pistorius 2013: 21-22) that include regional sites such as:
  - Early Stone Age (ESA) sites at Maleoskop near Groblersdal;
  - The Bushman Rock Shelter Middle Stone Age (MSA) site near Orighstad;
  - Late Stone Age (LSA) sites at Bushman Rock Shelter near Orighstad and Höningnestkrans near Badfontein; and
  - San / Bushmen and Khoi rock art near Ermelo and Bantu-speaking Late Farming Community (LFC) engravings in the northern and eastern parts of the Eastern Highveld.
- Farming Community sites that include regional sites such as:
  - Early Farming Community (EFC) (Pistorius 2013: 23) material culture have been found at:
    - Höningnestkrans Shelter near Badfontein;
    - Welgelegen Shelter on the Vaal River near Ermelo; and
    - Sterkspruit and Doornkop near Lydenburg and in Nelspruit.
  - LFC sites (Pistorius 2013: 23-24) are abundant in the region including Bakone sites between Lydenburg, Badfontein and Machadodorp and Eastern Sotho clans such as the Pai, Pulana and Kutswe in the eastern parts of Mpumalanga. Specific, important LFC sites and episodes include:
    - Sites associated with Swazi expansion into the Mpumalanga Highveld and Lowveld from 1815 to 1868);
    - Sites associated with Shangaan clans who entered the region from across the Lebombo Mountains in the east during the second half of the nineteenth century;
    - The Bakgatla (Pedi) chiefdom in the Steelpoort Valley that rose to prominence under Thulare in the early 1800’s who maintained an extended sphere of influence across the Limpopo and Mpumalanga Provinces during the nineteenth century;



- Ndzundza-Ndebele settlements at Kwa Maza and Esikhunjini from the 18<sup>th</sup> century and at Erholweni from 1839 to 1883 where their sphere of influence, known as KoNomthjarhelo, stretched across the Steenkampsberge;
  - The Bakopa settlement at Maleoskop from 1840 to 1864, where they were massacred by the Swazi;
  - Corbelled stone huts are associated with Sotho predecessors on Tafelkop near Davel that date from 1700s into the 19<sup>th</sup> century; and
  - Numerous stonewalled settlements spread out along the eastern edge of the Groot Dwarsrivier Valley served as the early abode for smaller clans such as the Choma and Phetla communities which date from the nineteenth century.
- Historical heritage (Pistorius 2013: 24-27) including:
    - Historical towns surrounding the study area such as Delmas (1907), Ogies (1928) and Witbank (1903);
    - Coal mining heritage dating from the late 19th century and continuing into the present; and
    - Vernacular stone architectural heritage that comprised a unique architectural style established in the Eastern Highveld from the second half of the 19<sup>th</sup> century well into the early 20<sup>th</sup> century that made use of a wider variety of stone types than elsewhere in South Africa, including sandstone, ferricrete ('oukclip'), dolerite ('bloukclip'), granite, shale and slate.

The Eastern Highveld vernacular stone architecture heritage is important for a number of reasons (Pistorius 2013: 26-27):

- In terms of the ecology, the general absence of natural trees prior to active afforestation precluded the use of timber in construction and firing of clay bricks. As a result, stone was the most important building material in the Eastern Highveld; and
- LFCs such as the Sotho, Pedi, Ndebele and Swazi contributed to the Eastern Highveld stonewalled architecture. These indigenous built environment traditions influenced white settlers in the region to utilise the same resources, with the addition of European knowledge and traditions of stone masonry.

### 7.1.2 Identified Heritage Resources

Pistorius conducted a pre-disturbance survey of the study area during the course of 2012 / 2013. The survey was conducted as a vehicular survey whilst following haul roads or two off-road tracks through the veld. According to Pistorius (2013: 16) the Tweefontein Project Area was surveyed several times previously.

The 2012 / 2013 survey was reported on in the 2013 HIA that listed a total of 30 heritage sites: 24 burial grounds and six historical structures (Pistorius 2013: 28-57). The sites recorded in the previous HIA are listed in Table 7-1. This list details the CS and field ratings obtained from the Digby Wells CS process.

### 7.1.3 Impact Assessment and Mitigation Plans

The 2013 HIA report considered possible heritage impacts on burial grounds GY 02, GY 08, GY 13, GY 15 and GY 19 to GY 22, as well as on all the historical structures with the exception of sites VH and HH 02 (Pistorius 2013: 59).

The recommended mitigation plans included:

- Mitigating directly affected burial grounds through exhumation and relocation (Pistorius 2013: 62);
- Developing CMPs for the burial grounds that can remain in situ (Pistorius 2013: 62); and
- Investigation of historical structures (so-called Phase 2 heritage assessment) and application for alteration and / or destruction permits from the responsible HRAs *prior* to any changes being made to identified structures (Pistorius 2013: 63).



**Table 7-1: List of Sites Recorded in Pistorius 2013**

Resource ID	Type	Description	Cultural Significance	Field Rating	Latitude	Longitude
GY 01	Burial / grave	Large burial ground containing over 1000 graves. Graves comprise dressings ranging from rocks, rubble and formal granite headstones. A significant number of graves are older than 60 years.	High	Grade III A	S26.02863	E29.16355
GY 02	Burial / grave	Burial ground containing around 86 graves, including ones older than 60 years, near an existing haul road. Grave dressings comprise mainly cement headstones and curbs.	High	Grade III A	S26.07410	E29.15707
GY 03	Burial / grave	Burial ground containing more than 77 graves, including ones older than 60 years. Grave dressings comprise mainly cement headstones.	High	Grade III A	S26.05168	E29.13590
GY 04	Burial / grave	Burial ground containing more than 20 graves, possibly associated with a farm labour community that used to reside nearby. Some graves are older than 60 years.	High	Grade III A	S26.06423	E29.18108
GY 05	Burial / grave	Burial ground containing eight graves situated within a Eucalyptus wood. Dressings comprise ferricrete cairns and cement headstones.	High	Grade III A	S26.06423	E29.11717
G 06	Burial / grave	A single grave located between two maize fields. Grave dressing comprises a metal frame and cement headstone. Grave is probably older than 60 years.	High	Grade III A	S26.05772	E29.12267
GY 07	Burial / grave	Burial ground containing around 10 graves, all older than 60 years and dating from the late 1910s to the early 1950s. Site is fenced with a ferricrete stonewall.	High	Grade III A	S26.04957	E29.13140
GY 08	Burial / grave	Burial ground containing around 20 graves adjacent to a 400 kV Eskom transmission line. Most grave dressings comprise cement headstones.	High	Grade III A	S26.01505	E29.14137
GY 09	Burial / grave	Burial ground containing at least three graves, with cement headstones as dressings. Probably older than 60 years.	High	Grade III A	S26.02628	E29.12037
GY 10	Burial / grave	Burial ground located below a 400 kV transmission line containing eight graves. Dressings comprise formal granite headstones and slabs, cement headstones and curbs and stone-packed borders. Graves older than 60 years.	High	Grade III A	S26.02533	E29.12585
GY 11	Burial / grave	Burial ground containing at least 90 graves, most of which comprise stone-packed dressings. Possibly includes graves older than 60 years.	High	Grade III A	S26.00257	E29.11925
GY 12	Burial / grave	Location of burial ground indicated by mine officials, allegedly containing three graves. No visible surface indicators for the existence of graves.	High	Grade III A	S26.00216	E29.11547
GY 13	Burial / grave	Burial ground containing around 20 graves, most of which comprise brick edging as dressings. Possible that some graves are older than 60 years.	High	Grade III A	S25.99817	E29.16642
GY 14	Burial / grave	Burial ground containing at least 105 graves, most comprising cement headstones and some granite dressings. Graves possibly older than 60 years.	High	Grade III A	S25.99952	E29.17382
GY 15	Burial / grave	Burial ground containing more than 400 graves, comprising formal granite dressings and informal dressings.	High	Grade III A	S26.04138	E29.20317
GY 16	Burial / grave	Burial ground containing around eight graves, some comprising cement dressings. Graves with inscriptions indicate dates less than 60 years, but older graves may exist.	High	Grade III A	S26.10859	E29.09756
GY 17	Burial / grave	Burial ground containing three graves, located in between two railway lines. No dates obtained.	High	Grade III A	S26.09342	E29.17596
GY 18	Burial / grave	Burial ground that may contain around five graves. No sound surface indicators exist to determine actual graves.	High	Grade III A	S26.10235	E29.21867
GY 19	Burial / grave	Burial ground containing at least three graves. This site is associated with the South African War (1899-1902).	High	Grade I	S26.03885	E29.18528
GY 20	Burial / grave	Burial ground containing more than 25 graves, most comprising stone-packed dressings. Possible older than 60 years.	High	Grade III A	S26.04435	E29.18788

Resource ID	Type	Description	Cultural Significance	Field Rating	Latitude	Longitude
GY 21	Burial / grave	Burial ground containing at least 30 graves. Dressings mainly comprise rubble (concrete, bricks and ferricrete). Possibly older than 60 years.	High	Grade III A	S26.03738	E29.18997
GY 22	Burial / grave	Burial ground containing at least 23 graves. The site is well maintained and dressings comprise cement headstones. Possible that some graves are older than 60 years.	High	Grade III A	S26.04672	E29.19525
GY 23	Burial / grave	Burial ground contains at least 14 graves, comprising slate headstones. Graves date from the early 20th century.	High	Grade III A	S26.07613	E29.11100
GY 24	Burial / grave	Burial ground containing an unknown number of graves. Possibly older than 60 years.	High	Grade III A	S26.07855	E29.11256
AOC	Structure	Administrative office block, complex with administrative offices	Low	General Protection IV B	S26.04672	E29.19525
CH	Structure	Club House with golf course.	Low	General Protection IV B	S26.07613	E29.11100
CS	Structure	Coalville structure, structure with similar appearance as a residence, but which may have served as a post office.	Low	General Protection IV B	S26.07855	E29.11256
HH 01	Structure	Residential house next to the Coalville structure	Low	General Protection IV B	S26.03251	E29.16954
HH 02	Structure	Historical house dating from the 1930's behind a garage at the entrance to the once existing Witcon residential area	Low	General Protection IV B	S26.02573	E29.17309
VH	Structure	Victorian styled house, located on Zaaiwater 11IS. Associated with outbuildings	Low	General Protection IV B	S26.02922	E29.17217



## 7.2 Gap Analysis

The 2013 HIA was reviewed and subjected to a gap analysis. The purpose of the gap analysis was to highlight information gaps that should be considered as part of the TOP EMP. The results of the gap analysis are presented in Table 7-2.

The gap analysis indicated that the HIA only partially complies with the seven criteria required in terms of section 38(3) of the NHRA: the report did not consider heritage impacts relative to socio-economic benefits nor did it consider any alternatives.

In terms of the HRM process generally required through the NHRA, and specifically outlined in sections 38(4) and (8), it was found to be non-compliant. This is not necessarily a reflection on the author of the 2013 HIA, but rather on the overall environmental management process.

It is recommended that the identified gaps<sup>2</sup> are addressed according to the “information required” presented in Table 7-2.

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<sup>2</sup> This report details the findings of the assessment for the Phase 2 re-alignment project only. Gaps identified in the 2013 HIA relate to the over TOP and must be considered separately from this report.

Table 7-2: Gap Analysis of 2013 Pistorius HIA

NHRA HRM Criteria				
HIA Report Requirements	Addressed in HIA	HIA Reference	Adequacy	Information Required
38(3)(a) - Identification and mapping of heritage resources	Yes	3.1 (p. 11), 4.1 (p. 16), 6.1-6.4 (pp. 28-57)	Inadequate	Identified sites are not mapped relative to project activities. Report must indicate positions in context of planned project infrastructure and activities.
38(3)(b) - Evaluation of significance	Yes	7.1-7.2 (pp. 58-59)	Adequate	Updated based on the Digby Wells CS methodology
38(3)(c) - Heritage impacts on resources	Yes	7.3-7.3.2 (pp. 72-62)	Inadequate	Heritage impacts are discussed generically, not relative to project activities. Report needs to indicate locality of sites relative to activities, and impacts assessed accordingly.
38(3)(d) - Heritage impact relative to sustainable social and economic benefits	No	Not included	Inadequate	Report should consider heritage impacts relative to social and economic benefits of the proposed project. IDPs, LEDs and other planning documents could be used to guide such evaluation.
38(3)(e) - Results of consultation	Yes	6.2.4 (p. 35), 6.2.18 (p. 48), 10 (p. 71)	Inadequate	Results of SEP and other consultation not included in the report. Details of any comment made by IAPs should be integrated.
38(3)(f) - Consideration of alternatives	No	Not included	Inadequate	The HIA needs to consider alternatives, including 'no-development' and 'no-go' options, as well as alternative uses for historical buildings.
38(3)(g) - Mitigation plans	Yes	7.4- (pp.62-63)	Inadequate	Mitigation plans are very generic and does not take into account project activities, alternatives and inherent cultural significance of identified heritage resources. Mitigation plans need to be made project specific and detail various steps needed to implement plans.
<b>NHRA HIA requirement compliance (out of 7)</b>	<b>5</b>	<b>Partial compliance</b>		
HRM Process Requirements	Action	Report / Case Reference	Date	Responsible HRA
38(4) - Report submission to responsible HRA	No	-	-	-
38(4) - Statutory Comment issued by responsible HIA	No	-	-	-
<b>HRM process compliance (out of 2)</b>	<b>0</b>	<b>Non-compliance</b>		
<b>Overall compliance (out of 9)</b>	<b>5</b>	<b>Partial compliance</b>		



### 7.3 Summary of Regional Socio-Economic Aspects

***The information summarised in this section is based on the socio-economic chapter in the EIR that was derived from the Socio-Economic Study for the Tweefontein Optimisation Project (Nemai 2010)***

The study area falls within the Emalahleni Local Municipality (ELM), including the town of Ogies, Phola Township and wards 18, 19, 30 and 32. These wards are though only peripherally within the study area. The ELM is characterised as an urban and rural area, comprising large farms, dispersed urban settlements, coal mines and power stations. The municipality's development pattern is described as fragmented. This is in partly due Apartheid-era separate development policy and exaggerated by undermined and mining right. In addition, natural environmental features such as wetlands restrict opportunities for the physical integration of communities.

The majority of the ELM population is urbanised: only 11 % reside in non-urban areas. The ELM's total population was estimated at 435 217 in 2007, accounting for 27 % of the District population and 9% of Mpumalanga Province's. The highest population density is found in Lynnville with 202 households per hectare, followed by Phola with 160 households per hectare.

Mpumalanga's economic growth is 2.5 %, exceeding the province's population growth rate. The dominant economic sectors in terms of value added are highly capital intensive, but only represent a relatively small proportion of employed persons. Electricity, manufacturing and mining comprise 59.6 % regional gross value added, but only accounts for 20.5 % of total employment.

The ELM Integrated Development Plan (IDP) provided the following employment per sector figures for the ELM population:

- 23 % mining and quarrying;
- 13.2 % community, social and personal services;
- 13.1 % in wholesale and retail trade;
- 10 % in manufacturing; and
- 3.1 % in agriculture, hunting, forestry and fishing.

All large employers in the study area are associated with mining as the primary activity. The study area's unemployment rate is 33.6%, higher than the national 21.9 %.

The ELM has the highest number of informal settlements in the Nkangala District. The housing backlog is estimated at around 38 627 units, with the largest backlog occurring in the western and north-western parts of Emalahleni / Witbank.



Transportation within the ELM and study area is a major concern. No public bus transport or taxi routes exist in the area: taxis only operate within and between bigger centres such as Phola and Kriel.

In summary, the study area population has increased faster than the provincial average. Most employment is provided by the mining and manufacturing sectors.

## 7.4 Geology and Palaeontological Potential

The Tweefontein operations are underlain by lithologies associated with the Karoo Supergroup and intrusive Karoo dolerites from the Jurassic Period. Of relevance to this study are geological formations associated with the Permian Ecca Group of the Karoo Supergroup (See Table 7-3).

The Ecca Group comprises a total of 16 formations. Within the project area, these are restricted to the Volksrust and Vryheid Formations.

The Volksrust Formation is predominantly argillaceous unit which interfingers with the overlying Beaufort Group and underlying Vryheid Formation. The formation consists of grey to black silty shale with thin, usually bioturbated, siltstone or sandstone lenses and beds. Thin phosphate and carbonate beds and concretions are fairly common (Johanson, et al., 2006). Palaeontologically, this formation has been rated with a high significance, and potentially contains trace fossils, rare temnospondyl amphibian remains, invertebrates, and organic microfossils (SAHRIS, 2015).

As stated previously, the Volksrust Formation is underlain by the Vryheid Formation of the Ecca Group. The Vryheid Formation pinches out against numerous local basement highs, in the north into the shales of the Volksrust Formation. The rugged pre-Karoo topography along the north western margin of the basin provided sheltered environments for the development of coal swamps. These include glacially sources valleys blocked by moraines and lagoons enclosed by islands of pre-Karoo rock (Johanson, et al., 2006). The lithology of the Vryheid Formation comprises of coarse to fine-grained sandstone and siltstone. Dark coloured siltstone can be observed due to the presence of carbon enrichment and coal beds, of which 5 dominant seams occur within the regional study area (Snyman, 1998). Palaeontologically, this formation has a very high significance and potentially contains rich fossil plant assemblages of the Permian Glossopteris Flora, rare fossil wood, diverse palynomorphs (SAHRIS, 2015). The Vryheid Formation has been rated with a very high palaeontological sensitivity (Figure 7-1).

In the area under consideration, the Vryheid Formation overlays directly on the Dwyka Group. The Dwyka Group comprises glacial, interglacial and post-glacial siliciclastic sediments (eg tillites), and has been rated with low palaeontological significance.

The palaeontological potential and sensitivity of the study area was assessed by Prof. Marion Bamford whose study is attached in Appendix C. Based on this report and the

baseline presented above, it is evident that the Permian Vryheid Formation is potentially highly sensitive because of the coal reserves and chance of fossil plants occurring. Fossil plants are present in the shales and mudstones between coal seams but seldom within coal seams.

The distribution of such fossils is, however, very sporadic and unpredictable. In addition, coal flora plants are not a rare although it requires time and opportunistic finds to locate any pockets of preserved plants. Within this palaeontological context insect wings are extremely rare and vertebrates are entirely absent.



Palaeontological Sensitivity	Required Action
<b>Very High</b>	Field assessment and protocol for finds are required.
<b>High</b>	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely.
<b>Moderate</b>	Desktop study is required.
<b>Low</b>	No palaeontological studies are required, however, a protocol for finds is required.
<b>Insignificant / Zero</b>	No palaeontological studies are required.
<b>Unknown</b>	These areas will require a minimum of a desktop study.

**Figure 7-1: Palaeo-sensitivity Map with Approximate Location of the Tweefontein Project indicated in white.**

**Table 7-3: Geological Profile of the Tweefontein Operations Project Area Adapted from Johanson, et al., 2006 and SAHRIS, 2015**

Ma	Eon	Era	Period	Supergroup	Group	Formation	Lithology's	Sensitivity	Fossil Heritage
180	Phanerozoic	Mesozoic	Jurassic	Karoo		Karoo dolerites	Intrusive dolerite dykes		
		Palaeozoic	Permian			Volksrust	Dark grey shale, basinal dark mudrocks with phosphatic / carbonate / sideritic concretions, minor coals	High	Trace Fossils, rare temnospondyl amphibian remains, invertebrates (bivalves, insects), minor coals with plant remains, petrified wood, organic microfossils (acritarchs), low-diversity marine to non-marine trace fossil assemblages
						Ecca	Light grey coarse- to fine-grained sandstone and siltstone. Dark coloured siltstone due to presence of carbon enrichment and coal beds. Deltaic mudrocks and sandstones, locally coastal and fluvial deposits, with occasional coal seams (Ecca "Coal Measures")	Very high	Abundant plant fossils of Glossopteris and other plants. Trace fossils. The reptile Mesosaurus has been found in the southern part of the Karoo Basin. Rich fossil plant assemblages of the Permian Glossopteris Flora (lycophods, rare ferns and horsetails, abundant glossopterids, cordaitaleans, conifers, ginkgoaleans), rare fossil wood, diverse palynomorphs. Abundant, low diversity trace fossils, rare insects, possible conchostracans, non-marine bivalves, fish scales
						Vryheid			
	Dwyka	Glacial, interglacial and post-glacial siliciclastic sediments (eg tillites)	Low	Trace fossils, organic-walled microfossils, rare marine invertebrates (eg molluscs), fish, vascular plants. Interglacial and post-glacial trace fossil assemblages, possibility of body fossils (eg molluscs, fish, plants)					
320									





## 7.5 Results of Reconnaissance

The general environment of the project area is dominated by mining related activities and the haul road. The proposed route of the re-alignment follows the existing haul road and keeps a distance of approximately 20-25 m from the haul road as shown in Figure 7-2. Most of the route adjacent the haul road is disturbed from the construction of said road and erosion channels have been dug on either side at irregular intervals. The proposed route crosses the haul road at the existing culvert bridge which was built by the mine. The eastern end of the proposed route runs through a grove of trees within 10 m of a dump as shown in Figure 7-3.



**Figure 7-2: Previous Access Route Located within the Proposed Re-alignment shown in blue above. The Haul Road is Located to the Right as shown in red above**



**Figure 7-3: Eastern End of the Re-alignment Located next to Dump**

### 7.5.1 Identified Heritage Resources

During the pre-disturbance survey conducted by Digby Wells, one burial ground was identified / verified. This burial ground was first identified by Pistorius 2013 as site GY 01 (Pistorius 2013: 31). He recommended either exhumation and relocation or *in-situ* management of the burial ground.

The site is located within 30 m of the proposed re-alignment

### 7.5.2 BGG-001 / Burial ground

Cultural Significance:	Field Rating:	Co-ordinates	
Very High	Grade IV A	-26.031611	29.164132

A very large burial ground of around 110 m x 140 m or 1.5 ha, located approximately 30 m from the proposed road re-alignment. The burial ground is fenced with an access gate. The site is not well kept.

The burial ground contains more than 1000 graves, dressings of which comprise formal granite dressings as well as dressings of stone and cement.

A site notice was erected on site advertising a grave relocation process.



**Figure 7-4: General Views of GY 01**

## 8 Heritage Impact Assessment

### 8.1 Methodology

#### 8.1.1 Evaluation of Significance

The significance rating process is designed to provide a numerical rating of the cultural significance<sup>3</sup> of identified heritage resources. The evaluation was done as objectively as possible through a matrix developed by Digby Wells for this purpose. In addition, the methodology aims to allow ratings to be reproduced independently should it be required, provided that the same information sources are used.

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

**Box 3: NHRA section 3 criteria**

<sup>3</sup> Cultural significance is defined in the NHRA as the intrinsic “aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance” of a heritage resource. These attributes are combined and reduced to four themes used in the Digby Wells significance matrix: aesthetic, historical, scientific and social.



This matrix takes into account heritage resources assessment criteria set out in subsection 3(3) of the NHRA (see Box 3), which determines the intrinsic, comparative and contextual significance of identified heritage resources. A resource's importance rating is based on information obtained through review of available credible sources and representivity or uniqueness (i.e. known examples of similar resources to exist). The final significance attributed to a resource furthermore takes into account the physical integrity of the fabric of the resource. The formula used to determine significance can be summarised in Box 4.

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

**Box 4: CS formula**

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

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

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

The weight assigned to the various parameters for significance in the formula, significance ratings and recommended mitigation are presented in Table 8-1.

### 8.1.2 Field Ratings

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

The field rating process is designed to provide a numerical rating of the recommended grading of identified heritage resources. The evaluation was done as objectively as possible by integrating the field rating into the significance matrix. Field ratings guide decision-making in terms of appropriate minimum required mitigation measures and consequent management

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

**Box 5: Field rating formula**



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responsibilities in accordance with section 8 of the NHRA. The formula used to determine field ratings is summarised in Box 5. The weight assigned to the various field rating parameters in the formula and the sum of the average ratings are is presented in Table 8-1.

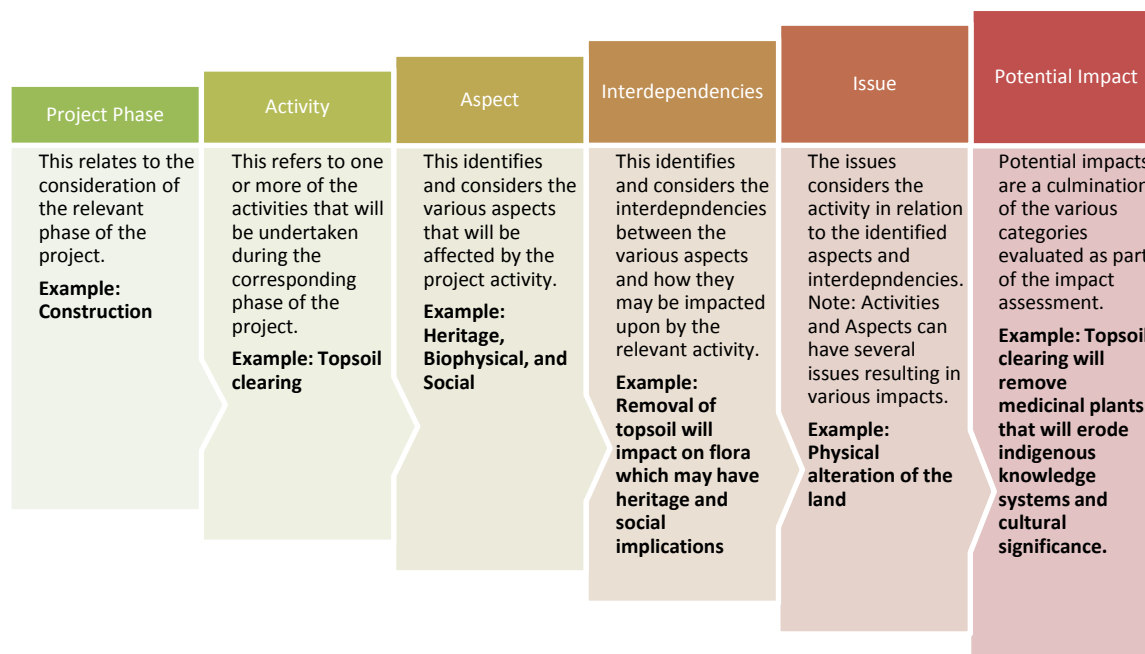
**Table 8-1: Ratings and Descriptions used in Determining CS and Field Ratings**

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



### 8.1.3 Impact Assessment

The potential impacts were considered through an examination of the project phase and activity, the environmental aspect, the interdependencies between aspects, an assessment and classification of categories, and consideration of the potential impact on heritage resources. An example of this process is presented in Figure 8-1.



**Figure 8-1: Example of how Potential Impacts were Considered.**

The proposed activities for which environmental authorisation are being applied for correspond to Listing Notices GNR 983, 984 and 984.

#### 8.1.3.1 Defining Heritage Impacts

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

- Direct or primary heritage impacts** affect the fabric or physical integrity of the heritage resource, for example destruction of an archaeological site or historical building. Direct or primary impacts may be the most immediate and noticeable. Such impacts are usually ranked as the most intense, but can often be erroneously assessed as high-ranking.



- **Indirect, induced or secondary heritage impacts** can occur later in time or at a different place from the causal activity, or as a result of a complex pathway. For example, restricted access to a heritage resource resulting in the gradual erosion of its cultural significance that may be dependent on ritual patterns of access. Although the physical fabric of the resource is not affected through any primary impact, its significance is affected that can ultimately result in the loss of the resource itself.
- **Cumulative heritage impacts** result from in-combination effects on heritage resources acting within a host of processes that are insignificant when seen in isolation, but which collectively have a significant effect. Cumulative effects can be:
  - **Additive:** the simple sum of all the effects, e.g. the total number of development activities that will occur within the study area.
  - **Synergistic:** effects interact to produce a total effect greater than the sum of the individual effects, e.g. the effect of each different activity on the archaeological landscape in the study area.
  - **Time crowding:** frequent, repetitive impacts on a particular resource at the same time, e.g. the effect of regular blasting activities on a nearby rock art site or protected historical building high.
  - **Neutralizing:** where the effects may counteract each other to reduce the overall effect, e.g. the effect of changes in land use could reduce the overall impact on sites within the archaeological landscape of the study area.
  - **Space crowding:** high spatial density of impacts on a heritage resource, e.g. density of new buildings resulting in suburbanisation of a historical rural landscape.

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

In addition, the NHRA requires that heritage resources are graded in terms of national, provincial and local concern based on their importance and consequent official (i.e. State) management effort required. The type and level of baseline information required to adequately predict heritage impacts varies between these categories. Three 'concentric' study areas were defined for the purposes of this study and are discussed in detail in the HSR.

### **8.1.3.2 Impact Assessment**

The impact rating process is designed to provide a numerical rating of the identified heritage impacts. The significance rating follows an established impact/risk assessment formula is shown in Box 6.





The weight assigned to the various parameters for positive and negative impacts in the formula is presented in Table 8-3 below.

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

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

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

Impacts were rated prior to mitigation and again after consideration of the proposed mitigation measures. Impacts were then categories into one of eight categories listed in Table 8-3. The relationship between the consequence, probability and significance ratings is also graphically depicted in Table 8-3.

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

*where:*

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

*and*

*Probability = Likelihood of an impact occurring*

In the formula for calculating consequence:

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

**Box 6: Impact assessment formula**

**Table 8-2: Description of Duration, Extent, Intensity and Probability Ratings used in Impact Assessment**

Value	DURATION RATING - A measure of the lifespan of the impact		EXTENT RATING A measure of how wide the impact would occur		INTENSITY RATING- A measure of the degree of harm, injury or loss.		PROBABILITY RATING - A measure of the chance that consequences of that selected level of severity could occur during the exposure window.	
	Probability	Description	Exposure	Description	Intensity	Description	Probability	Description
7	<b>Permanent</b>	Impact will permanently alter or change the heritage resource and/or value (Complete loss of information)	<b>International</b>	Impacts on heritage resources will have international repercussions, issues or effects, i.e. in context of international cultural significance, legislation, associations, etc.	<b>Extremely high</b>	Major change to Heritage Resource with High-Very High Value	<b>Certain/Definite</b>	Happens frequently. The impact will occur regardless of the implementation of any preventative or corrective actions.
6	<b>Beyond Project Life</b>	Impact will reduce over time after project life (Mainly renewable resources and indirect impacts)	<b>National</b>	Impacts on heritage resources will have national repercussions, issues or effects, i.e. in context of national cultural significance, legislation, associations, etc.	<b>Very high</b>	Moderate change to Heritage Resource with High-Very High Value	<b>High probability</b>	Happens often. It is most likely that the impact will occur.
5	<b>Project Life</b>	The impact will cease after project life.	<b>Region</b>	Impacts on heritage resources will have provincial repercussions, issues or effects, i.e. in context of provincial cultural significance, legislation, associations, etc.	<b>High</b>	Minor change to Heritage Resource with High-Very High Value	<b>Likely</b>	Could easily happen. The impact may occur.
4	<b>Long Term</b>	Impact will remain for >50% - Project Life	<b>Municipal area</b>	Impacts on heritage resources will have regional repercussions, issues or effects, i.e. in context of the regional study area.	<b>Moderately high</b>	Major change to Heritage Resource with Medium-Medium High Value	<b>Probable</b>	Could happen. Has occurred here or elsewhere
3	<b>Medium Term</b>	Impact will remain for >10% - 50% of Project Life	<b>Local</b>	Impacts on heritage resources will have local repercussions, issues or effects, i.e. in context of the local study area.	<b>Moderate</b>	Moderate change to Heritage Resource with Medium - Medium High Value	<b>Unlikely / Low probability</b>	Has not happened yet, but could happen once in a lifetime of the project. There is a possibility that the impact will occur.
2	<b>Short Term</b>	Impact will remain for <10% of Project Life	<b>Limited</b>	Impacts on heritage resources will have site specific repercussions, issues or effects, i.e. in context of the site specific study area.	<b>Low</b>	Minor change to Heritage Resource with Medium - Medium High Value	<b>Rare / Improbable</b>	Conceivable, but only in extreme circumstances. Have not happened during the lifetime of the project, but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	<b>Transient</b>	Impact may be sporadic/limited duration and can occur at any time. E.g. Only during specific times of operation, and not affecting heritage value.	<b>Very Limited</b>	Impacts on heritage resources will be limited to the identified resource and its immediate surroundings, i.e. in context of the specific heritage site.	<b>Very low</b>	No change to Heritage Resource with values medium or higher, or Any change to Heritage Resource with Low Value	<b>Highly Unlikely /None</b>	Expected never to happen. Impact will not occur.

**Table 8-3: Impact significance ratings, categories and relationship between consequence, probability and significance**

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change.	Major (positive)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the heritage resources.	Moderate (positive)
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the heritage resources.	Minor (positive)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the heritage resources.	Negligible (positive)
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the heritage resources.	Negligible (negative)
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the heritage resources.	Minor (negative)
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the heritage resources and result in severe effects.	Moderate (negative)
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects.	Major (negative)

**Relationship between consequence, probability and significance ratings**

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



## 8.2 Heritage Impacts

The construction of a road is associated with various impacts on both the biophysical and socio-economic environment. This section describes environmental impacts assessed in relation to the Cultural Heritage aspect. This section is based on the 2013 HIA, updated and amended to include the CS of heritage resources identified in the 2013 HIA and through a pre-disturbance survey conducted by Digby Wells of the proposed road re-alignment.

This section considers the potential direct and indirect impacts on heritage resources identified (See Section 7.5 above) within the development footprint of the Phase 2 road re-alignment. These impacts are considered in relation to the project related activities outlined in section 3 above. .

The impact assessment and mitigation plans chapter is presented as a narrative description of the sources of risk and potential impacts, and as a discussion of feasible mitigation measures to avoid and / or better negative impacts and enhance positive ones.

### 8.2.1 Impacts on Burial Grounds and Graves

As reported in the 2013 HIA, and verified by the pre-disturbance survey undertaken by Digby Wells, the most numerous type of heritage resource occurring in the study area are burial grounds and graves. Identified / verified burial grounds and graves of relevance to the Phase 2 re-alignment project are GY 01. The potential impacts to this resource are discussed further below.

Heritage impacts can potentially manifest as direct effects on the gravesites, as well as indirectly on the inherent cultural significance of burial grounds and graves and communities associated with the deceased.

#### **8.2.1.1 Direct Impacts on Burial Grounds and Graves GY 01**

Direct impacts on grave sites can include damage to or destruction of surface dressings caused by diverse actions during the construction phase of the project. Direct impacts can also include damage to or destruction of the *contents* of graves, for example due to accidental or deliberate exposure and erosion of surrounding soils. See Table 8-4 for the assessment of direct impacts on gravesites.

Any unmitigated direct impact on a grave must be considered as extremely detrimental, and may occur through the expected life of the project. Such impacts will not only affect the physical site, but will inevitably lead to social repercussions amongst descendant communities and public outcry. In addition, the person or parties responsible for any damage will be liable to fines and / or imprisonment in accordance with the NHRA, as well as other national and provincial legislation.

To avoid these extremely negative, direct impacts on gravesites it will be necessary to implement feasible mitigation measures to promote the preservation of the burial ground and maintain the status quo.

**Table 8-4: Assessment of direct impacts on burial grounds and graves**

<b>IMPACT DESCRIPTION: Physical Changes to Burial Grounds &amp; Graves</b>				
<b>Predicted for Project Phase:</b>	Pre-construction	Construction	Operation	
<b>Dimension</b>	<b>Rating</b>	<b>Motivation</b>		
<b>PRE-MITIGATION</b>				
Duration	Permanent (7)	Unmitigated changes to any gravesite may result in permanent destruction of graves, or very long-term social repercussions that could continue well beyond the project life.	Consequence: Extremely detrimental (-20)	Significance: Moderate - negative (-100)
Extent	National (6)	Social repercussions resulting from unmitigated changes to graves could affect at the very least descendant communities residing in the region. In addition, unmitigated changes to graves will result in the involvement of local, provincial and national authorities, as well as potentially national media attention.		
Intensity x type of impact	Extremely high - negative (-7)	Any unmitigated changes to graves must be considered extremely negative		
Probability	Likely (5)	If the recommended mitigation plans are not implemented, and any changes to graves take place, it is very likely that the above impacts will manifest.		
<b>MITIGATION:</b>				
<p>GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a CMP that includes:</p> <p>Establishing a buffer of 25 m around the burial ground and graves;</p> <p>Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and</p> <p>Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.</p>				
<b>POST-MITIGATION</b>				
Duration	Short term (2)	Impacts on graves, once mitigated, will be short-term provided that the mitigation measures are appropriately implemented.	Consequence: Slightly detrimental (-7)	Significance: Negligible - negative (-27)
Extent	Very Limited (1)	Mitigation through the proposed recommendations will reduce the extent of potential impacts to limited portions of the burial ground.		



Intensity x type of impact	Very high - negative (-6)	In terms of in situ conservation, the proposed mitigation measures will result in a minor change to the burial ground, however, loss or restricted access will still negatively affect the graves and persons associated.		
Probability	Unlikely (3)	It is unlikely that these impacts will remain after mitigated changes.		

### **8.2.1.2 Indirect Impacts on Burial Grounds and Graves**

Indirect impacts can include among others loss or restricted access to gravesites, degradation of the intrinsic CS of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties. See Table 8-5 for the assessment of indirect impacts on gravesites.

In addition to impacts or effects on people associated with the graves and deceased, these effects can also pose a significant social and litigation risks to Glencore, e.g. claims against the company for any loss, injury or death suffered whilst visiting gravesites.

To reduce such impacts and risks, a CMP must be developed, integrated into the EMP and implemented whenever required.

A CMP is fundamentally a consultative process. To ensure that the CMP is developed according to best practice, it is highly recommended that the process to identify and consult affected stakeholders outlined in the NHRA: Regulations is complied with, irrespective of whether graves are older or younger than 60 years. This would entail an extensive Burial Grounds and Graves Consultation (BGGC) process that must aim to identify *bona fide* next of kin and reach agreement regarding continued conservation and management of gravesites.

The CMP will need to include entitlements to which affected parties are entitled, and clearly define any restrictions and limitations to rights that may apply, e.g. due to health and safety risks. The CMP should, ideally, be submitted to the SAHRA Burial Grounds and Graves unit for record purposes.


**Table 8-5: Assessment of indirect impacts on burial grounds and graves**

<b>IMPACT DESCRIPTION: Effects on Communities</b>				
<b>Predicted for Project Phase:</b>		Construction	Operation	
<b>Dimension</b>	<b>Rating</b>	<b>Motivation</b>		
<b>PRE-MITIGATION</b>				
Duration	Project Life (5)	Impacts such as restricted access and possible accidental damage will remain throughout the project life.	Consequence: Extremely detrimental (-18)	Significance: Moderate - negative (-90)
Extent	National (6)	Social repercussions resulting from unmitigated changes to graves could affect at the very least descendant communities residing in the region. In addition, unmitigated changes to graves will result in the involvement of local, provincial and national authorities, as well as potentially national media attention.		
Intensity x type of impact	Extremely high - negative (-7)	Any unmitigated changes to graves must be considered extremely negative		
Probability	Likely (5)	If the recommended mitigation plans are not implemented, and any changes to graves take place, it is very likely that the above impacts will manifest.		
<b>MITIGATION:</b>				
An extensive Burial Grounds and Graves Consultation process must be implemented in accordance with NHRA Regulations to identify bona fide next of kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families.				
<b>POST-MITIGATION – Mitigation Measures (if implemented) will Enhance the Inherent CS (Positive Impact) through the Sustainable Use by Affected Communities.</b>				
Duration	Project Life (5)	As for pre-mitigation	Consequence: Highly beneficial (15)	Significance: Moderate - positive (75)
Extent	Municipal Area (4)	The development of CMPs would require the involvement at the very least of the local municipal authorities. Any potential accidental damage to gravesites during project life could escalate to national level.		
Intensity x type of impact	Very high - positive (6)	In terms of in situ conservation, loss or restricted access will still negatively affect the graves and persons associated. However, through developing a CMP in consultation with affected communities, the intrinsic CS of burial sites can be preserved.		



Probability	Likely (5)	Mitigation will ensure that grave sites are conserved <i>in situ</i> according to the requirements of affected communities, and within legal requirements. This will ensure that the CS of gravesites are enhanced through sustainable use by affected communities.	
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## 8.2.2 Impacts on the Vryheid Formation and Palaeontological Potential

**Surface activities associated with the proposed Phase 2 road re-alignment will not impact on the palaeontology of the study area.**

**Palaeontological impacts are only expected for underground mining activities. Consequent assessments would therefore only then be required and if fossils are found by the geologist or environmental personnel.**

**Refer to Appendix C for the detailed Palaeontological Impact Assessment Report.**

Notwithstanding the inherent very high palaeontological sensitivity of the Vryheid Formation, project activities were not considered to have any major impacts on fossils, and therefore no further palaeontological assessments are required. Surface activities will not in any way impact on fossil heritage. Both Phases 1 and 2 of the road re-alignment are highly unlikely to impact on fossils, as construction will not penetrate more than 2 m below the surface, which is already extensively disturbed from previous activities such as agriculture and road works.

## 9 Heritage Impacts vs Sustainable Socio-Economic Benefits

Based on the socio-economic summary presented in section 7.2, it is evident that unemployment and housing are major concerns within the study area and wider region. The mining sector was shown to be largest direct employer, as well the largest indirect contributor to other employment opportunities who rely on providing products and services to the mining sector.

The following local and national socio-economic benefits of the continuation of mining operations from the proposed project are anticipated:

- Local and regional employment opportunities. Although smaller in number than employment creation during the construction phase, these will have a significantly longer duration;
- Increased business opportunities for local entrepreneurs through the supply of goods and services to the mine;
- A positive macro-economic impact at a local, regional and provincial level due to operational expenditure, taxes and royalties; and
- Economic and social benefits associated with Corporate Social Responsibility (CSR) and Local Economic Development (LED) initiatives by the mine.

These sustainable socio-economic benefits to the surrounding communities that could derive from the Tweefontein Project and Phase 2 road re-alignment arguably outweigh the significance of heritage impacts. This assumption is based on the following:





- The identified heritage resources are not unique;
- The historical structures are of low cultural significance;
- Although burial grounds and graves are highly significant, all potential impacts these sites can be managed through appropriate mitigation plans; and
- As discussed in sections 7.1.1 above and 10 below, coal mining heritage has over the years already become an aspect of the cultural environment.

## 10 Cumulative Impacts on the Cultural Landscape

The proposed Phase 2 road re-alignment would not have major significant cumulative heritage impacts on the cultural landscape. The re-alignment is proposed within an area that over the years has already been altered by coal mining activities.

Broadly speaking, cumulative heritage impacts that could be associated with the overall Tweefontein Project include the following:

- The continued development and operation of the Tweefontein Project will have an additive effect on the cultural landscape. This implies that any significant heritage resources that may occur in the project area could experience either direct or indirect effects of time.
- Various activities associated with coal mining, such as blasting, may also have ‘time crowding’ cumulative effects, where frequent, repetitive impacts on identified sites such as burial grounds and historical structures could affect their physical integrity.
- Finally, additive effects will contribute to ‘space crowding’ cumulative effects. As indicated in the 2013 HIA and summarised in section 7.1.1, the study area is located in a wider region with a demonstrated coal mining heritage spanning more than 100 years. The ‘space crowding’ effect will contribute to this continued coal mining heritage, but at the same time reduce the more rural, agricultural heritage. Increased coal mine and other industrial developments will over time also sterilise the landscape of certain archaeological and historical heritage.

## 11 Conclusion

Digby Wells was requested by Glencore to conduct a HRM process component for the required EA process for Phase 2 of the Tweefontein Road Re-alignment Project. Phase 2 involves the re-alignment of the P141-1 Provincial Road from the D2769 extension road following a north westerly direction for approximately 3.4 km to join the existing P 141-1 road. The proposed route is slightly curved eastward to avoid an existing graveyard (GY01). As part of the proposed Project, the P141-1 Provincial Road between the P29-1 (R555) and D2770 (R547) will be permanently closed. Furthermore, the D2770 (R547) Road between the P141-1 Provincial Road and the N12 will be permanently closed.

The 2013 HIA listed a total of 30 heritage sites: 24 burial grounds and six historical structures (Pistorius 2013: 28-57). Of relevance to the Phase 2 road re-alignment are the potential direct and indirect impacts to the burial ground and graves GY 01.

These can be summarised as follows:

- Damage to or destruction of surface dressings of graves caused by diverse actions during the construction phase of the project; and
- Loss or restricted access to gravesites, degradation of the intrinsic CS of gravesites associated with living heritage due to loss of access, and health and safety risks to any visitors to gravesites that may be located within mining properties

To mitigate these potential impacts to the burial ground and graves GY 01, the following recommendations apply:

- GY 01 must be preserved in situ. Potential direct impacts to the burial ground should be mitigated through the implementation of a CMP that includes:
  - Establishing a buffer of 25 m around the burial ground and graves;
  - Educating engineers and construction workers of the location of the burial grounds and potential direct impacts; and
  - Monitoring of the burial grounds and graves during the construction phase of the road re-alignment.
- An extensive BGGC process must be implemented in accordance with NHRA Regulations to identify bona fide Next-of-Kin and reach agreement regarding the future of the graves. Gravesites should ideally be conserved in situ, and the consultation process must enable a mutually agreed CMP to be developed and approved, allowing for visitation rights by families

In addition to the identified heritage resources, this assessment also considered the Vryheid Formation. Notwithstanding the inherent very high palaeontological sensitivity of the Vryheid Formation, surface activities associated with the Phase 2 re-alignment were not considered to have any impacts on fossils, and therefore no further palaeontological assessments are required. Similarly, cumulative heritage impacts were considered to be negligible.



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## 12 Bibliography

Johanson, M. R., van Vuuren, C. J., Visser, J. N., Cole, D. I., de V. Wickens, H., Christie, A. D., et al. (2006). Sedimentary Rocks of the Karoo Supergroup. In M. R. Johnson, C. R. Anhaeusser, & R. J. Thomas (Eds.), *The Geology of South Africa* (pp. 461-500). Johannesburg: The Geological Society of South Africa and Council for Geosciences.

SAHRIS. (2015). *Fossil Heritage Layer Browser*. Retrieved May 27, 2015, from The South African Heritage Resources Information System: <http://www.sahra.org.za/fossil-heritage-layer-browser>

Snyman, C. P. (1998). Coal. In M. G. Wilson, & C. P. Anhaeusser (Eds.), *The Mineral Resources of South Africa: Handbook* (pp. 136-205). Johannesburg: Council for Geosciences.

Heritage Impact Assessment

Phase 2 of the Proposed Re-alignment of the P141-1 Provincial Road, Tweefontein Mine  
Complex, Mpumalanga Province

GLE3075



**DIGBY WELLS**  
ENVIRONMENTAL

## Appendix A: Specialists CV

## JOHAN NEL

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
09/2011 to present	Digby Wells Environmental	Manager: Heritage Resources Management unit
05/2010-2011	Digby Wells Environmental	Archaeologist
10/2005-05/2010	Archaic Heritage Project Management	Manager and co-owner
2003-2007	Rock Art Mapping Project	Freelance archaeologist Resident archaeologist



2002-2003	Department of Anatomy, University of Pretoria	Special assistant: 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 PROFESSIONAL REGISTRATION

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

## 6 PUBLICATIONS AND CONFERENCE PAPERS

<b>Authors and Year</b>	<b>Title</b>	<b>Published in/presented at</b>
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
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.

## 7 PROJECT EXPERIENCE

### 7.1 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.

### 7.2 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.



### 7.3 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. Slypsteen 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.



## 7.4 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.

## **7.5 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.



DIGBY WELLS  
ENVIRONMENTAL

## NATASHA HIGGITT

Ms Natasha Higgitt  
Assistant Heritage Consultant  
Social Department  
Digby Wells Environmental

### 1 EDUCATION

- University of Pretoria
- BA Degree (2008)
- Archaeology Honours (2010)
- Title of Dissertation- Pass the Salt: An Archaeological analysis of lithics and ceramics from Salt Pan Ledge, Soutpansberg, for evidence of salt working and interaction.

### 2 LANGUAGE SKILLS

- English - Excellent (read, write and speak)
- Afrikaans - Fair (read, write and speak)
- Italian – Poor (Speaking only)

### 3 EMPLOYMENT

- July 2011 to Present: Assistant Heritage Consultant at Digby Wells Environmental
- April 2011 to June 2011: Lab assistant at the Albany Museum Archaeology Department, Grahamstown, Eastern Cape
- April 2010 to March 2011: Intern at the Archaeology Department, Albany Museum, Grahamstown, Eastern Cape under the Department of Sports, Recreation, Arts and Culture, Eastern Cape Government, South Africa (DSRAC)

### 4 FIELD EXPERIENCE

- Human remains rescue excavation at St Francis Bay, Eastern Cape
- Human remains rescue excavation at Wolwefontein, Eastern Cape
- Recorded two rock art sites at Blaauwbosch Private Game Reserve, Eastern Cape

- Attended a 2 week excavation/study tour in the Friuli Region in Italy, organised by the *Società Friulana di Archeologia*, sponsored by *Ente Friuli nel Mondo*, and excavated a 12th century medieval castle
- Attended a 2 week excavation in Limpopo, Waterpoort Archaeological Project organised by Xander Antonites (Yale PhD Candidate)
- A total of 5 University of Pretoria Archaeology field schools in Limpopo and Gauteng spanning over 4 years

## 5 PROJECT EXPERIENCE

- Notification of Intent to Develop for the Doornkloof Flood Remedial Measures Project, Centurion, Gauteng Province for Iliso Consulting (Pty) Ltd (Digby Wells Environmental)
- Notification of Intent to Develop for the Oakleaf Open Cast Coal Mine, Bronkhorstspuit, Gauteng Province for Oakleaf Resources (Digby Wells Environmental)
- Notification of Intent to Develop for the Rietfontein 101IS Prospecting Project for Rustenburg Platinum (Digby Wells Environmental)
- Heritage Impact Assessment for the Weltevreden Open Cast Coal Mine, Belfast, Mpumalanga for Northern Coal (Pty) Ltd (Digby Wells Environmental)
- Notification of Intent to Develop for the Grootegeluk Expansion Project, Lephalale, Limpopo Province for Exxaro Resources (Pty) Ltd (Digby Wells Environmental)
- Notification of Intent to Develop and Heritage Statement for the London Road Petrol Station, Alexandria, Gauteng for ERM Southern Africa (Pty) Ltd (Digby Wells Environmental)
- Heritage Impact Assessment for the Roodepoort Strengthening Project, Roodepoort, Gauteng for Fourth Element (Digby Wells Environmental)
- Heritage Statement for the Stoffel Park Bridge Upgrade, Mamelodi, Gauteng for Iliso Consulting (Pty) Ltd (Digby Wells Environmental)
- Heritage Statement for the Witrand Prospecting EMP, Bethal, Mpumalanga for Rustenburg Platinum (Digby Wells Environmental)
- Heritage Statement for the Onverwacht Prospecting EMP, Kinross, Mpumalanga for Rustenburg Platinum (Digby Wells Environmental)
- Heritage Statement for a Proposed Acetylene Gas Production Facility, located near Witkopdorp, Daleside, south of Johannesburg, Gauteng Province for Erm Southern Africa (Pty) Ltd (Digby Wells Environmental)
- Heritage Impact Assessment for the Platreef Platinum Project, Mokopane, Limpopo for Platreef Resources (Digby Wells Environmental)
- Heritage Statement for ATCOM and Tweefontein Dragline Relocation Project, near Witbank, Mpumalanga Province for Jones and Wagner Consulting Civil Engineers (Digby Wells Environmental)





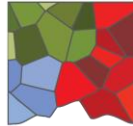
- Heritage Statement Report for the Wilgespruit Bridge Upgrade, Pretoria, Gauteng Province for Iliso Consulting (Pty) Ltd (Digby Wells Environmental)
- Heritage Statement Report for the Kosmosdal sewer pipe bridge upgrade, Pretoria, Gauteng Province for Iliso Consulting (Pty) Ltd (Digby Wells Environmental)
- Phase 1 Heritage Impact Assessment for the Thabametsi Coal Mine, Lephalale, Limpopo for Exxaro Coal (Digby Wells Environmental)
- Heritage Statement for the Zandbaken Coal Mine Project, Zandbaken 585 IR, Sandbaken 363 IR and Bosmans Spruit 364 IS, Standerton, Mpumalanga for Xtrata Coal South Africa (Digby Wells Environmental)
- Phase 1 Heritage Impact Assessment for the Brakfontein Thermal Coal Mine, Mpumalanga for Universal Coal (Digby Wells Environmental)
- Development of a RAP for Aureus Mining for the New Liberty Gold Mine Project, Liberia (Digby Wells Environmental)
- Phase 1 Archaeological Impact Assessment for the MBET Pipeline, Steenbokpan, Limpopo (Digby Wells Environmental)
- Notice of Intent to Develop and Cultural Resources Pre-Assessment for Orlight SA (PTY) Ltd Solar PV Project. 2012. (Digby Wells Environmental)
- Agricultural Survey for Platreef ESIA, Mokopane, Limpopo. 2011. (Digby Wells Environmental)
- Cultural Resources Pre-Assessment for the Proposed Sylvania Everest North Mining Development in Mpumalanga, near Lydenburg. 2011. (Digby Wells Environmental)
- Phase 2 Mitigation of Archaeological sites at Boikarabelo Coal Mine, Steenbokpan, Limpopo. 2011. (Digby Wells Environmental)
- Cultural Resources Pre-Assessment for Proposed Platinum Mine Prospecting in Mpumalanga, near Bethal for Anglo Platinum. 2011. (Digby Wells Environmental)
- Cultural Resources Pre-Assessment for proposed Platinum Mine at Mokopane, Limpopo for Ivanhoe Platinum. 2011. (Digby Wells Environmental)
- Phase 1 AIA Mixed-use housing Development, Kwanobuhle, Extension 11, Uitenhage, Eastern Cape. 2011.
- Phase 1 AIA Centane to Qholora and Kei River mouth road upgrade survey, Mnquma Municipality, Eastern Cape. 2011. (SRK Consulting)
- Phase 1 AIA Clidet Data Cable survey, Western Cape, Northern Cape, Free State and Eastern Cape. 2011. (SRK Consulting)
- Phase 1 AIA Karoo Renewable Energy Facility, Victoria West, Northern Cape. 2011. (Savannah Environmental)
- Phase 1 AIA Windfarm survey in Hamburg, Eastern Cape. 2010. (Savannah Environmental)



- Phase 1 AIA Windfarm survey in Molteno, Eastern Cape. 2010. (Savannah Environmental)
- Phase 1 AIA Housing Development at Motherwell, P.E. 2010. (SRK Consulting)
- Phase 1 AIA Sand quarry survey in Paterson, Eastern Cape. 2010. (SRK Consulting)
- Phase 1 AIA Quarry Survey at Victoria West. 2010. (Acer [Africa] Environmental Management Consultants)
- Phase 1 AIA Quarry Survey at Port Elizabeth. 2010. (E.P Brickfields)

## **6 PROFESSIONAL AFFILIATIONS**

- Association of Southern African Professional Archaeologists (ASAPA): Professional member
- Association of Southern African Professional Archaeologists (ASAPA): CRM Practitioner (Field Supervisor: Stone Age, Iron Age and Rock Art)
- South African Museums Association (SAMA): Member



# 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); 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) Prof T.N. Huffman 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) Prof T.N. Huffman 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) Prof T.N. Huffman 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 Jaco van der Walt 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) Prof T.N. Huffman 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 Jaco van der Walt jaco.heritage@gmail.com



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 Thohoyandou SEA Project	Heritage Statement	Archaeologist	2 months	Eskom	Completed Heritage Statement	Heritage Contracts Unit Jaco van der Walt 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 Jaco van der Walt 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 Karim Sadr 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 Gavin Anderson 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) Prof T.N. Huffman thomas.huffman@wits.ac.za
Der Brochen Archaeological 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 Jaco van der Walt jaco.heritage@gmail.com
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 Jaco van der Walt 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) Vici Napier vici@sefsa.co.za
Bathhako Mine Expansion	North-West Province, South Africa	2010 2010	Mapping of historical sites located within the Bathhako Mine Expansion Area	Mapping	Archaeologist	1 week	Heritage Contracts Unit	Completed Mapping	Heritage Contracts Unit Jaco van der Walt 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 Cyrille Mutombo 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	Heritage Impact Assessment	Heritage Consultant	2 years	Randgold Resources	Completed Heritage Impact Assessment	Randgold Resources Charles Wells Charles.wells@randgoldresources.com
Everest North Mining Project	Steelpoort, Mpumalanga, South Africa	2012 2012	Heritage Impact Assessment on the farm Vygenhoek	Heritage Impact Assessment	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	Heritage Impact Assessment	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 Gerick Mouton
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	Heritage Impact Assessment	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	On-going	Aureus Mining	Project is on-going	Aureus Mining
Falea Uranium Mine Environmental Assessment	Falea, Mali	2013 2013	Heritage Scoping for the proposed Falea Uranium Mine	Heritage Scoping	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	Heritage Impact Assessment	Heritage Consultant	6 months	Atkins Limited	Completed Heritage Impact Assessment and provided recommendations for further studies	Atkins Limited Irene Bopp Irene.Bopp@atkinglobal.com
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 Alan Cochran 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 Kasantha Moodley 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	On-going	Exxaro	Project is on-going	Exxaro Johan van der Bijl Johan.vanderbijl@exxaro.com



Nzoro 2 Hydro Power Project	Oriental 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	On-going	Randgold Resources	Completed introductory meetings – project on-going	Kibali Gold Mine Cyrille Mutombo 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	Heritage Impact Assessment	Heritage Consultant	On-going	AECOM	Project is on-going	AECOM
Soweto Cluster Reclamation Project	Soweto, Gauteng, South Africa	2014 2014	Heritage Impact Assessment for reclamation activities associated with the Soweto Cluster Dumps	Heritage Impact Assessment	Heritage Consultant	On-going	ERGO	Project is on-going	ERGO Greg Ovens 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	NID	Heritage Consultant	On-going	BHP Billiton	Project is on-going	BHP Billiton
Klipspruit Extension: Weltevreden Project	Ogies, Mpumalanga, South Africa	2014 2014	NID and Heritage Statement for the expansion of the Klipspruit Mine	NID	Heritage Consultant	On-going	BHP Billiton	Project is on-going	BHP Billiton
Ergo Rondebult Pipeline Basic Assessment	Johannesburg, South Africa	2014 2014	NID and Heritage Statement for the construction of the Rondebult Pipeline	NID	Heritage Consultant	1 Week	ERGO	Completed screening assessment and NID	ERGO
Kibali ESIA Update Project	Oriental Province, Democratic Republic of Congo	2014 2014	Update of the Kibali ESIA for the inclusion of new open-cast pit areas	Heritage Impact Assessment	Heritage Consultant	On-going	Randgold Resources	Project is on-going	Randgold Resources Charles Wells 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	On-going	Gold One International	Project is on-going	Gold One International

Heritage Impact Assessment

Phase 2 of the Proposed Re-alignment of the P141-1 Provincial Road, Tweefontein Mine  
Complex, Mpumalanga Province

GLE3075



**DIGBY WELLS**  
ENVIRONMENTAL

## Appendix B: 2013 HIA

**Prepared for:**

**CLEAN STREAM ENVIRONMENTAL SERVICES**

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**A PHASE I HERITAGE IMPACT ASSESSMENT (HIA) STUDY FOR  
XSRATA SOUTH AFRICA (PTY) LTD'S (XSA) TWEEFONTEIN  
OPTIMISATION AMENDMENT PROJECT (TOP AMENDMENT  
PROJECT) ON THE EASTERN HIGHVELD IN THE MPUMALANGA  
PROVINCE OF SOUTH AFRICA**

**Prepared by:**

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**August 2013**

## **EXECUTIVE SUMMARY**

A Phase I Heritage Impact Assessment (HIA) study as required in terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999) was done for the Tweefontein Optimisation Amendment Project (TOP Amendment Project) on several farms to the south-west of Ogies on the Eastern Highveld in the Mpumalanga Province of South Africa.

The aims with the Phase I HIA study were the following:

- To determine if any of the types and ranges of heritage resources (the 'national estate') as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) do occur in the Project Area and, if so, to establish the significance of these heritage resources.
- To establish whether these heritage resources will be affected by the Tweefontein Optimisation Amendment Project and, if so, to propose mitigation measures for those heritage resources that may be affected by the TOP Amendment project.

The Phase I HIA study revealed the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999), namely:

- At least twenty four graveyards.
- Buildings with historical significance.

No pre-historical remains were recorded in the Project Area nor did this study provide for a paleontological study.

The graveyards and historical structures were geo-referenced and mapped (Figure 5, Tables 1 & 2).

### **The significance of the heritage resources**

Several graveyards and most of the historical remains will be affected (destroyed) by the TOP Amendment Project. The significance of the graveyards and historical remains therefore is indicated. Mitigation measures are also outlined for the heritage resources which will be affected by the TOP Amendment Project.

### **The significance of the graveyards**

All graveyards and graves can be considered to be of high significance and are protected by various laws. Legislation with regard to graves includes Section 36 of the National Heritage

Resources Act (No 25 of 1999) whenever graves are older than sixty years. The act also distinguishes various categories of graves and burial grounds. Other legislation with regard to graves includes those which apply when graves are exhumed and relocated, namely the Ordinance on Exhumations (No 12 of 1980) and the Human Tissues Act (No 65 of 1983 as amended).

It seems as if all the graveyards in the Project Area hold graves which are older than sixty years.

### **The significance of the historical structures**

Historical buildings and structures such as those outlined in this report are older than sixty years or are approaching this age and therefore are protected by Section 3 and Section 38 of the National Heritage Resources Act (No 25 of 1999). The significance of these historical buildings can be described as medium to low when considering criteria such as the following (Table 3):

- Historical houses on rural areas on the Eastern Highveld are rapidly disappearing as a result of the expansion of the coal mining industry and as a result of abandonment (particularly on farms) and their subsequent decay.
- The historical buildings have research (scientific) value.
- The historical buildings can add to our knowledge regarding human life ways and traditions on the Eastern Highveld during the early twentieth century.
- The historical structures can be altered (renovated) and utilized in an adaptive context.

### **Possible impact on the heritage resources**

It is highly likely that the following heritage resources will be affected by the TOP Amendment Project, namely:

- GY02, GY08, GY13, GY15, GY19, GY20, GY21 and GY22.
- Most of the historical buildings except the Victorian House (VH) and Historical House 02 (HH02).

### **The significance of the impact on the heritage resources**

The significance of possible impacts on the heritage resources was determined using a ranking scale based on the following criteria:

The significance of any possible impact on the graveyards is very high (Table 4).

The significance of any possible impact on the historical houses is high (Table 5).

### **Mitigating the heritage resources**

#### **Mitigating the graveyards**

The graveyards must be mitigated by means of exhumation and relocation. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.

#### **Mitigating the historical remains**

Historical structures may not be affected (demolished, renovated, altered) by the TOP Amendment Project *prior* to their investigation by a historical architect in good standing with the South African Heritage Resources Agency (SAHRA). XSA has to acquire a permit from the South African Heritage Resources Authority (SAHRA) *prior* to any of these structures and buildings being demolished or altered as a result of the TOP Amendment Project.

A Conservation Management Plan for the remaining unaffected graveyards must be included in the mine's EMP to ensure their continued existence during the construction, operation and decommissioning phase of the TOP Amendment Project.

#### **General**

If any heritage resources of significance are exposed during the TOP Amendment Project the South African Heritage Resources Authority (SAHRA) should be notified immediately, all development activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) should be notified in order to determine appropriate mitigation measures for the discovered finds. This may include obtaining the necessary authorisation (permits) from SAHRA to conduct the mitigation measures.

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## **1 INTRODUCTION**

This document contains the report on the results of a Phase I Heritage Impact Assessment (HIA) study which was done for Xstrata South Africa (Pty) Ltd's (XSA) proposed amendment to the Tweefontein Optimisation Project (TOP Amendment Project). The Tweefontein Complex is an existing open cast and underground coal mine which incorporates parts of the farms Waterpan 81IS, Klippan 332IS, Tweefontein 13IS, Klippan 14IS, Vlakraagte 330IS, Kleinkopje 15IS and Zaaiwater 11IS to the south-east of Ogies on the Eastern Highveld in the Mpumalanga Province of South Africa.

Focused archaeological research in the Mpumalanga Province has outlined the rich and diversified heritage of the region which include remains dating from the pre-historical and from the historical (or colonial) periods of South Africa. Pre-historical and historical remains in the Mpumalanga Province of South Africa therefore form a record of the heritage of most groups living in South Africa today.

Various types and ranges of heritage resources that qualify as part of South Africa's 'national estate' as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) occur in the Mpumalanga Province (see Box 1, next page).

## **Box 1: Types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999).**

The National Heritage Resources Act (Act 25 of 1999, Section 3) outlines the following types and ranges of heritage resources that qualify as part of the national estate:

- a. Places, buildings structures and equipment of cultural significance;
- b. Places to which oral traditions are attached or which are associated with living heritage;
- c. Historical settlements and townscapes;
- d. Landscapes and natural features of cultural significance;
- e. Geological sites of scientific or cultural importance;
- f. Archaeological and palaeontological sites;
- g. Graves and burial grounds including-
  - i. Ancestral graves;
  - ii. Royal graves and graves of traditional leaders;
  - iii. Graves of victims of conflict;
  - iv. Graves of individuals designated by the Minister by notice in the Gazette;
  - v. Historical graves and cemeteries; and
  - vi. Other human remains which are not covered in terms of the Human Tissue Act (Act 65 of 1983);
- h. Sites of significance relating to the history of slavery in South Africa;
- i. Moveable objects, including -
  - i. Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, material, meteorites and rare geological specimens;
  - ii. Objects to which oral traditions are attached or which are associated with living heritage;
  - iii. Ethnographic art and objects;
  - iv. Military objects;
  - v. Objects of decorative or fine art;
  - vi. Objects of scientific or technological interest; and
  - vii. Books, records, documents, photographs, positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act (Act 43 of 1996).

The National Heritage Resources Act (Act 25 of 1999, Sec 3) also distinguishes nine criteria for a place and/or object to qualify as 'part of the national estate if they have cultural significance or other special value ...'. These criteria are the following:

- a. Its importance in the community, or pattern of South Africa's history;
- b. Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- c. Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- d. Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- e. Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f. Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- g. Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- h. Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and/or
- i. Its significance relating to the history of slavery in South Africa.

## **2 TERMS OF REFERENCE**

XSA's proposed TOP Amendment Project covers a range of activities which will involve a number of farms to the south-east of Ogies in the Mpumalanga Province of South Africa. These mining and related activities may impact on any of the types and ranges of heritage resources that are distinguished in Section 3 of the National Heritage Resources Act (No 25 of 1999) (see Box 1) and which may occur in the proposed Project Area.

In order to comply with legislation, XSA requires knowledge of the presence, relevance and the significance of any heritage resources that may occur in the Project Area in order to take pro-active measures with regard to any heritage resources that may be affected by the proposed TOP Amendment Project. Clean Stream Environmental Services, the environmental company responsible for compiling the Environmental Impact Assessment report for the proposed TOP Amendment Project therefore commissioned the author to undertake a Phase I Heritage Impact Assessment (HIA) study for the Project Area.

The aims with the Phase I HIA study were the following:

- To determine if any of the types and ranges of heritage resources (the 'national estate') as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) do occur in the Project Area and, if so, to establish the significance of these heritage resources.
- To establish whether these heritage resources will be affected by the proposed TOP Amendment Project and, if so, to propose mitigation measures for those heritage resources that may be affected by the TOP Amendment Project.

### 3 THE PROJECT AREA

#### 3.1 Location

The proposed TOP Amendment Project covers portions of the farms Waterpan 81IS, Klippan 332IS, Tweefontein 13IS, Klippan 14IS, Vlaklaagte 330IS, Kleinkopje 15IS and Zaaiwater 11IS to the south-east of Ogies on the Eastern Highveld in the Mpumalanga Province of South Africa (2529CC Witbank [Emalahleni] & 2629AB Vanwyksdrift; 1:50 000 topographical maps and 2628 East Rand; 1:250 000 map) (Figures 1-3).



**Figure 1- Regional setting for the Tweefontein Optimisation Amendment Project south-east of Ogies on the Eastern Highveld in the Mpumalanga Province of South Africa (2628 East Rand; 1:250 000) (above).**

The Project Area comprises an undulating piece of land located between the railway line running between Emalahleni, Ogies and Delmas in the south, the N12 in the north-

west and the R347 in the north-east. The Project Area slightly extends beyond (to the north) of both these arbitrary boundaries

### **3.2 The nature of the Project Area**

The Project Area is marked by a rolling landscape which used to be covered with grass veldt and agricultural fields although relatively pristine stretches with grass veldt do occur. This rolling landscape is gradually being changed into a vast expansive coal mining landscape which includes open cast pits; coal, soil and waste dumps; stretches of land which are currently rehabilitated; an extensive network of haul roads and other associated mining infrastructure.



**Figure 2- The Project Area is characterised by a rolling landscape marked by outstretched grass veldt and agricultural fields which are gradually being replaced by open pits and associated infrastructure (above).**

Few trees occur in the Project Area. Those that do occur are exotics such as Wattles, Blue Gum lots and poplar-groves on the banks of streams. Oak trees are usually located near historical farm homesteads. However, none of these exist towards of the central part of the mining area any longer. Blue Gum trees have an anthropogenic

origin as they have been introduced by humans during the late nineteenth and early twentieth centuries. Stands with Wattles and Blue Gum trees particularly occur in the northern and eastern parts of the Project Area.

The northern and southern parts of the Project Area are the less disturbed while the central part serves as the main focus for coal mining and processing activities as well as the establishment of infrastructure.



**Figure 3- The Project Area is located on a landscape which is interspersed with open cast coal mining activities and associated infrastructure (above).**

The larger area is characterised by heritage resources which date from the pre-historical into the historical (colonial) period. Stone Age sites, including rock paintings, Iron Age sites and colonial remains do occur in the Eastern Highveld. The archaeological and historical significance of this cultural landscape is briefly outlined in this report (see Part 5, 'Contextualising the Project Area' and Part 9 'Select Bibliography').

The most common heritage resources which occur in the immediate area include:



- Historical farmstead complexes which are usually associated with main residences and different types of outbuildings.
- Formal and informal graveyards.

A number of heritage impact assessment studies have been done near the Project Area (see 'Part 9 Select Bibliography'), namely:

- Pelsler, A.J., van Vollenhoven, A.C., & van der Walt, J. 2008. A Report on the 1st Phase Archaeological Assessment of Grave Sites on various farms related to Xstrata Coal's Tweefontein Complex, South East of Ogies (Phola), Mpumalanga Province. Unpublished Report Archaetnos.
- Pistorius, J.C.C. 2006. A Baseline Heritage Impact Assessment (HIA) Study for Xstrata Coal's Tweefontein Division on the Eastern Highveld in the Mpumalanga Province of South Africa. Unpublished report for X Strata Coal Tweefontein Division.
- Pistorius, J.C.C. 2009. Heritage Assessment as part of Xstrata Coal's pre-feasibility study towards implementing the proposed Tweefontein Optimisation Project on the the Eastern Highveld in the Mpumalanga Province of South Africa. Unpublished report for Clean Stream Environmental Services.
- Pistorius, J.C.C. 2009. A Phase I Heritage Impact Assessment study for Xstrata Coal's Tweefontein Division on the Eastern Highveld in the Mpumalanga Province of South Africa. Unpublished report for Xstrata Coal Tweefontein Division.
- Pistorius, J.C.C. 2010. A Phase I Heritage Impact Assessment (HIA) study for Duiker Mining (Pty) Ltd's proposed Tweefontein Optimisation Project (TOP) on the Eastern Highveld in the Mpumalanga Province of South Africa. Unpublished report for Clean Stream Environmental Services.
- Pistorius, J.C.C. 2012. A Phase I Heritage Impact Assessment (HIA) study for Xstrata Coal's (Xstrata) proposed mine Treatment Scheme for Goedgevonden, Tweefontein, Impunzi and South Stock Coal Mines in Mpumalanga Province of South Africa. Unpublished report for Golder Associates Africa (Pty) Ltd.

### **3.3 The nature of the Tweefontein Optimisation Project**

The Tweefontein Complex is an existing mine near Ogies in the Mpumalanga Province. Xstrata South Africa (Pty) Ltd is in the process of applying for Environmental Authorisation to mine additional coal reserves within the Tweefontein Complex as part of the Tweefontein Optimisation Amendment Project. Coal is mined at the Tweefontein Complex by means of opencast and underground methods and is processed at the Processing Plant on site. The mine is currently operating in terms of their approved EMP (dated 2011) and their approved EIA (dated 2010) under the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) and the National Environmental Management Act (No. 107 of 1998) (NEMA) respectively.

Xstrata South Africa (Pty) Ltd (XSA) has re-assessed and altered their planning in terms of the mining and other related activities which occur at the Tweefontein Complex. As a result the Tweefontein Optimisation Amendment Project will entail the mining of additional areas and the construction of additional infrastructure. The proposed additional activities will result in changes to the approved operations within the Tweefontein Complex. Therefore, XSA has embarked on the mandatory environmental regulations necessary to obtain approval for the additional mining areas and infrastructure which have been identified.

## 4 APPROACH AND METHODOLOGY

This Phase I HIA study was conducted by means of the following:

### 4.1 Field survey

The field survey for the proposed mine was conducted with a vehicle whilst following haul roads or two track off-roads through the veld. The Tweefontein Project Area was surveyed on several occasions in the past and only the survey that was conducted after September 2012 was recorded with a GPS instrument. The track log thus recorded does not reflect the full range of surveys that were done for the Tweefontein Mine during the last decade.



**Figure 4- Track log registered during the 2013 survey for the Tweefontein Complex with a mounted GPS instrument. Several earlier surveys were done for Tweefontein during which no GPS tracks were recorded (above).**

The track log that was recorded outlines some of the main haul roads. Pedestrian surveys were usually conducted from these main roads when access for vehicle was not available. These pedestrian surveys focussed on target areas such as isolated

stands with trees, tall grass, possible building rubble or stands with Blue Gum trees and clumps of wattle trees (Figure 4).

## **4.2 Databases, literature survey and maps**

Databases kept and maintained at institutions such as the Provincial Heritage Resources Agency (PHRA), the Archaeological Data Recording Centre at the National Flagship Institute (Museum Africa) in Pretoria and SAHRA's national archive (SAHRIS) were consulted to determine whether any heritage resources of significance have been identified during earlier heritage surveys in or near the Project Area.

Literature relating to the pre-historical and the historical unfolding of the Eastern Highveld where the Project Area is located was reviewed (see Part 5, 'Contextualising the Project Area').

In addition, the Project Area was studied by means of maps, aerial photography provided by the mine and Google imagery (2529CC Witbank & 2629AB Vanwyksdrift; 1: 50 000 topographical maps and 2628 East Rand; 1:250 000 map) (Figures 1-4).

## **4.3 Assumptions and limitations**

It must be pointed out that heritage resources can be found in the most unexpected places. It must also be borne in mind that surveys may not detect all the heritage resources in a given project area. While some remains may simply be missed during surveys (observations), others may occur below the surface of the earth and may only be exposed once mining development commences.

If any heritage resources of significance are exposed during the amendment project the South African Heritage Resources Authority (SAHRA) should be notified immediately, all development activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) should be notified in order to determine appropriate mitigation measures for the discovered finds. This may include obtaining the necessary authorisation (permits) from SAHRA to conduct the mitigation measures.

#### 4.4 Some remarks on terminology

Terms that may be used in this report are briefly outlined below:

- **Conservation:** The act of maintaining all or part of a resource (whether renewable or non-renewable) in its present condition in order to provide for its continued or future use. Conservation includes sustainable use, protection, maintenance, rehabilitation, restoration and enhancement of the natural and cultural environment.
- **Cultural resource management:** A process that consists of a range of interventions and provides a framework for informed and value-based decision-making. It integrates professional, technical and administrative functions and interventions that impact on cultural resources. Activities include planning, policy development, monitoring and assessment, auditing, implementation, maintenance, communication, and many others. All these activities are (or will be) based on sound research.
- **Cultural resources:** A broad, generic term covering any physical, natural and spiritual properties and features adapted, used and created by humans in the past and present. Cultural resources are the result of continuing human cultural activity and embody a range of community values and meanings. These resources are non-renewable and finite. Cultural resources include traditional systems of cultural practice, belief or social interaction. They can be, but are not necessarily identified with defined locations.
- **Heritage resources:** The various natural and cultural assets that collectively form the heritage. These assets are also known as cultural and natural resources. Heritage resources (cultural resources) include all human-made phenomena and intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources, as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people of South Africa.

- In-Situ Conservation: The conservation and maintenance of ecosystems, natural habitats and cultural resources in their natural and original surroundings.
- Iron Age: Refers to the last two millennia and 'Early Iron Age' to the first thousand years AD. 'Late Iron Age' refers to the period between the 16<sup>th</sup> century and the 19<sup>th</sup> century and can therefore include the Historical Period.
- Maintenance: Keeping something in good health or repair.
- Pre-historical: Refers to the time before any historical documents were written or any written language developed in a particular area or region of the world. The historical period and historical remains refer, for the Leeuwkop Project Area, to the first appearance or use of 'modern' Western writing brought to the Eastern Highveld by the first Colonists who settled here from the 1840's onwards.
- Preservation: Conservation activities that consolidate and maintain the existing form, material and integrity of a cultural resource.
- Recent past: Refers to the 20<sup>th</sup> century. Remains from this period are not necessarily older than sixty years and therefore may not qualify as archaeological or historical remains. Some of these remains, however, may be close to sixty years of age and may, in the near future, qualify as heritage resources.
- Protected area: A geographically defined area designated and managed to achieve specific conservation objectives. Protected areas are dedicated primarily to the protection and enjoyment of natural or cultural heritage, to the maintenance of biodiversity, and to the maintenance of life-support systems.
- Reconstruction: Re-erecting a structure on its original site using original components.
- Replication: The act or process of reproducing by new construction the exact form and detail of a vanished building, structure, object, or a part thereof, as it appeared at a specific period.

- Restoration: Returning the existing fabric of a place to a known earlier state by removing additions or by reassembling existing components.
- Stone Age: Refers to the prehistoric past, although Late Stone Age peoples lived in South Africa well into the Historical Period. The Stone Age is divided into an Earlier Stone Age (3 million years to 150 000 thousand years ago) the Middle Stone Age (150 000 years to 40 000 years ago) and the Late Stone Age (40 000 years to 300 years ago).
- Sustainability: The ability of an activity to continue indefinitely, at current and projected levels, without depleting social, financial, physical and other resources required to produce the expected benefits.
- Translocation: Dismantling a structure and re-erecting it on a new site using original components.
- Project Area: refers to the area (footprint) where the developer wants to focus its development activities (refer to plan).
- Phase I studies refer to surveys using various sources of data in order to establish the presence of all possible types and ranges of heritage resources in any given Project Area (excluding paleontological remains as these studies are done by registered and accredited palaeontologists).
- Phase II studies include in-depth cultural heritage studies such as archaeological mapping, excavating and sometimes laboratory work. Phase II work may include the documenting of rock art, engraving or historical sites and dwellings; the sampling of archaeological sites or shipwrecks; extended excavations of archaeological sites; the exhumation of human remains and the relocation of graveyards, etc. Phase II work involve permitting processes, require the input of different specialists and the co-operation and approval of SAHRA.

## **5 CONTEXTUALISING THE PROJECT AREA**

The Project Area is located in the midst of a cultural landscape that is marked by heritage remains dating from the pre-historical to the historical period (see Part 9 'Select Bibliography'). The following brief overview of the pre-historical, historical and cultural evidence indicates the wide range of heritage resources which do occur across the Mpumalanga Province.

### **5.1 Stone Age and rock art sites**

Stone Age sites are marked by stone artefacts that are found scattered on the surface of the earth or as parts of deposits in caves and rock shelters. The Stone Age is divided into the Early Stone Age (ESA) (covering the period from 2.5 million years ago to 250 000 years ago), the Middle Stone Age (MSA) (referring to the period from 250 000 years ago to 22 000 years ago) and the Late Stone Age (LSA) (the period from 22 000 years ago to 200 years ago).

Dongas and eroded areas at Maleoskop near Groblersdal is one of only a few places in Mpumalanga where ESA Olduwan and Acheulian artefacts have been recorded. Evidence for the MSA has been excavated at the Bushman Rock Shelter near Ohrigstad. This cave was repeatedly visited over a prolonged period. The oldest layers date back to 40 000 years BP (Before Present) and the youngest to 27 000BP (Esterhuysen & Smith 2007).

LSA occupation of the Mpumalanga Province also has been researched at Bushman Rock Shelter where it dates back 12 000BP to 9 000BP and at Höningnestkrans near Badfontein where a LSA site dates back to 4 870BP to 200BP (Esterhuysen & Smith 2007).

The LSA is also associated with rock paintings and engravings which were done by San hunter-gatherers, Khoi Khoi herders and EIA (Early Iron Age) farmers (Maggs 1983, 2008). Approximately 400 rock art sites are distributed throughout Mpumalanga, notably in the northern and eastern regions at places such as Emalahleni (Witbank) (4),



Lydenburg (2), White River and the southern Kruger National Park (76), Nelspruit and the Nsikazi District (250). The Ermelo area holds eight rock paintings (Smith & Zubieta 2007).

The rock art of the Mpumalanga Province can be divided into San rock art which is the most wide spread, herder or Khoe Khoe (Khoi Khoi) paintings (thin scattering from the Limpopo Valley) through the Lydenburg district into the Nelspruit area and localised late white farmer paintings. Farmer paintings can be divided into Sotho-Tswana finger paintings and Nguni engravings (Only 20 engravings occur at Boomplaats, north-west of Lydenburg). Farmer paintings are more localised than San or herder paintings and were mainly used by the painters for instructional purposes (Smith & Zubieta 2007).

During the LSA and Historical Period, San people called the Batwa lived in sandstones caves and rock shelters near Lake Chrissie in the Ermelo area. The Batwa are descendants of the San, the majority of which intermarried with Bantu-Negroid people such as the Nhlapo from Swazi-descend and Sotho-Tswana clans such as the Pai and Pulana. Significant intermarriages and cultural exchanges occurred between these groups. The Batwa were hunter-gatherers who lived from food which they collected from the veldt as well as from the pans and swamps in the area. During times of unrest, such as the *difaqane* in the early nineteenth century, the San would converge on Lake Chrissie for food and sanctuary. The caves, lakes, water pans and swamps provided relative security and camouflage. Here, some of the San lived on the surfaces of the water bodies by establishing platforms with reeds. With the arrival of the first colonists in the nineteenth century many of the local Batwa family groups were employed as farm labourers. Descendants of the Batwa people still live in the larger Project Area (Schapera 1927, Potgieter 1955, Schoonraad & Schoonraad 1975).

## **5.2 Iron Age remains**

The Iron Age is associated with the first agro-pastoralists or farming communities who lived in semi-permanent villages and who practised metal working during the last two millennia. The Iron Age is usually divided into the Early Iron Age (EIA)

(covers the 1<sup>st</sup> millennium AD) and the Later Iron Age (LIA) (covers the first 880 years of the 2<sup>nd</sup> millennium AD).

Evidence of the first farming communities in the Mpumalanga Province is derived from a few EIA potsherds which occur in association with the LSA occupation of the Höningnest Shelter near Badfontein. The co-existence of EIA potsherds and LSA stone tools suggest some form of 'symbiotic relationship' between the Stone Age hunter-gatherers who lived in the cave and EIA farmers in the area (also note Batwa and Swazi/Sotho Tswana relationship) (Esterhuysen & Smith 2007).

The Welgelegen Shelter on the banks of the Vaal River near Ermelo also reflects some relationship between EIA farmers who lived in this shelter and hunter-gatherers who manufactured stone tools and who occupied a less favourable overhang nearby during AD1200 (Schoonraad & Beaumont 1971).

EIA sites were also investigated at Sterkspruit near Lydenburg (AD720) and in Nelspruit where the provincial governmental offices were constructed. The most infamous EIA site in South Africa is the Lydenburg head site which provided two occupation dates, namely during AD600 and from AD900 to AD1100. At this site the Lydenburg terracotta heads were brought to light. Doornkop, located south of Lydenburg, dates from AD740 and AD810 (Evers 1981, Whitelaw 1996).

The LIA is well represented in Mpumalanga and stretches from AD1500 well into the nineteenth century and the Historical Period. Several spheres of influence, mostly associated with stone walled sites, can be distinguished in the region. Some of the historically well-known spheres of influence include the following:

- Early arrivals in the Mpumalanga Province such as Bakone clans who lived between Lydenburg, Badfontein and Machadodorp and Eastern Sotho clans such as the Pai, Pulana and Kutswe who established themselves in the eastern parts of the province (Collett 1979, 1983; Delius 2007; Makhura 2007; Delius & Schoeman, 2008).

- Swazi expansion into the Highveld and Lowveld of the Mpumalanga Province occurred during the reign of Sobhuza (AD1815 to 1836/39) and Mswati (AD1845 to 1868) while Shangaan clans entered the province across the Lembombo Mountains in the east during the second half of the nineteenth century (Delius 2007, Makhura 2007.).
- The Bakgatla (Pedi) chiefdom in the Steelpoort Valley rose to prominence under Thulare during the early 1800's and was later ruled by Sekwati and Sekhukune from the village of Tsjate in the Leolo Mountains. The Pedi maintained an extended sphere of influence across the Limpopo and Mpumalanga Provinces during the nineteenth century (Mönnig 1978, Delius 1984).
- The Ndzundza-Ndebele established settlements at the foot of the Bothasberge (Kwa Maza and Esikhunjini) in the 1700's and lived at Erholweni from AD1839 to AD1883 where the Ndzundza-Ndebele's sphere of influence known as KoNomthjarhelo stretched across the Steenkampsberge.
- The Bakopa lived at Maleoskop (1840 to 1864) where they were massacred by the Swazi while the Bantwane live in the greater Groblersdal and Marble Hall areas.
- Corbelled stone huts which are associated with ancestors of the Sotho on Tafelkop near Davel which date from the AD1700's into the nineteenth century (Hoernle 1930).
- Stone walled settlements spread out along the eastern edge of the Groot Dwarsriver Valley served as the early abode for smaller clans such as the Choma and Phetla communities which date from the nineteenth century.

### **5.3 The Historical Period**

Historical towns closest to the Project Area include Delmas, Ogies and Witbank.

Delmas was laid out in 1907 on the farm Witklip ('white stone') which was divided into 192 residential stands, 48 smallholdings of 4 ha each and a commonage of

138ha. The farm belonged to Frank Dumat who originated from France where he grandfather had a small farm. He named the town Delmas which is derived from 'mas' which means a small farm in a southern dialect of French. In 1909 the government added another 5 500 ha to Frank Dumat's original rural settlement (Standard Encyclopedia).

Ogies serves as an important link in the running railway line running between Pretoria and Maputo which was built in 1896. It is also linked *via* Broodsniersplaas, 35km south of Middelburg to join the railway line between Ermelo and Piet Retief to Richards Bay. This railway line carries some of the longest and heaviest trains in the world. The town of Ogies developed around the railway station which was built on the farm Oogiesfontein in 1928 (Standard Encyclopedia).

Witbank came into being as the railway line between Pretoria and Lourenzo Marques which was built in 1894 passed close to where Witbank is located today. The first Europeans who came to the area observed the abundance of coal, which is evident on the surface or in the beds of streams. A stage post for wagons close to a large outcrop of whitish stones (a 'white ridge') gave the town its name. Witbank was established in 1903 on a farm known as Swartbos which belonged to Jacob Taljaard (Standard Encyclopedia).

#### **5.4 A coal mining heritage**

Coal mining on the Eastern Highveld is now older than one century and has become the most important coal mining region in South Africa. Whilst millions of tons of high-grade coal are annually exported overseas more than 80% of the country's electricity is generated on low-grade coal in Eskom's power stations such as Duvha, Matla and Arnot situated near coalmines on the Eastern Highveld.

The earliest use of coal (charcoal) in South Africa was during the Iron Age (300-1880AD) when metal workers used charcoal, iron and copper ores and fluxes (quartzite stone and bone) to smelt iron and copper in clay furnaces.

Colonists are said to have discovered coal in the FrenchHoek Valley near Stellenbosch in the Cape Province in 1699. The first reported discovery of coal in the interior of South Africa was in the mid-1830 when coal was mined in Kwa Zulu/Natal.

The first exploitation for coal was probably in Kwa Zulu/Natal as documentary evidence refers to a wagon load of coal brought to Pietermaritzburg to be sold in 1842. In 1860 the coal trade started in Dundee when a certain Pieter Smith charged ten shillings for a load of coal dug by the buyer from a coal outcrop in a stream. In 1864 a coal mine was opened in Molteno. The explorer, Thomas Baines mentioned that farmers worked coal deposits in the neighbourhood of Bethal (Transvaal) in 1868. Until the discovery of diamonds in 1867 and gold on the Witwatersrand in 1886, coal mining only satisfied a very small domestic demand.

With the discovery of gold in the Southern Transvaal and the development of the gold mining industry around Johannesburg came the exploitation of the Boksburg-Spring coal fields, which is now largely worked out. By 1899, at least four collieries were operating in the Middelburg-Witbank district, also supplying the gold mining industry. At this time coal mining also has started in Vereeniging. The Natal Collieries importance was boosted by the need to find an alternative for imported Welsh anthracite used by the Natal Government Railways.

By 1920 the output of all operating colliers in South Africa attained an annual figure of 9,5 million tonnes. Total in-situ reserves were estimated to be 23 billion tonnes in Witbank-Springs, Natal and Vereeniging. The total in situ reserves today are calculated to be 121 billion tonnes. The largest consumers of coal are Sasol, Eskom and the steel making industry.

## **5.5 A vernacular stone architectural heritage**

A unique stone architectural heritage was established in the Eastern Highveld from the second half of the 19<sup>th</sup> century well into the early 20<sup>th</sup> century. During this time period stone was used to build farmsteads and dwellings, both in urban and in rural areas. Although a contemporary stone architecture also existed in the Karoo and in the Eastern Free State Province of South Africa a wider variety of stone types were used in

the Eastern Highveld. These included sandstone, ferricrete ('ouklip'), dolerite ('blouklip'), granite, shale and slate (Naude 1993).

The origins of a vernacular stone architecture in the Eastern Highveld may be ascribed to various reasons of which the ecological characteristics of the region may be the most important. Whilst this region is generally devoid of any natural trees which could be used as timber in the construction of farmsteads, outbuildings, cattle enclosures and other structures, the scarcity of fire wood also prevented the manufacture of baked clay bricks. Consequently stone served as the most important building material in the Eastern Highveld (Naude 1993, 2000). One of these historical structures was excavated and described after a heritage mitigation project was conducted for a coal mine (Pistorius 2005).

LIA Sotho, Pedi, Ndebele and Swazi communities contributed to the Eastern Highveld's stone walled architecture. The tradition set by these groups influenced settlers from Natal and the Cape Colony to utilise the same resources to construct dwellings and shelters. Farmers from Scottish, Irish, Dutch, German and Scandinavian descent settled and farmed in the Eastern Highveld. They brought the knowledge of stone masonry from Europe. This compensated for the lack of fire wood on the Eastern Highveld which was necessary to bake clay bricks.

## **6 THE PHASE I HERITAGE IMPACT ASSESSMENT**

### **6.1 Types and ranges of heritage resources**

The Phase I HIA study revealed the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999), namely:

- At least twenty four graveyards.
- Buildings with historical significance.

No pre-historical remains were recorded in the Project Area nor did this study provide for a paleontological study.

The graveyards and historical structures were geo-referenced and mapped (Figure 5, Tables 1 & 2). The significance of these heritage resources is indicated whilst mitigation measures are outlined should any of the graveyards or historical structures be affected by the amendment project.

The Phase I HIA study is now briefly discussed and illustrated with photographs.

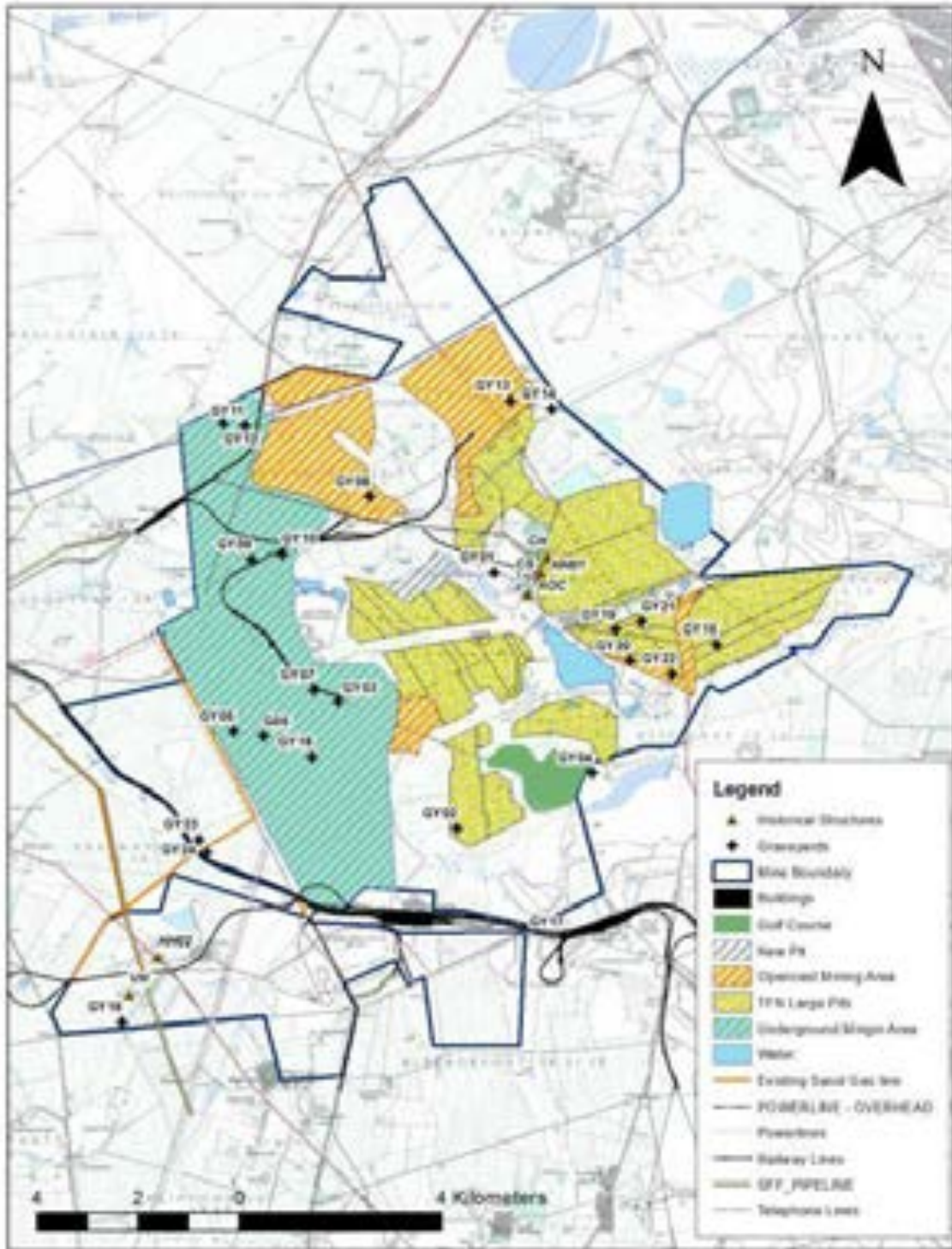


Figure 5- The TOP Amendment Project involves several farms to the south-east of Ogies in the Mpumalanga Province. Note the presence of graveyards and historical remains in the Project Area (above).



## **6.2 Formal and informal graveyards**

Small communities who used to live in the Project Area during the last century and a half left small cemeteries after they have left the area. The majority of their dwellings consisting of square and elongated mud dwellings as well as cone-on-cylinder huts have disintegrated.

Most of these abandoned graveyards are no longer visited by the deceased's relatives. These abandoned and neglected graveyards gradually became inconspicuous and therefore are difficult to detect during surveys. This is amplified by the fact that most of the graves are undecorated and that their state of deterioration tends to obscure the visibility of these structures.

At least twenty four graveyards were recorded in the Project Area. The graveyards were numerically numbered from GY01 to GY24 with a single grave in between (G06). Many of the graveyards contain between ten to hundred graves whilst at least one holds more than a thousand individuals.

It is highly likely that more small graveyards or single graves may exist and that they have been missed during the different surveys that were conducted during the past decade. This is primarily due to the size of the Tweefontein Complex as a whole and the fact that surveys that were done mainly focussed on critical areas where mining development is planned.

Graveyards have been exhumed and relocated in the past in the Tweefontein Complex. The relocation of graveyards is a near continuous process and this author and the current archaeological relocation team is in a synergetic relationship with the mine and its grave relocation process.

### 6.2.1 Graveyard 01

GY01 is a very large graveyard with more than a thousand graves. The majority of the graves are covered with piles of stone, brick or rubble. Many graves, however, are fitted with granite tomb stones, slabs and granite edgings. A large number of graves are also fitted with cement tomb stones.

Many of the graves in this cemetery are older than sixty years.

GT01 is severely neglected. It was once fenced-in and fitted with an entrance gate.



**Figure 6- GY01 near the main entrance road to the Tweefontein mine offices holds more than a thousand graves. Many of the graves are older than sixty years (above).**

Inscriptions on some of the tombstones read as follow:

- 'In loving memory of our beloved mother Martha F \*1912-09-15, †1982-12-16 Ever remembered by her children and grandchildren and great grandchildren RIP Jacobs'

- 'Mnisi In loving memory of our dear father Siliso Elias \* 1945 † 1982-05-02 Lala Ngoxolo from your children'
- Daddy Moses Wilkinson \*12-5-1947, †26-9-1980, My beloved husband I will always love and remember you from your wife son daughter and grandchildren RIP'
- 'Rest in peace Philip Xhaka, \* ? †12-2-1978, ????? aunty, wife and kids'
- 'In memory of Andrew Sebuti Sefako Born on 25-08-1930 Died on 15-06-1968 Remembered by his family may his soul rest in peace RIP'

### **6.2.2 Graveyard 02**

This graveyard is located next to a haul road a few hundred meters to the north of the abandoned Duiker Open Cast Mine. GY02 is composed of two sections with graves. One section used to be located in a fenced-in area where a large sisal plant is growing. This section contains the graves of members of the Wazalwa clan. The second section of this graveyard joins the first section but is not as neatly maintained as the first section.

Together the two sections contain as many as eighty-six graves. The majority of graves are fitted with cement tomb stones and are edged with cement strips. Only one of the graves in the second section has a decipherable inscription on its tombstone.

Some of the graves are older than sixty years.



**Figure 7- GY02 comprises two sections and holds as many as eighty-six graves. Most of the graves of members of the Wazalwa clan are fitted with cement headstones with inscriptions (above).**

Inscriptions on a number of the tombstone read as follow:

- 'In loving memory of our father Petrus Born 1809 Died 17-6-1943 RIP'
- 'Maria Magdalinah Mokoena Borne 26 December 1926'
- Mrs Betty Malaza Wazalwa Mhlaka 27-03-1920'
- Mr Thomas Malaza 07-02-1950
- Joseph Simelane Wazalwa Ngezi, 18-08-1974 Walala Ngezi 03-05-1976'
- Mr Moses Malaza Wazalwa Mhlaka 13-07-1928 Lala Ngoxolo'
- 'VGE 7-12-73 Washowa Zikhali Wazalwa Mhlaka'

### **6.2.3 Graveyard 03**

This graveyard is located next to a dirt road within the boundaries of the Boschmans Colliery. The graveyard is mainly composed of graves with cement head stone. The

majority of graves are edged with cement strips. The graveyard contains more than seventy-seven graves.



**Figures 8 & 9- GY03 near Boschman's Colliery holds more than seventy-seven graves (above). GY04 is a large graveyard consisting of several sections containing more than one hundred graves (below)**

#### **6.2.4 Graveyard 04**

This graveyard is located near a stand of Blue Gum trees. According to spokesperson Sameul Makhatswa a large community of farm workers used to live near the Blue Gum trees in the past. Their residences have long been destroyed and the graveyard is the only remaining evidence of the once existing village. More than twenty graves occur in this graveyard.

The graveyard consists of three sections, namely a section that is fenced-in with three graves which are fitted with granite slabs and tombstones. The inscriptions on the tombstones read as follow:

- 'Jem Mokwena \*07-02-1903, †27-06-1960, Robala ka khotso'
- 'Captain Boy Mokwena \*17-04-1920, †31-12-1976, Remembered by wife and children'
- 'Mokwena Bobby David \*25-12-1950, †05-09-1999, From your wife and children'

The second (middle) section of the graveyard is composed of a number of graves which are covered with piles of stone.

The third section of the graveyard is also composed of a number of graves of which the majority are fitted with cement headstones. Most of these graves are edged with bricks.

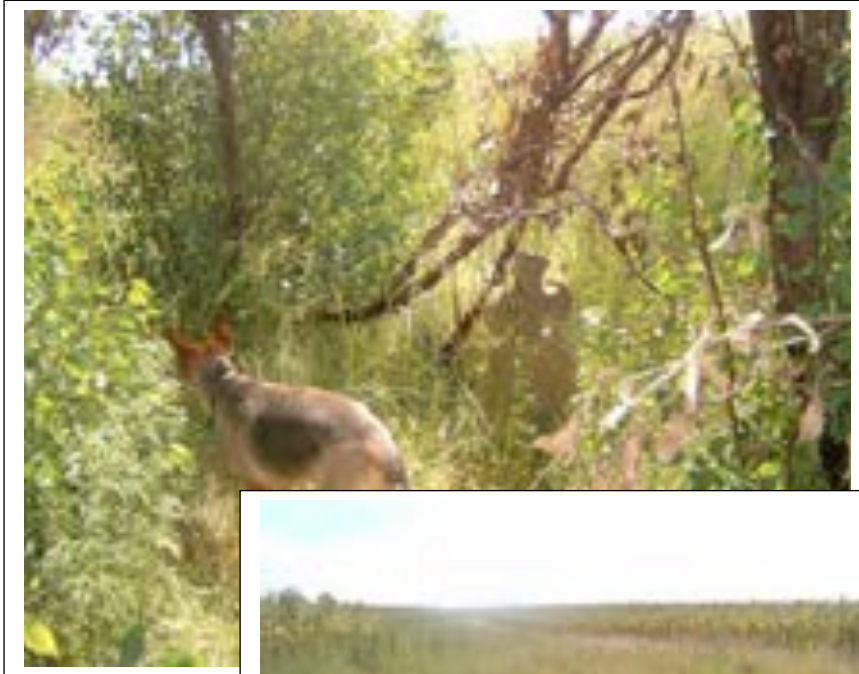
At least one of the graves is fitted with a cement head stone with the following inscription:

- 'Hannes Mabizela Wavela Go, 1918, ?ambuba Mhla 19-01-1955, Wabe Kwamhla, 01-02-1955'

#### **6.2.5 Graveyard 05**

This graveyard merely contains eight graves which are all located in the midst of a Blue Gum plantation near the middle of a maize field. At least four graves are covered with

piles of ferricrete stone while two are fitted with cement tomb stones. These tomb stones do not have any inscriptions.



**Figures 10 & 11- GY05 and G06 are respectively located in in Blue Gum lot and between agricultural fields(above and below).**

### **6.2.6 Grave 06**

This solitary grave is located between two agricultural fields, is covered with an iron framework and is fenced-in.

The grave is fitted with a cement head stone with no inscription. G06 is probably close to sixty years old.

### **6.2.7 Graveyard 07**

This historical graveyard in the Boschmans Colliery contains between eight to ten graves and is demarcated with a ferricrete wall. The graveyard was used by the De Jager and Groenewald families.

Most of the graves are older than sixty years.

Inscriptions on six of the seven graves read as follow:

- 'Hier Rus (HR) O? C De Jager, Geb Mei 13-1886 Overl Mei 23-1918, Ik ben ?ren opstanding'.
- 'Hier rust Coenraad JC De Jager, Geb 28 Julie 1914, Overl 31 Jan 1917, Veilig in Jesus armen'
- 'Ter nagedagtenis aan ons liefeling seuntntjie Gerhard De Jager Geb 19-9-1942 Oorl 7-4-1944'
- HR Ons geliefde moeder Catherina Getruda Groenewald Geb Lombaard 4 Aug 1871 Oorl 26 April 1950 Joe Chris en Katie'
- '??? Groenewald Geb 27 Junie 1900 Overleden Maart 1922'
- 'Hier rus CJ Groenewald Geboren 1865 die 28 April Overlede die 16 Dec 1941 Rus in vrede Gez 12 vers 1'





**Figure 12- GY07 near Boschmans Colliery belonged to the Groenewald and De Jager families (above).**

### **6.2.8 Graveyard 08**

Graveyard 08 is located in the Waterpan North Colliery, next to one of Eskom's 400kv power lines. This graveyard is home to fifteen to twenty graves, the majority of which are fitted with cement head stones. Several of the graves are covered with piles of stone. Most of the inscriptions on the head stones are undecipherable.

At least one of the graves is fitted with a granite headstone with the following inscription:

- 'Ramasilo \*05-08-1904, \*25-04-1972 Buried on 30-04-1972'



**Figure 13- GY08 is located next to one of Eskom's power lines in the Waterpan North Colliery (above).**

### **6.2.9 Graveyard 09**

This graveyard is characterised by at least three graves near two large Blue Gum trees on Tweefontein 13IS. The graves are located in the veldt between a maize field and a railway line.

All three graves are fitted with cement head stones with no inscriptions. The graves used to be fenced-in.



**Figure 14- Graveyard 09 is located between a railway line and two large Blue Gum trees (above).**

#### **6.2.10 Graveyard 10**

GY10 occurs under Eskom's 400kV power line that crosses the farm Tweefontein 13IS from the east to the west. It is situated near one of the pylons that carry the power line. The graveyard holds eight graves, three belonging to the Mabona family and one to the Mahlangu family.

The graveyard is currently overgrown with vegetation but is still visited and maintained by family members of the deceased.

Two of the graves are covered with granite slabs and have granite headstone; four of the graves are demarcated with ferricrete stones and two have cement edgings. One of the graves with cement edgings also has a cement head stone.

Inscriptions on some of the head stones read as follow:

- ‘In loving memory to Ellen Maliwa Born 1897 Died 16 April 1942 Rest in peace MABONA’
- ‘Hleziphi Mabona Born 1871 Died ?’,
- ‘Annie Nomoya Born 1910 Died 1942 May your soul RIP GRANNY Mahlangu’
- ‘Elem Mabona Died April 1942’



**Figure 15- GY10 under Eskom’s 400kV power line on the farm Tweefontein 13IS after it was cleared from vegetation (above).**

#### **6.2.11 Graveyard 11**

Graveyard 11 is located where the N4 Highway crosses the road running between Ogies and Witbank. This graveyard is composed of two sections, one which used to be fenced-in and a second section which is located outside the fenced-in area. At least ninety graves were recorded.

A limited number of graves are fitted with headstones with no inscriptions. The majority are covered with piles of stones or bricks.



**Figure 16- Graveyard 11 near the crossing between Ogies and Witbank and the N4 (above).**

#### **6.2.12 Graveyard 12**

According to mine officials GY12 is located directly to the north of the N12 near a dam and in the midst of a maize field. The graveyard holds three graves which are covered with stones.

This author could not confirm the existence of this graveyard. It is possible that it may have been ploughed under.

This graveyard will not be affected by the TOP Project as it is located to the north of the N12 where no mining activities are being planned for the unforeseeable future.



**Figure 17- Two 'islands' (unworked areas) in the middle of a maize field to the north of the N12 may hold graves. However, the possible presence of any graves on these islands has not been confirmed by fieldwork as this graveyard, if it exists, is not threatened by any mining activities in the near foreseeable future (above).**

### **6.2.13 Graveyard 13**

GY13 is located on Waterpan 8IS in close proximity of a farm homestead complex. It holds approximately twenty one graves some of whom are edged with bricks. A single headstone with no inscriptions occurs.



**Figures 18 & 19- GY13 is barely visible as it is overgrown with kikuyu grass to the left of Xstrata's signpost (above). GY14 holds as many as seventy graves many of which are fitted with cement headstones with indecipherable inscriptions (above).**

#### **6.2.14 Graveyard 14**

This graveyard (GY13) on Waterpan 8IS is a large graveyard with as many as one hundred and five graves many of which are fitted with cement headstones. Although many of the headstones were inscribed at one time most are indecipherable today.

A limited number of graves are decorated with granite headstones.

#### **6.2.14 Graveyard 15**

This large graveyard on Kleinkopje 15IS is located in the midst of a maize field. It holds more than four hundred graves.



**Figure 20- GY15 is a large graveyard on Kleinkopje 15IS which holds more than four hundred graves (above).**

#### **6.2.16 Graveyards 16**

GY16 is located on Zaaiwater 11IS along the northern border of an avenue of Blue Gum trees. The graveyard is neglected and totally obscure by tall grass. Consequently no photograph has been taken.

GY16 holds the remains of approximately eight individuals. Some of the graves are fitted with cement headstones. Several of the graves have cement head stones with inscriptions. Four of these read as follow:

- 'Nestar Thwala, Wazalala 1922 1962'



- 'Belina Malalose washona 1964 July'
- 'Mathew Sibindi Nkosi Died 15-4-1967 HVM 179'
- 'Lina 1919 1970'

GY16 is located to the south of the R545 in the south-western corner of the Project Area where no mining will take place in the foreseeable future.

#### **6.2.17 Graveyard 17**

GY17 was not accessible at the time when the fieldwork was done due to reasons of safety. This graveyard is located in a dangerous but 'safe' spot as it is situated midway between two railway lines in close proximity of a clump of wattle trees.

Its locality between two railway lines makes it difficult and unsafe to access while it is highly unlikely that it will be affected by any future developmental activities due to its location.

GY17 holds only two to three graves which are demarcated with a fence.



**Figures 21 & 22- Graveyard 17 is situated between two railway lines where it could not be accessed (above). GY18 could not be found in agricultural fields and its existence is highly doubted (below).**



### **6.2.18 Graveyard 18**

This graveyard is reported in Pelsers (2008) census on the graveyards present in the Tweefontein mining area. According to Pelsers this possible graveyard was indicated by local farm workers to mine officials. However, no formal graves are visible except for some haphazardly occurring stones on the surface that could cover the remains of humans.

According to spokespersons GY18 may have contain as many as five graves.

It is possible that these graves may have been disturbed as a result of agricultural activities over time. However, it is also possible that these stones may merely have been collected from the veld when the agricultural fields were prepared and that they have been haphazardly stacked on heaps next to the agricultural field where they were scattered over time.

### **6.2.19 Graveyard 19**

GY19 dates from the Anglo-Boer War (AD1899-1902) and holds at least three graves. One of the graves is covered with a scattered pile of slate whilst at least one of the graves is fitted with a white washed headstone manufactured from sandstone or cement.

The third grave is fitted with a granite headstone with the following inscription:

- 'Voor Vryheid en Vaderland Johannes Jacobus Bezuidenhout van Bethal Geb 25 April 1864 Gestorwen 12 Julie 1901 te Doornkraal'.

This graveyard is older than sixty years.



**Figure 23- Graveyard 19 dates from the Anglo Boer War (AD1899-1902) and holds the remains of Jacobus Bezuidenhout and two other individuals (above).**



**Figure 24- Graveyard 20 is located against a soft slope holds and holds more than twenty five graves (above).**

### **6.2.20 Graveyard 20**

GY20 is located against a slight slope near the ruins of dwellings and a Blue Gum bush. It holds more than twenty five graves most of which are covered with piles of concrete pieces and bricks.

A few of the graves are edged with clay bricks whilst others are fitted with cement headstones. No inscriptions are visible. The graveyard which is older than sixty years is severely deteriorated.

### **6.2.21 Graveyard 21**

GY21 is located along a maize field near the edge of a Blue Gum plantation. It is severely deteriorated and holds the remains of at least thirty individual. Most of the graves are covered with pieces of concrete, bricks and ferricrete.



**Figure 25- Graveyard 21 is located in a maize field and near the edge of a Blue Gum plantation (above).**

### 6.2.22 Graveyard 22

Graveyard 23 is located against a slope overlooking a dry stream. It is a well maintained and nearly all the graves are fitted with cement headstones. Most of the deceased are Ndebele's.

GY23 holds at least twenty three graves which are demarcated with stone and brick walls into three separate (family) sections. Some of the cement headstones hold the following inscriptions:

- 'Mouswane Tshebangu'
- 'Sokapaboke Kapak'
- 'Swartbooi Skhosana'
- 'Jacob Skhosana'
- 'Sabhina Skhosana'



**Figure 26- Graveyard 23 is located against a relative steep slope and holds the remains of approximately twenty five individual who were Ndebele speaking (above).**

### 6.2.23 Graveyard 23

GY23 holds at least fourteen graves within the confines of a beautifully constructed stone-wall which was built with slate. All the headstones are exfoliated with the result that no inscriptions are visible. It seems as if the Minnaar and Dreyer families were buried in this graveyard.

At least one of the headstones is decipherable and contains the following inscription:

- 'Hier rust K P Minnaar Geb 18 Des 1837 Overl 14 .... 1914 Eggenoot van MDJ Minnaar Ps 130 V 4 Ek blyf den Heer verwagten My ziel zyn ongestoort Ik hoop in al my klagten op zy onfeilbare woord'



**Figure 27- Graveyard 24 holds the remains of the Minnaar and Dreyer families and is located near a waste dump in the south-western corner of the mining area (above).**

### 6.2.24 Graveyard 24

GY24 is located in close proximity of GY23. It holds the remains of an unknown number of individuals.

GY24 was inaccessible at the time of the fieldwork due to blasting. GY24 is probably contemporary with GY23 and therefore older than sixty years.



### 6.3 Buildings and structures with historical significance

A few buildings, some still in use, qualify as possible significant historical structures as they occur in the Project Area. These structures and buildings are the following:

- The administrative office complex that is currently being used by XSA has partly been modernised. Some of the individual buildings as well as the core of the complex may hold historical significance.



**Figure 28- XSA administrative office complex possibly includes individual structures or a core which may qualify as historical significant (above).**

- The Coalville structure (CS) which has the appearance of a residence and which may have served as a post office in the past.
- A possible historical residence occurs next to the Coalville structure.
- A Victorian house (VH) which is painted green with outbuildings on Zaaiwater 11IS have historical significance.
- A historical house is located at the back of the garage near the entrance to the once existing Witcon (Duiker) residential area.
- The Tweefontein Club House next to the golf course.



**Figures 29, 30 & 31- The Coalville structure (above), a Victorian residence and a second residence on Zaaiwater 11IS have historical significance (above).**

## 6.4 Tables

The coordinates for the heritage resources which were recorded in the Project Area are as follow:

Grave yards	Coordinates	Location and brief description
GY01	26° 01' 718's 29° 09' 813'e	Large graveyard with more than a thousand graves.
GY02	26° 04' 446's 29° 09' 424'e	Graveyard next to haul road. Contains approximately 86 graves.
GY03	26° 03' 101's 29° 08' 154'e	Next to dirt road in Boschman's Colliery. Holds approximately 77 graves.
GY04	26° 03' 854's 29° 10' 865'e	Close to haul road and Blue Gum avenues. Divided into sections with more than hundred graves.
GY05	26° 03' 411's 29° 07' 030'e	Fourteen graves in a Blue Gum plantation. Two graves covered with ferricrete and two fitted with cement head stones.
G06	26° 03' 463's 29° 07' 360'e	Single grave in a maize field.
GY07	26° 02' 974's 29° 07' 884'e	De Jager and Groenewald families' graveyard In Boschmans Colliery. Holds 8-10 graves.
GY08	26° 00' 903's 29° 08' 482'e	Next to 400kV power line the Waterpan North Colliery. Holds approximately 15-20 graves.
GY09	26° 01' 577's 29° 07' 222'e	Three graves next to two Blue Gum trees in the Boschman's North Colliery.
GY10	26° 01' 520's 29° 07' 551'e	Eight graves under a 400kV power line next to a railway line in the Boschman's North Colliery.
GY11	26° 00' 154's 29° 07' 155'e	Near the crossing between the N12 and the Witbank-Ogies road. Holds 90 graves.
GY12	26° 00' 07.775"s 29° 06' 55.68"e	Located in maize field north of the N12. May be ploughed under. Outside mining area.
GY13	25° 59' 890's 29° 09' 985'e	Approximately 21 graves edged with bricks. Near farm homestead. Some fitted with cement head stones.
GY14	25° 59' 971's 29° 10' 429'e	More than 105 graves next to a maize field and near a pan.
GY15	26° 02' 483's 29° 12' 190'e	Large graveyard with more than 400 graves.
GY16	26° 06' 30.94"s 29° 05' 51.21"e	Located in a Blue Gum bush on Zaaewater 11IS with unknown number of graves. Outside mining area.

GY17	26° 05' 36.32"s 29° 10' 33.45"e	Located between railway line and dump. Two to three demarcated graves.
GY18	26.06141s 29.13120e	Possible graveyard with 5 graves disturbed by ploughing.
GY19	26° 02.331's 29° 11.117'e	Graveyard with three graves which dates from the Anglo Boer War (AD1899-1901).
GY20	26° 02.661's 29° 11.273'e	Located against slight slope. Holds approximately thirty seven graves.
GY21	26° 02.243's 29° 11.398'e	Located in maize field. Severely deteriorated. Hold approximately seventy three graves.
GY22	26° 02.803's 29° 11.715'e	Located against relatively steep slope. Neatly maintained. Approximately twenty graves of Ndebele speaking people.
GY23	26° 04.568's 29° 06.660'ee	Minnaar and Dreyer graveyard with fourteen graves demarcated with a stone wall.
GY24	26 04 42.78s 29 06 45.22ee	Undisclosed number of graves in close proximity of GY23.

**Table 1- Coordinates for graveyards in the Project Area (above).**

<b>Historical Structures</b>	<b>Coordinates</b>	<b>Location and brief description</b>
(AOC) Administrative office block	26° 01' 57.05's 29° 10' 10.36'e	Complex with administrative offices
(CS) Coalville structure	26° 01' 753' 29° 10' 330'	Structure with similar appearance as a residence but which may have served as a post office.
(HH01) House next to the Coalville structure	26° 01' 723' 29° 10' 316'	Residential house
Victorian styled house (VH)	See 1:50 000 map 2629AA Ogies	Located on Zaaiwater 11IS. Associated with outbuildings
(HH02) Historical house	26° 05' 811' 29° 06' 228'	House dating from the 1930's behind a garage at the entrance to the once existing Witcon residential area
(CH) Club House	26° 01' 32.63's 29° 10' 23.12'e	Golf club house with golf course

**Table 2- Coordinates and brief description of structures and buildings with historical significance in the Project Area (above)**

## **7 THE SIGNICANCE, POSSIBLE IMPACT ON AND MITIGATION OF THE HERITAGE RESOURCES**

### **7.1 The significance of the heritage resources**

Several graveyards and most of the historical remains will be affected (destroyed) by the TOP Amendment Project. The significance of the graveyards and historical remains therefore is indicated. Mitigation measures are also outlined for the heritage resources which will be affected by the TOP Amendment Project.

#### **7.1.1 The significance of the graveyards**

All graveyards and graves can be considered to be of high significance and are protected by various laws. Legislation with regard to graves includes Section 36 of the National Heritage Resources Act (No 25 of 1999) whenever graves are older than sixty years. The act also distinguishes various categories of graves and burial grounds. Other legislation with regard to graves includes those which apply when graves are exhumed and relocated, namely the Ordinance on Exhumations (No 12 of 1980) and the Human Tissues Act (No 65 of 1983 as amended).

It seems as if all the graveyards in the Project Area hold graves which are older than sixty years.

#### **7.1.2 The significance of the historical structures**

Historical buildings and structures such as those outlined in this report are older than sixty years or are approaching this age and therefore are protected by Section 3 and Section 38 of the National Heritage Resources Act (No 25 of 1999). The significance of these historical buildings can be described as medium to low when considering criteria such as the following (Table 3):

- Historical houses on rural areas on the Eastern Highveld are rapidly disappearing as a result of the expansion of the coal mining industry and as a result of abandonment (particularly on farms) and their subsequent decay.

- The historical buildings have research (scientific) value.
- The historical buildings can add to our knowledge regarding human life ways and traditions on the Eastern Highveld during the early twentieth century.
- The historical structures can be altered (renovated) and utilized in an adaptive context.

<b>Significance rating</b>	<b>Criteria for significance rating</b>	<b>Mitigation/Management Measures</b>
<b>High (3)</b>	National/provincial value Educational, research, aesthetical conservation value Future use	Conserve unaffected for posterity (preferably) <i>in situ</i>
<b>Medium (2)</b>	Provincial value Medium educational, research, aesthetical conservation value No future use	Phase II investigation before demolishing. Permitting required
<b>Low (1)</b>	Local and site specific value Low educational, research, aesthetical conservation value No future use	Document during Phase I HIA Demolish during construction. No permitting required

**Table 3- Significance rating for historical remains in the Project Area (above).**

## **7.2 Possible impact on the heritage resources**

It is highly likely that the following heritage resources will be affected by the TOP Amendment Project, namely (Figure 5):

- GY02, GY08, GY13, GY15, GY19, GY20, GY21 and GY22.
- Most of the historical buildings except the Victorian House (VH) and Historical House 02 (HH02).

### 7.3 The significance of the impact on the heritage resources

The significance of possible impacts on the heritage resources was determined using a ranking scale based on the following criteria:

- Occurrence
  - Probability of occurrence (how likely is it that the impact may/will occur?), and
  - Duration of occurrence (how long may/will it last?)
- Severity
  - Magnitude (severity) of impact (will the impact be of high, moderate or low severity?), and
  - Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?).

Each of these factors has been assessed for each potential impact using the following ranking scales:

Probability: 5 – Definite/don't know 4 – Highly probable 3 – Medium probability 2 – Low probability 1 – Improbable 0 – None	Duration: 5 – Permanent 4 - Long-term (ceases with the operational life) 3 - Medium-term (5-15 years) 2 - Short-term (0-5 years) 1 – Immediate
Scale: 5 – International 4 – National 3 – Regional 2 – Local 1 – Site only 0 – None	Magnitude: 10 - Very high/don't know 8 – High 6 – Moderate 4 – Low 2 – Minor

The environmental significance of each potential impact was assessed using the following formula:

Significance Points (SP) = (Magnitude + Duration + Scale) x Probability

The maximum value is 100 Significance Points (SP). Potential environmental impacts are rated as very high, high, moderate, low or very low significance on the following basis:

- More than 80 significance points indicates VERY HIGH environmental significance.
- Between 60 and 80 significance points indicates HIGH environmental significance.
- Between 40 and 60 significance points indicates MODERATE environmental significance.
- Between 20 and 40 significance points indicates LOW environmental significance.
- Less than 20 significance points indicates VERY LOW environmental significance.

### 7.3.1 The significance of the impact on the graveyards

The significance of any possible impact on the graveyards is very high (Table 4).

Grave-yards	Probability of impact	Magnitude of impact	Duration of impact	Scale of impact	Significance points	Significance rating
GY02	5	10	5	1	90	Very High
GY08	5	10	5	1	90	Very High
GY13	5	10	5	1	90	Very High
GY15	5	10	5	1	90	Very High
GY19	5	10	5	1	90	Very High
GY20	5	10	5	1	90	Very High
GY21	5	10	5	1	90	Very High
GY22	5	10	5	1	90	Very High

**Table 4: Significance of potential impacts on graveyards in the Project Area (above).**



### 7.3.2 The significance of the impact on the historical remains

The significance of any possible impact on the historical houses is high (Table 5).

Historical remains	Probability of impact	Magnitude of impact	Duration of impact	Scale of impact	Significance points	Significance rating
AOC	5	10	5	1	90	Very High
CS01	5	10	5	1	90	Very High
HH01	5	10	5	1	90	Very High
CH	5	10	5	1	90	Very High

**Table 5: Significance of potential impacts on the historical remains in the Project Area (above).**

## 7.4 Mitigating the heritage resources

### 7.4.1 Mitigating the graveyards

The graveyards must be mitigated by means of exhumation and relocation. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.

A Conservation Management Plan for the remaining unaffected graveyards must be included in the mine's EMP to ensure their continued existence during the construction, operation and decommissioning phase of the TOP Amendment Project

#### **7.4.2 Mitigating the historical remains**

Historical structures may not be affected (demolished, renovated, altered) by the TOP Amendment Project *prior* to their investigation by a historical architect in good standing with the South African Heritage Resources Agency (SAHRA). XSA has to acquire a permit from the South African Heritage Resources Authority (SAHRA) *prior* to any of these structures and buildings being demolished or altered as a result of the TOP Amendment Project.

## **8 CONCLUSION AND RECOMMENDATIONS**

The Phase I HIA study revealed the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999), namely:

- At least twenty four graveyards.
- Buildings with historical significance.

No pre-historical remains were recorded in the Project Area nor did this study provide for a paleontological study.

The graveyards and historical structures were geo-referenced and mapped (Figure 5, Tables 1 & 2). The significance of these heritage resources is indicated whilst mitigation measures are outlined should any of the graveyards or historical structures be affected by the amendment project.

### **The significance of the heritage resources**

Several graveyards and most of the historical remains will be affected (destroyed) by the TOP Amendment Project. The significance of the graveyards and historical remains therefore is indicated. Mitigation measures are also outlined for the heritage resources which will be affected by the TOP Amendment Project.

### **The significance of the graveyards**

All graveyards and graves can be considered to be of high significance and are protected by various laws. Legislation with regard to graves includes Section 36 of the National Heritage Resources Act (No 25 of 1999) whenever graves are older than sixty years. The act also distinguishes various categories of graves and burial grounds. Other legislation with regard to graves includes those which apply when graves are exhumed and relocated, namely the Ordinance on Exhumations (No 12 of 1980) and the Human Tissues Act (No 65 of 1983 as amended).

It seems as if all the graveyards in the Project Area hold graves which are older than sixty years.

### **The significance of the historical structures**

Historical buildings and structures such as those outlined in this report are older than sixty years or are approaching this age and therefore are protected by Section 3 and Section 38 of the National Heritage Resources Act (No 25 of 1999). The significance of these historical buildings can be described as medium to low when considering criteria such as the following (Table 3):

- Historical houses on rural areas on the Eastern Highveld are rapidly disappearing as a result of the expansion of the coal mining industry and as a result of abandonment (particularly on farms) and their subsequent decay.
- The historical buildings have research (scientific) value.
- The historical buildings can add to our knowledge regarding human life ways and traditions on the Eastern Highveld during the early twentieth century.
- The historical structures can be altered (renovated) and utilized in an adaptive context.

### **Possible impact on the heritage resources**

It is highly likely that the following heritage resources will be affected by the TOP Amendment Project, namely:

- GY02, GY08, GY13, GY15, GY19, GY20, GY21 and GY22.
- Most of the historical buildings except the Victorian House (VH) and Historical House 02 (HH02).

### **The significance of the impact on the heritage resources**

The significance of possible impacts on the heritage resources was determined using a ranking scale based on the following criteria:

The significance of any possible impact on the graveyards is very high (Table 4).

The significance of any possible impact on the historical houses is high (Table 5).

## **Mitigating the heritage resources**

### **Mitigating the graveyards**

The graveyards must be mitigated by means of exhumation and relocation. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.

A Conservation Management Plan for the remaining unaffected graveyards must be included in the mine's EMP to ensure their continued existence during the construction, operation and decommissioning phase of the TOP Amendment Project.

### **Mitigating the historical remains**

Historical structures may not be affected (demolished, renovated, altered) by the TOP Amendment Project *prior* to their investigation by a historical architect in good standing with the South African Heritage Resources Agency (SAHRA). XSA has to acquire a permit from the South African Heritage Resources Authority (SAHRA) *prior* to any of these structures and buildings being demolished or altered as a result of the TOP Amendment Project.



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**Member ASAPA**

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## **10 SPOKESPERSONS CONSULTED**

Philip Makgoka. Environmental Coordinator. Xstrata Tweefontein

Tshepo Makgoloko. Cattle herder in the proposed mining area. Xstrata Tweefontein.

## **APPENDIX A: DETAILS OF THE SPECIALIST**

**Profession:** Archaeologist, Museologist (Museum Scientists), Lecturer, Heritage Guide Trainer and Heritage Consultant

### **Qualifications:**

BA (Archaeology, Anthropology and Psychology) (UP, 1976)

BA (Hons) Archaeology (distinction) (UP, 1979)

MA Archaeology (distinction) (UP, 1985)

D Phil Archaeology (UP, 1989)

Post Graduate Diploma in Museology (Museum Sciences) (UP, 1981)

### **Work experience:**

Museum curator and archaeologist for the Rustenburg and Phalaborwa Town Councils (1980-1984)

Head of the Department of Archaeology, National Cultural History Museum in Pretoria (1988-1989)

Lecturer and Senior lecturer Department of Anthropology and Archaeology, University of Pretoria (1990-2003)

Independent Archaeologist and Heritage Consultant (2003-)

**Accreditation:** Member of the Association for Southern African Professional Archaeologists. (ASAPA)

**Summary:** Julius Pistorius is a qualified archaeologist and heritage specialist with extensive experience as a university lecturer, museum scientist, researcher and heritage consultant. His research focussed on the Late Iron Age Tswana and Lowveld-Sotho (particularly the Bamalatji of Phalaborwa). He has published a book on early Tswana settlement in the North-West Province and has completed an unpublished manuscript on the rise of Bamalatji metal workings spheres in Phalaborwa during the last 1 200 years. He has written a guide for Eskom's field personnel on heritage management. He has published twenty scientific papers in academic journals and several popular articles on archaeology and heritage matters. He collaborated with environmental companies in compiling State of the Environmental Reports for Ekurhuleni, Hartbeespoort and heritage management plans for the Magaliesberg and Waterberg. Since acting as an independent consultant he has done approximately 800 large to small heritage impact assessment reports. He has a longstanding working relationship with Eskom, Rio Tinto (PMC), Rio Tinto (EXP), Impala Platinum, Angloplats (Rustenburg), Lonmin, Sasol, PMC, Foskor, Kudu and Kelgran Granite, Bafokeng Royal Resources etc. as well as with several environmental companies.

## APPENDIX B: DECLARATION OF INDEPENDENCE

<p>I, Julius CC Pistorius, declare that:</p> <ul style="list-style-type: none"> <li>• I act as the independent environmental practitioner in this application</li> <li>• I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant</li> <li>• I declare that there are no circumstances that may compromise my objectivity in performing such work;</li> <li>• I have expertise in conducting environmental impact assessments, including knowledge of the National Heritage Resources Act (No 25 of 1999) and any guidelines that have relevance to the proposed activity;</li> <li>• I will comply with the Act, regulations and all other applicable legislation;</li> <li>• I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;</li> <li>• I have no, and will not engage in, conflicting interests in the undertaking of the activity;</li> <li>• I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;</li> <li>• I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;</li> <li>• I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;</li> <li>• I will keep a register of all interested and affected parties that participated in a public participation process; and</li> <li>• I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not</li> <li>• all the particulars furnished by me in this form are true and correct;</li> <li>• will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and</li> <li>• I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.</li> </ul> <p><b>Disclosure of Vested Interest</b></p> <p>I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2010.</p>
<p style="text-align: center;">. . . . .</p> <p style="text-align: center;">.</p> <p>_____ Signature of the environmental practitioner: Private Consultant</p> <p>_____ Name of company:</p> <p>_____ Date: 26-4-2013</p>
<p>_____ Signature of the Commissioner of Oaths:</p> <p>_____ Date:</p> <p>_____ Designation:</p>

Heritage Impact Assessment

Phase 2 of the Proposed Re-alignment of the P141-1 Provincial Road, Tweefontein Mine  
Complex, Mpumalanga Province

GLE3075



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ENVIRONMENTAL

## Appendix C: Palaeontological Study

**Palaeontological Impact Assessment for the proposed  
Road alignments (2 phases) and Extension to the  
underground coal mine, Tweefontein Optimisation  
Project, Mpumalanga**

**Desktop Study**

**For  
Digby Wells Environmental**

**26 May 2015**

**Prof Marion Bamford**  
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[Marion.bamford@wits.ac.za](mailto:Marion.bamford@wits.ac.za)

# **Palaeontological Impact Assessment for the proposed Road alignments (2 phases) and Extension to the underground coal mine, Tweefontein Optimisation Project, Mpumalanga**

## **Background**

Glencore Operations South Africa (Pty) Ltd (Glencore) currently employs both underground and open pit coal mining activities at its Tweefontein Mine Complex. In 2008, Glencore initiated the Tweefontein Optimisation Project (TOP) which aims to recover the remaining strategic coal reserves within the mine complex. As part of the TOP, Glencore had identified that a portion of the strategic coal reserve is located beneath the existing P141-1 Provincial Road which forms part of Mpumalanga's strategic public transport network. In light of this, Glencore proposed the realignment of the P141-1 Provincial Road in 2010. For planning purposes, the road realignment was separated into two phases, as follows:

Phase 1: Realignment of the P141-1 Provincial Road from the north eastern portion of the Tweefontein dam, to just beyond the Phoenix dam. The Environmental Impact Assessment (EIA) and Water Use Licence (WUL) process for this section of the road was undertaken in 2014 with the Environmental Authorisation granted in November 2014 (17/2/3N-260).

Phase 2: Realignment of the P141-1 Provincial Road from the D2769 extension road (currently under construction), following a north westerly direction for approximately 3.4 km to join the existing P 141-1 road. This application for environmental authorisation relates to Phase 2 only and is hereafter referred to as the proposed project.

## **Proposed Project**

Glencore is proposing Phase 2 of the Tweefontein Road Realignment Project as stated above. This includes the realignment of a section of the P141-1 Provincial Road which traverses through the Tweefontein Mine Complex, situated 8 kilometres (km) east of Ogies in the Mpumalanga Province. This is to enable the extraction of the coal resource situated beneath the P141-1 road reserve as part of the TOP initiated in 2010.

The realignment of the P141-1 Provincial Road runs from the D2769 extension road which is currently under construction, following a north westerly direction. A new bridge is proposed to cross over the existing mine haul road. The road realignment curves eastwards thus avoiding a grave yard. It continues in the north easterly direction and traverses a watercourse over which a culvert is proposed to be constructed. The proposed realignment then proceeds to join the existing P 141-1 Provincial Road at the point where it intersects the mine access road (Grootpan haul road). The proposed realigned P141-1 Provincial Road will be 3.4 km in length with a 40 m wide road reserve.

During the construction phase of the proposed project, the P141-1 Provincial Road between R555 and R547 will be temporarily closed. This activity assumes that the construction of Phase 1 of the proposed road realignment would have been completed prior to the commencement of Phase 2 (which is the proposed project). In addition to this, the R547 between the P141-1 Provincial Road and the N12 will be permanently closed off. (Information from Digby Wells)

## **Methods and Terms of Reference**

1. In order to determine the likelihood of fossils occurring in the affected area geological maps, literature, palaeontological databases and published and unpublished records must be consulted.
2. If fossils are likely to occur then a site visit must be made by a qualified palaeontologist to locate and assess the fossils and their importance.
3. Unique or rare fossils should either be collected (with the relevant SAHRA permit) and removed to a suitable storage and curation facility, for example a Museum or University palaeontology department or protected on site.
4. Common fossils can be sacrificed if they are of minimal or no scientific importance but a representative collection could be made if deemed necessary.

The published geological and palaeontological literature, unpublished records and databases were consulted to determine if there are any records of fossils from the sites and the likelihood of any fossils occurring there.

## **Geology and Palaeontology**

According to the geological map the Tweefontein mine and proposed road realignments lie in the Permian Vryheid Formation and are “red” in the SAHRIS palaeosensitivity map (Fig 1). There are extensive coal deposits in this region comprising five coal seams underground, with seams 2 and 4 being the thickest (Snyman, 1998) and of economic importance. On average seam 5 is more than 10m below the surface, and seam 4 upper is more than 35m below the surface. According to the SAHRIS palaeosensitivity map the area is highly sensitive because of the coal reserves and chance of fossil plants occurring.

Based on the literature (Cadle et al., 1993; Aitken, 1994; Falcon, 1989; Glasspool, 2003;) and from personal experience visiting South African coal mines, fossil plants are present in the shales and mudstones between coal seams but seldom within coal seams. The distribution, however, is extremely sporadic and unpredictable. Furthermore, coal flora plants are not a rare. It takes time and opportunistic finds to locate any pockets of preserved plants. Insect wings are extremely rare and vertebrates are always absent.





Figure 1. Geological map of the area between Kendal, Ogies and Kriel. The approximate location of the proposed opencast mine is indicated with the arrow. Abbreviations of the rock types are explained in Table 1. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Symbol	Group/Formation	Lithology	Approximate Age
Jd	Jurassic	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pvo	Volksrust	shale	Middle Permian, Upper Ecca
Pv	Vryheid	Shales, sandstone, coal	Lower Permian, Middle Ecca
C-Pd	Dwyka	Tillite, sandstone, mudstone, shale	Upper Carboniferous to Lower Permian
Vm	Malmani subgroup	Dolomite, chert	Pretoria Group >2200Ma

Table 1: Explanation of symbols for the geological map and approximate ages (Eriksson et al., 2006; Johnson et al., 2006; Snyman, 1998).

### Recommendation

The proposed road realignments are on the surface and unlikely to penetrate more than 2m below the surface which is already disturbed from previous activities such as agriculture and road works. The mine extension is proposed to be in the existing area of operation and focused on coal remaining in the mine so is already disturbed.

It is highly unlikely that the road alignment phases 1 and 2 will impact on any fossil material.

The proposed mine extension is within the coal seams of the existing mining operation so will not impact on fossil plants. Therefore there is no need for any further palaeontological assessment.

If fossil plant material is discovered during the road alignment process or mining operations, then it is strongly recommended that a professional palaeontologist be called to assess the importance and rescue them if necessary (with the relevant SAHRA permit).

If the fossil material is deemed to be of scientific interest then further visits by a professional palaeontologist would be required to collect more material. Given the shortage of such qualified people in South Africa and the stringent safety laws for access by the mining companies, any long term monitoring of the fossils is impractical. Nonetheless a monitoring programme is outline below.

As far as the palaeontology is concerned the proposed development can go ahead. Any further palaeontological assessment would only be required AFTER mining has commenced and IF fossils are found by the geologist or environmental personnel.

#### **Monitoring Programme for Palaeontology –to commence once the mine is operational.**

1. The following procedure is only required if and when underground mining commences. The surface activities would not impact on the fossil heritage as the coals and any associated fossil plants are below ground.
2. When mining operations commence the shales and mudstones (of no economic value) must be given a cursory inspection by the mine geologist or designated person before being added to the dumps used by the mine. Any fossiliferous material should be put aside in a suitably protected place. This way the mining activities will not be interrupted.
3. Photographs of similar fossil plants must be provided to the mine to assist in recognizing the fossil plants in the shales and mudstones.
4. On a regular basis, to be agreed upon by the mine management and the qualified palaeobotanist sub-contracted for this project, the palaeobotanist should visit the mine to inspect the selected material and check the dumps where feasible. The frequency of inspections should be monthly. If the geologist/deputy is diligent and extracts the fossil material then inspections can be less frequent.
5. Fossil plants considered to be of good quality or scientific interest by the palaeobotanist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the mine a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA.
6. If any underground inspection is deemed necessary then the normal safety procedures that the mine management endorses, must be followed by the palaeobotanist and associated mine employees.
7. If no good fossil material is recovered then the site inspections by the palaeobotanist can be reduced to annual events until mining operations cease. Annual reports by the palaeobotanist must be sent to SAHRA.

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Heritage Impact Assessment

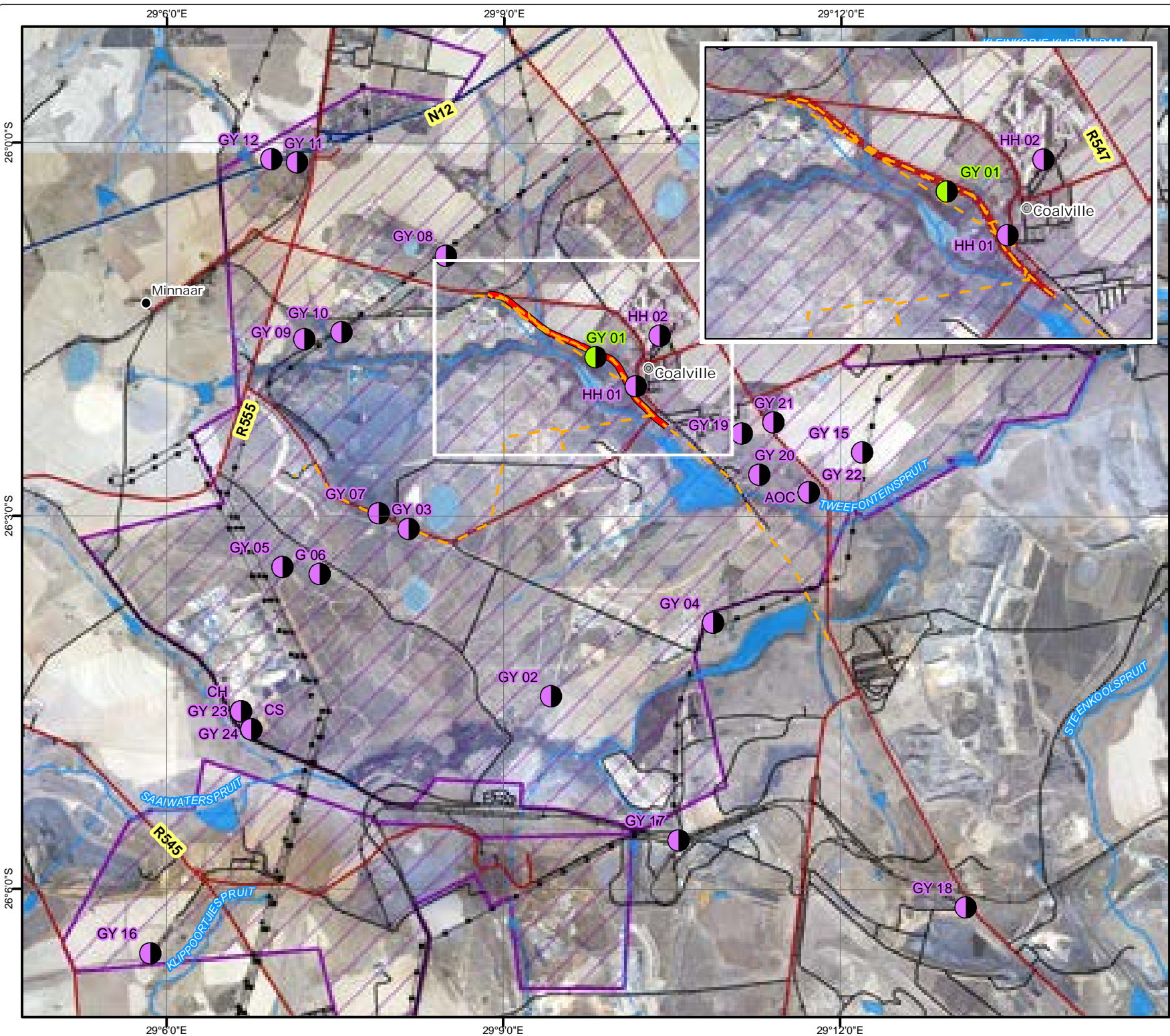
Phase 2 of the Proposed Re-alignment of the P141-1 Provincial Road, Tweefontein Mine  
Complex, Mpumalanga Province

GLE3075



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## Appendix D: Plans



# Glencore Tweefontein Road Re-alignment Phase 2 Heritage Impact Assessment

## Legend

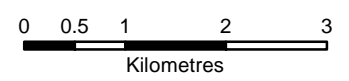
- Tweefontein Complex Mining Area
- Phase 2 Road Alignment
- Heritage Tracks
- ⊙ Other Town
- Settlement
- Power Line
- Arterial / National Route
- Main Road
- Minor Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam / Lake
- Non-Perennial Pan / Stream
- Perennial Pan

## Identified Heritage Resources

- 2015 HIA
- 2013 HIA





















Projection: Transverse Mercator  
 Datum: WGS 1984  
 Central Meridian: 29°E  
 Date: 03/09/2015  
 Ref #: meg.GLE3075.201509.031



# Glencore Tweefontein Road Re-alignment Phase 2

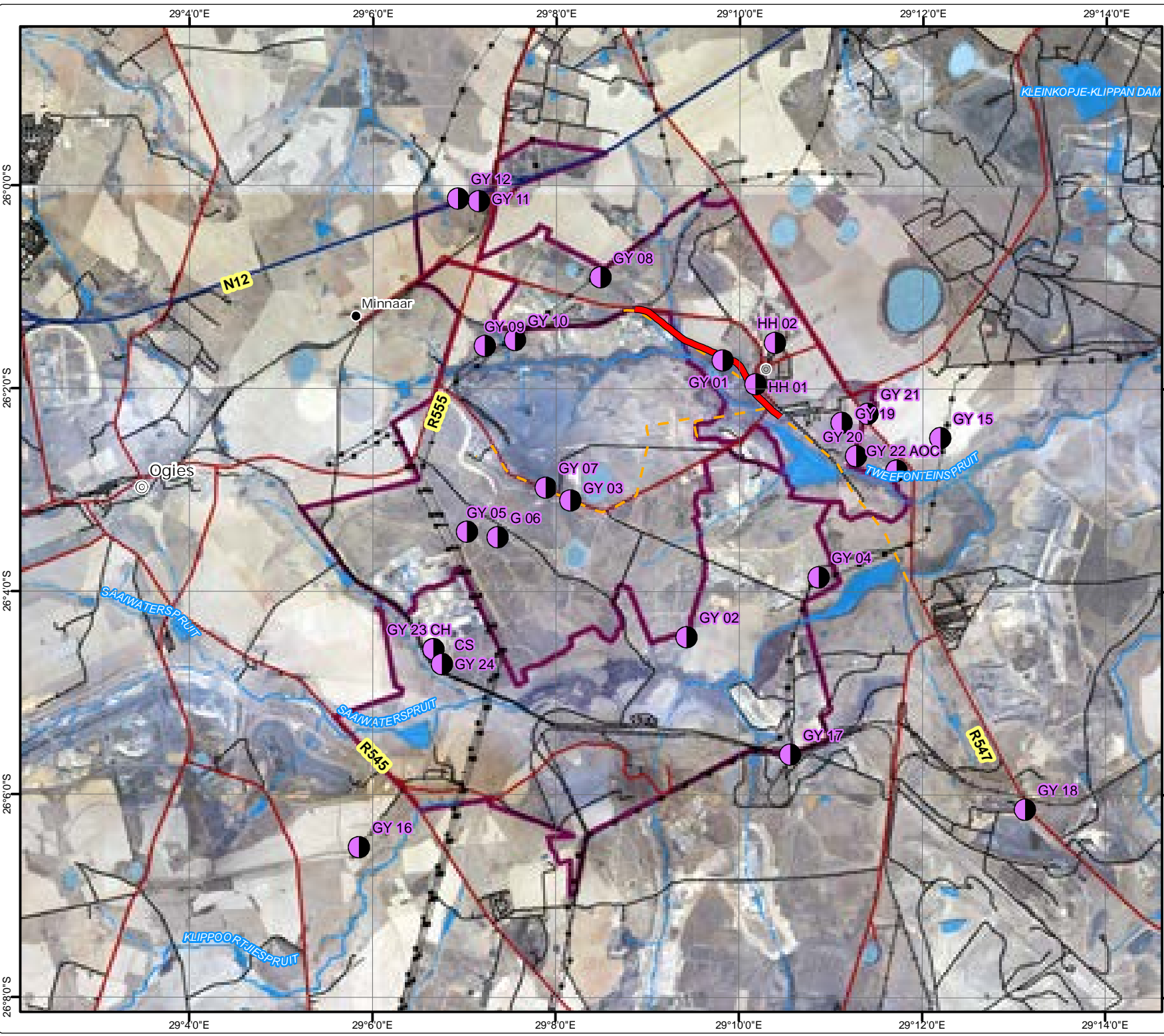
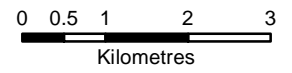
## Heritage Scoping Survey

### Legend

-  Tweefontein Collieries
-  Phase 2 Road Alignment
-  Identified Heritage Resources
-  Heritage Tracks
-  Secondary Town
-  Other Town
-  Settlement
-  Power Line
-  Arterial / National Route
-  Main Road
-  Minor Road
-  Railway Line
-  Non-Perennial Stream
-  Perennial Stream
-  Dam Wall
-  Dam / Lake
-  Non-Perennial Pan / Stream
-  Perennial Pan




















Projection: Transverse Mercator  
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 Central Meridian: 29° E  
 Date: 29/05/2015  
 Ref #: sdp.GLE3075.201505.103



# Glencore Tweefontein Road Re-alignment Phase 2

## Regional Geology

### Legend

-  Tweefontein Collieries
-  Phase 2 Road Alignment
-  Heritage Tracks
-  Secondary Town
-  Other Town
-  Settlement
-  Power Line
-  Arterial / National Route
-  Main Road
-  Minor Road
-  Railway Line
-  Non-Perennial Stream
-  Perennial Stream
-  Dam Wall
-  Dam / Lake
-  Non-Perennial Pan / Stream
-  Perennial Pan

### Regional Geology

-  Dwyka Grp, Karoo Spgrp
-  Karoo Dolerite Sui
-  Loskop Fm, Transvaal Spgrp
-  Vryheid Fm, Karoo Spgrp
-  Rooiberg Grp, Transvaal Spgrp



Projection: Transverse Mercator  
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 Central Meridian: 29° E  
 Date: 19/05/2015  
 Ref #: sdp.GLE3075.201505.103

