HERITAGE IMPACT ASSESSMENT FOR THE WITWATERSRAND GOLD FIELDS ACID MINE DRAINAGE PROJECT (WESTERN BASIN)

TRANS-CALEDON TUNNEL AUTHORITY (TCTA)

AUGUST 2012

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Report Title:	**Heritage Impact Assessment for the Witwatersrand Gold Fields Acid Mine Drainage Project (Western Basin)**
Report type:	**Heritage Impact Assessment to Section 38(1) NHRA (1999)**
Project Number:	**BKS1310**

Name	Responsibility	Signature	Date
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EXECUTIVE SUMMARY

Digby Wells Environmental has been requested by Trans-Caledon Tunnel Authority to conduct a Heritage Impact Assessment for the Western Basin of the Witwatersrand Gold Fields in the Gauteng Province. The Department of Water Affairs issued Trans-Caledon Tunnel Authority with a directive to act as the agent to plan, design, and implement immediate and short term measures to manage and control acid mine drainage in the Western, Central, and Eastern Basins of the Witwatersrand Gold Fields.

A summary table of identified heritage resources during the field survey is provided below.

Heritage Resource ID	Description	Value	Impact Assessment: before project mitigation	Impact Assessment: after mitigation	Field Rating
PY013	Dolomite outcrop in the Krugersdorp Game Reserve.	0	0	0	Field Rating IV C - General
PY014	Dolomite outcrop in the Krugersdorp Game Reserve.	0	0	0	Field Rating IV C - General
PY015	Dolomite outcrop in the Krugersdorp Game Reserve.	0	0	0	Field Rating IV C - General
BE009	A residential complex located approximately 10 m from the proposed AMD and treated water pipeline routes.	5	0	0	Field Rating IV A - General
BE010	A single Industrial building located approximately 8 m from the proposed AMD and treated water pipeline routes.	1	0	0	Field Rating IV B - General
BE011	Ruins most likely associated with an old horse farm.	3	0	0	Field Rating IV B - General
BE016	The headgear at Rand Uranium's No. 8 Shaft.	7	126	21	Grade III B - Local
G012	A single informal grave located approximately 20 m from the proposed treated water pipeline route.	4	0	0	Field Rating IV A - General

A single informal grave was identified during the field survey of the proposed High Density Sludge treatment plant and pipeline routes in the Western Basin (BKS1310/2627BA/G012). The grave is located outside of the development footprint and will not be impacted upon and therefore no mitigation measures are recommended for the graves. However, although no

mitigation measures are recommended, it is suggested that the proposed treated water pipeline route follow the existing access road to avoid alteration, damage to, or destruction of potential graves that may exist in the area. Furthermore, it is also recommended that the grave be fenced off to avoid alteration, damage to, or destruction of the grave during the construction and operational phases of the project.

A total of three dolomite outcrops were identified during the field survey of the proposed treated water pipeline route in the Western Basin. Due to the proximity of the Western Basin to the Cradle of Humankind World Heritage Site COH WHS, the dolomite outcrops found in the Krugersdorp Game Reserve, may be of palaeontological importance. It is recommended that this site be exempt from the proposed footprint area. The table below presented the recommended mitigation measures.

The stakeholders and Interested and Affected Parties were consulted during the Public Participation Process. No further heritage resources were identified during the Public Participation Process however concerns about the impact of acid mine water on the Cradle of Humankind World Heritage Site Cradle of Humankind World Heritage Site was raised.

GLOSSARY OF ABBREVIATIONS AND TERMS

AMD	Acid Mine Drainage
ASAPA	Association of Southern African Professional Archaeologists
BA	Bachelor of Arts
BSc	Bachelor of Science
BRI	Black Reef Incline
CBD	Central Business District
CE	Common Era
CFP	Chance Find Procedure
COH WHS	Cradle of Humankind World Heritage Site
CRM	Cultural Resource Management
CV	Curriculum Vitae
DWA	Department of Water Affairs
ECL	Environmental Critical Level
ESA	Early Stone Age
FFP	Fossil Find Procedure
GN	Government Notice
HDS	High Density Sludge
HER	Bureau of Heraldry on registered heraldic representations
HIA	Heritage Impact Assessment
HRA	Heritage Resources Authority
HRM	Heritage Resources Management
I&APs	Interested and Affected Parties
ICOMOS	International Council on Monuments and Sites
IMC	Inter-Ministerial Committee
kya	Thousand years ago
LSA	Late Stone Age
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA	Middle Stone Age
MSc	Master of Science
mya	Million years ago
NAAIRS	National Automated Archival Information Retrieval System
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID	Notice of Intent to Develop
PHRA	Provincial Heritage Resources Authority
PPP	Public Participation Process
SAB	Public Records of Central Government since 1910
SAHRA	South African Heritage Resources Authority
SAHRIS	South African Heritage Resources Information Systems

SAPS	South African Police Service
STP	Shovel Test Pit
TAB	Public Records of former Transvaal Provinces and its predecessors as well as of magistrates and local authorities
TCTA	Trans-Caledon Tunnel Authority
ToR	Terms of Reference
TSF	Tailings Storage Facility
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WITS	University of the Witwatersrand

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1 INTRODUCTION

Gold mining has occurred in the Witwatersrand for more than 120 years. During the underground mining operations, water was pumped to the surface to enable mining to take place. As mining stopped, the pumping of the underground water ceased and the mine voids started filling with water. The sulphide minerals in the rocks were exposed to water and oxygen, which resulted in acid mine drainage (AMD) forming. The mining voids, thus, progressively filled with acidic water that contained heavy metals and started to decant on the surface in September 2002 in the Western Basin at Randfontein.

In 2010, Cabinet appointed an Inter-Ministerial Committee (IMC) to address the serious challenges posed by AMD. The IMC tasked a Technical Committee to investigate the AMD issues. The Technical Committee subsequently appointed a team of experts, who developed and presented a Draft Report on AMD to Cabinet on 9 February 2011. The IMC experts report indicated that interventions are urgently required as prevention of AMD decant from the mining basins is considered of national importance. As part of a national mitigation strategy, the Department of Water Affairs (DWA) subsequently issued Trans-Caledon Tunnel Authority (TCTA) with a directive to act as the agent to plan, design and implement immediate and short term measures to manage and control AMD in the Western, Central and Eastern Basins of the Witwatersrand Gold Fields in Gauteng, South Africa.

The immediate intervention entails the refurbishment and upgrading of the existing Rand Uranium water treatment plant to treat the water currently decanting from the Western Basin. The short term intervention entails the construction of three new High Density Sludge (HDS) treatment plants. Water will be abstracted from existing shafts in the three basins before being treated in the HDS plants. The neutralised water will then be discharged into streams within close proximity to the plant infrastructure. The water will be abstracted such that a level is maintained in the old workings where it is prevented from affecting any infrastructure or aquifers. This level is called the Environmental Critical Level (ECL).

Digby Wells Environmental (Digby Wells) was appointed by TCTA to conduct the Heritage Impact Assessment (HIA) for the short term intervention for the treatment of AMD in the Western Basin, which is holistically referred to as the 'Witwatersrand Gold Fields AMD Project' (Witwatersrand AMD Project).

2 BACKGROUND INFORMATION

2.1 Report Type: Section 38(1) Heritage Impact Assessment (HIA)

TCTA requested Digby Wells to undertake a HIA for the short term intervention of the Western Basin to be completed for the development of the Witwatersrand AMD Project. This report presents the HIA results for the short term intervention of the Western Basin.

2.2 Context of Development

2.2.1 Type of Development

The proposed Witwatersrand AMD Project deals with the immediate and short term interventions as proposed by the IMC Task Team of Experts. For the immediate intervention, the Rand Uranium water treatment plant will be upgraded in the West Rand. For the short term intervention of the Western Basin, the proposed AMD treatment plant is near to the existing Rand Uranium treatment plant. Short term intervention activities planned for the Western Basin will include:

- Abstraction of AMD via pumps at Rand Uranium's No. 8 Shaft at a depth to achieve the ECL of 1150 mamsl;
- The lowering of the current water table in the old mine workings to 165 m below surface by pumping an average of 53 Ml/day (peak of 60 Ml/day) from Shaft No. 8. For the first two to three years this water will be treated concurrently by the Rand Uranium treatment plant and the short term treatment plant. Thereafter, the ECL will be maintained by treating the water at the short term plant only, where pumping will be reduced to an average of 27 Ml/day (peak of 35 Ml/day);
- Construction and operation of a new HDS treatment plant on the Randfontein Estates site;
- Construction of a treated water pipeline to a suitable discharge point on the Tweelopiespruit within the Krugersdorp Game Reserve; and
- Construction of waste sludge disposal pumps and pipeline to the West Wits Pit for the disposal of the sludge from the treatment process.

2.2.2 Land Subdivision or Rezoning

The properties are currently zoned for mining. The Witwatersrand AMD Project is in effect a continuation of mining activities, in an attempt to still decant of acid water. Therefore, no subdivision of land or rezoning will be required.

For the immediate intervention, the Rand Uranium water treatment plant in the West Rand, will be refurbished and upgraded. For the short term intervention of AMD in the Western Basin, the proposed water treatment plant is near the existing Rand Uranium treatment plant in the Randfontein Estates area. It has been proposed that the disposal of the sludge takes place at the existing West Wits Pits Tailings Storage Facility (TSF). The abstraction of water will take place at Rand Uranium's No. 8 Shaft. The portion numbers and owners of the land on which the infrastructure for the short term intervention for the Witwatersrand AMD Project are to be constructed is summarised in Table 2-1 below.

Table 2-1: Affected farms and portions on which the infrastructure for the short term intervention will be constructed

AMD process	Farm Name	Portion Number	Name of Landowner
AMD Abstraction	Uitvalfontein 244 IQ	Remainder	Randfontein Estates Limited
Treatment Plant	Randfontein 247 IQ	Ptn 1 R/E	Western Areas Limited
Discharge Points	Waterval 174 IQ	Remaining Extent	No data available

2.2.3 Development Context of Study Area

The Western Basin is located in the Krugersdorp, Witpoortjie and Randfontein areas. The mine lease areas in the basin cover about 57 km². Mintails is active in the basin area with re-mining of old tailings dams and dumps. Rand Uranium is also re-mining selected sand dumps and is planning to reclaim slimes dams and commence possible underground mining. Past mining in the basin has created an underground mine void volume of approximately 43 Mm^3 at ECL. The cessation of mining in the basin has resulted in progressive flooding of the void since 1997, until water started to decant from an old shaft in September 2002.

The decant points are all located in the north-western section of the Old Randfontein Estates Mine. A portion of the decanting mine water is intercepted at the decant point referred to as the Black Reef Incline shaft (BRI) and pumped to a mine water treatment facility, namely the Rand Uranium treatment plant, before being released to the Tweelopiespruit. The combined treated and untreated AMD flows down the Tweelopiespruit towards the Crocodile River West. Approximately one third of decant is currently being treated at the Rand Uranium treatment plant.

2.3 Client, Consultant and Land Owner

The contact details of the client are presented in Table 2-2below.

Table 2-2: Client contact details

ITEM	COMPANY CONTACT DETAILS
Company	BKS (PTY) Ltd
Contact person	Nicola Liversage
Tel no	012 421 3500
Fax no	012 421 3601
E-mail address	NicolaL@bks.co.za
Postal address	PO Box 3173, Pretoria, 0001

The contact details of the consultant are presented in Table 2-3 below.

Table 2-3: Consultant contact details

ITEM	COMPANY CONTACT DETAILS
Company	Digby Wells Environmental
Contact person	Grant Beringer
Tel no	011 789 9495
Fax no	011 789 9498
E-mail address	grant.beringer@digbywells.com
Postal address	Private Bag X10046, Randburg, 2125, South Africa

The contact details of the land owners are presented in Table 2-4.

Table 2-4: Land owners contact details

ITEM	COMPANY CONTACT DETAILS
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Contact person	Braam Bothma
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ITEM	**COMPANY CONTACT DETAILS**
Company	Royal Engineering
Contact person	Sandra Botes
Tel no	084 836 6957
E-mail address	katrynbotes@gmail.com
ITEM	**COMPANY CONTACT DETAILS**
Company	Private
Contact person	Piet Schutte
Tel no	082 376 2488
ITEM	**COMPANY CONTACT DETAILS**
Company	Sterkfontein Country Estates
Contact person	Garfield Krige
Tel no	083 657 0560
E-mail address	garfield@aed.co.za
ITEM	**COMPANY CONTACT DETAILS**
Company	Sterkfontein Country Estates
Contact person	Paul Hoogendyk
Tel no	082 771 4530
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ITEM	COMPANY CONTACT DETAILS
Company	Sterkfontein Country Estate
Contact person	Louis Trichardt
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E-mail address	ltrichardt@vodamail.co.za
ITEM	**COMPANY CONTACT DETAILS**
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ITEM	**COMPANY CONTACT DETAILS**
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ITEM	**COMPANY CONTACT DETAILS**
Company	Sterkfontein
Contact person	Pieter van der Merwe
Tel no	082 431 2584

3 TERMS OF REFERENCE

3.1 Client Terms of Reference

TCTA requested Digby Wells to undertake a HIA for the short term intervention of the Western Basin to be completed for the development of the Witwatersrand AMD Project.

3.2 Scope of Work

The Draft Scoping Report identified potential impacts associated with the proposed Witwatersrand AMD Project. With regards to impacts on heritage resources, the Witwatersrand AMD Project may include the following potential impacts:

- May cause alteration, damage to or destruction of historical buildings and structures older than 60 years;
- Potential increases in water flow due to discharge may impact on heritage resources that could occur downstream and near river banks;
- Potential increases in water flow due to discharge may impact on intangible heritage aspects such as baptism sites located in or near the river; and
- Increased flow into the Tweelopiespruit may result in positive or negative changes to the landscape of the Cradle of Humankind World Heritage Site (COH WHS). This will be addressed in a separate study once information from relevant specialist studies have been collated and assessed.

As part of the recommended Terms of Reference (ToR), the Scope of Work for the short term interventions of the Western Basin consisted of compiling a HIA report which included the aims and objectives discussed below.

3.3 Aims and Objectives

The aim of this HIA was to assist the client in identifying, documenting and managing heritage resources found in the proposed project area in a responsible manner. This assessment also aimed to protect, preserve and develop resources within relevant legislative frameworks. In essence, this study aimed to:

- Identify, record and document sites of cultural significance archaeological, palaeontological, cultural and historic sites, including graves and cemeteries, within the proposed development area;
- Evaluate whether proposed activities will have any negative impacts on these heritage resources during construction, operation and decommissioning phases;
- Recommend mitigation and management measures to avoid or ameliorate any negative impacts on structures, objects or sites of cultural significance; and
- Promote the overall conservation and protection of natural and cultural resources in the proposed project area and its surroundings.

3.4 Legislative Requirements

3.4.1 Summary

The HIA is governed by national legislation and standards; and International Best Practise. These include:

3.4.1.1 South African Legislation

- National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA);

3.4.1.2 Standards and Regulations

- South African Heritage Resources Agency (SAHRA) Minimum Standards (2006); and
- Association of Southern African Professional Archaeologists (ASAPA) Constitution and Code of Ethics.

3.4.1.3 International Best Practise and Guidelines

- The United Nations Educational, Scientific and Cultural Organisation (UNESCO) Convention concerning the Protection of the World Cultural and Natural Heritage (1972), and subsequent charters, recommendations, treaties;
- International Council on Monuments and Sites (ICOMOS) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties (2010); and
- Applicable guidelines, charters and recommendations.

3.4.2 NHRA (1999)

The primary legislation that must be considered with regard to heritage resources is the NHRA (1999). The sections of this act are applicable to the NFS UCG are discussed below.

3.4.2.1 Section 2 – Definition of heritage resources

Section 2 of the NHRA (1999) contains definitions of certain terms used in heritage resources management. In terms of this proposal the following definitions must be considered:

- (ii) **archaeological**: any material remains resulting from human activity older than 100 years; any form of rock art older than 100 years and the area within 10 m of the art; and any feature, structure or artefact associated with military history older than 75 years as well the sites on which they are found;
- (v) **cultural significance**: aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance;
- (viii) **development**: any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or

influence its stability and future well-being, including construction, alteration, demolition, removal or change of use of a place or a structure at a place; carrying out any works on or over or under a place; subdivision or consolidation of land comprising, a place, including the structures or airspace of a place; constructing or putting up for display signs or hoardings; any change to the natural or existing condition or topography of land; and any removal or destruction of trees, or removal of vegetation or topsoil;

- (xiii) **grave**: a place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place;
- (xvi) **heritage resource**: any place or object of cultural significance;
- (xxi) **living heritage**: intangible aspects of inherited culture, and may include cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships;
- (xxxi) **palaeontological**: any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trance;
- (xxxviii) **public monuments and memorials**: all monuments and memorials erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual;
- (xiil) **site**: any area of land, including land covered by water, and including any structures or objects thereon;
- (xivl) **structure**: any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith; and
- (xviil) **victims of conflict**: certain persons who died in any area now included in the Republic as a direct result of any war or conflict as specified in the regulations, but excluding victims of conflict covered by the Commonwealth War Graves Act, 1992 (Act No. 8 of 1992); members of the forces of Great Britain and the former British Empire who died in active service in any area now included in the Republic prior to 4 August 1914; persons who, during the Anglo-Boer War (1899-1902) were removed as prisoners of war from any place now included in the Republic to any place outside South Africa and who died there; and certain categories of persons who died in the ‘‘liberation struggle’’ as defined in the regulations, and in areas included in the Republic as well as outside the Republic.

3.4.2.2 Section 34 of the NHRA (1999)

The proposed activities associated with the Western Basin Witwatersrand AMD Project will include the construction and subsequent operation of pumps and additional structures for abstraction of acid mine water from Rand Uranium's No. 8 Shaft. This will require the removal of the existing headgear and associated structures.

Section 34 of the NHRA (1999) provides for general protection of structures older than 60 years. Most importantly, Section 34(1) clearly states that no structure or part thereof may be altered or demolished without a permit issued by the relevant provincial heritage resources authority (PHRA).

A destruction permit will thus be required before any removal and/or demolition may take place, unless exempted by the PHRA according to Section 34(2).

3.4.2.3 Section 35 of the NHRA (1999)

Construction and operation activities associated with the Witwatersrand AMD Project – in the immediate receiving environment – are unlikely to impact on archaeological or palaeontological resources. Construction of the abstraction and water treatment plants will mainly be contained within existing mining areas. Pipelines will follow existing servitudes as far as possible.

Section 35 of the NHRA (1999) does however provide general protection of archaeological and palaeontological resources and meteorites. In the event that archaeological resources are discovered during the course of development Section 38(3) specifically requires that the discovery must immediately be reported to the responsible PHRA, or local authority or museum who must notify the PHRA. Furthermore, no person may without permits issued by SAHRA destroy, excavate, or make any alterations to archaeological or palaeontological resources encapsulated in Section 38(4).

3.4.2.4 Section 36 of the NHRA (1999)

Construction and operation activities associated with the Witwatersrand AMD Project – in the immediate receiving environment – are unlikely to impact on burial grounds and graves. Construction of the abstraction and water treatment plants will mainly be contained within existing mining areas. Pipelines will follow existing servitudes as far as possible.

Section 36 of the NHRA (1999) does allow for general protection of burial grounds and graves. Should burial grounds or graves be found during the course of development, Section 36(6) stipulates that such activities must immediately cease and the discovery reported to the responsible Heritage Resources Authority (HRA) and the South African Police Service (SAPS). Furthermore, as specified in Section 38(3) no person may destroy, damage, exhume or alter any burial site without a permit issued by SAHRA.

3.4.2.5 Section 38 – Heritage Resources Management (HRM)

Section 38(1) and (2) – HIAs independent of the National Environmental Management Act, (Act No. 107 of 1998) (NEMA) and Mineral and Petroleum Resources Act, (Act No. 28 of 2002) (MPRDA)

Section 38(1) stipulates that the relevant HRA must be notified of any development at the earliest opportunity possible, via a Notice of Intent to Develop (NID). The HRA is required to comment on the NID within 14 days stating whether a HIA is required or not. A Heritage Statement – which is the equivalent of a baseline – should be compiled to inform the NID.

The following activities, as stipulated in Section 38(1) of the NHRA (1999), act as triggers for the undertaking of HIAs:

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (b) the construction of a bridge or similar structure exceeding 50 m in length;
- (c) any development or other activity which will change the character of a site -
  - (i) exceeding 5 000 m² in extent; or
  - (ii) involving three or more existing erven or subdivisions thereof; or
  - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
  - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority,
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a PHRA,

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

3.5 Expertise of Specialist

Johan Nel has completed a Bachelor of Arts (BA) degree in archaeology and anthropology and a BA Honours degree in archaeology at the University of Pretoria. Mr Nel holds the position of Unit Manager for Cultural Resource Management (CRM) in the Social Science Department at Digby Wells.

Shahzaadee Karodia has completed a BA degree in archaeology and anthropology, a Bachelor of Science (BSc) Honours degree in palaeontology, and a Master of Science (MSc) degree in archaeology. Ms Karodia specialises in palaeoanthropology and historical archaeology. She currently holds the position of Archaeology Consultant at Digby Wells. Curriculum Vitae (CVs) of the specialists involved are attached in Appendix A.

4 METHODOLOGY

This HIA consisted of a desktop study - including background literature reviews, aerial and historical map surveys and a review of relevant impact assessment reports, inferred information – and a pedestrian site survey. A heritage site visit was undertaken for the identification and documentation of potential heritage resources, as stipulated in the NHRA (1999) and SAHRA Minimum Standards (2006). The site visit took place on 24 May 2012 and on 21 to 22 August 2012.

4.1 Survey and Sampling

A vehicle and pedestrian survey was undertaken on 21 August to 22 August 2012. The survey began at the abstraction site at Rand Uranium's No. 8 Shaft and along the proposed AMD pipeline route to the HDS treatment plant on the Randfontein Estates site. The survey then continued along the proposed water treatment plant to the discharge point on the Tweelopiespruit in the Krugersdorp Game Reserve. The vehicle and pedestrian survey was aimed at locating and documenting potential sites of heritage significance located within the project boundaries and its immediate surrounds. General site conditions and features on site were recorded by means of photographs, GPS location, and description. A physical and pedestrian survey was done to identify and record any sites found *in situ*.

4.2 Data Acquisition

Data acquisition was aimed at information gathering relating to known heritage resources within and surrounding the proposed area for development. Project information and data was obtained through intensive research and data gathering, including a variety of primary and secondary sources such as academic journals, textbooks and records, national and provincial websites, archaeological field guides, national guidelines, maps, photographs and plans. Surveys of historical aerial photographs, historical maps, topographical maps and satellite imagery were undertaken to plot potential sites. Some older maps such as the GSGS series of the early 20th century topographical maps were also consulted and integrated into the HIA where applicable. These are invaluable resources as they often include features and information not recorded on later maps.

4.3 Public Participation and Consultation

As part of the Public Participation Process (PPP), questions pertaining to living and intangible heritage were included. These questions were designed to determine the potential existence of any sites of significance in terms of Section 3 of the NHRA (1999). The results will be reported on in the PPP Report.

4.4 Assessment

4.4.1 Assessment of Site Value and Significance

Identified heritage resources' cultural significance was assessed relative to the National Estate in terms of Section 3 of the NHRA (1999). Potential impacts on the heritage resources were assessed in terms of Digby Wells' standard impact assessment methodology, as well as in terms of the impact assessment criteria and ratings as detailed in the ASAPA guidelines and the SAHRA guidelines.

The assessment of heritage resources includes three distinct but complimentary assessment criteria: value, field rating, and impact assessment. A brief description of the assessment methodology will be presented here. For a full description of the assessment methodology see Appendix B.

In order to determine the value or significance of a heritage resource, the importance of that resource in terms of its authenticity and integrity at the time of the assessment must be determined. Importance is based on four dimensions – artistic, historic, scientific and social – each with a subset of attributes that may assist in determining the importance of the resources on each dimension. The authenticity of a heritage resource is then determined on the credibility of available information sources. Lastly, the degree of integrity is based on the condition of the resource at the time of assessment compared to the ideal or to other known examples. Once the importance, authenticity and integrity of a heritage resource are achieved, the value of that heritage resource can then be assessed.

Field ratings or the proposed grading of heritage resources are required by SAHRA in terms of Section 7(1) of the NHRA (1999). Field ratings prescribe criteria for assessing heritage resources consistent with Section 3(3) of the NHRA (1999).

Assessment of impacts on heritage resources relies on two factors that must be considered when rating impacts:

- The potential physical and/or visual impact on the heritage resource; and
- The impact on the cultural landscape should any heritage resource change or be destroyed.

The impact rating takes into accounts the special scale, the expected duration, the severity, the consequence, and the probability of the impact as well as the value of the heritage resource. The impact rating is then applied to pre-mitigation and post-mitigation scenarios with the intention of removing all impacts on heritage resources.

5 DESCRIPTION OF PROPERTY AND AFFECTED ENVIRONMENT

5.1 Details of Area Surveyed

The Western Basin covers the Krugersdorp (Mogale City), Witpoortjie and Randfontein areas. Rand Uranium operations started in 1952 with the successful application as a uranium producer and its first processing plant commissioned in 1954. The mine lease areas in this basin extend over about 57 km². The project is located in the Mogale City Local Municipality of the Randfontein Magisterial District in the Gauteng Province. Krugersdorp, Randfontein and Roodepoort are some of the towns with residential suburbs closest to the proposed project (Table 5-1). The COH WHS is located approximately 10 km north of the Western Basin.

A summary of the geographic details of the study area is presented in Table 5-1 below.

Table 5-1: Location data

Province	Gauteng Province
Magisterial District	Randfontein Magisterial District
Municipality	Mogale City Local Municipality
Property Name and Number	Uitvalfontein 244 IQ Randfontein 247 IQ Waterval 174 IQ
1:50 000 Map Sheet	2627BA Randfontein
GPS Co-ordinates (Rand Uranium No.8 Shaft)	-26.1355
	27.7201

The location and site maps are presented in Appendix D.

6 RESTRICTIONS, LIMITATIONS AND KNOWLEDGE GAPS

The following restrictions were encountered during the course of this study:

- The project area has been in continual flux since the establishment of the first mines, and as such integrity of sites, structures and other tangible resources was difficult to determine.
- Dense grass cover along the proposed AMD and treated water pipeline routes obscured surface visibility: potential to identify surface material or features was affected.
- Archaeological remains may be located on a sub-surface level (Figure 6-1).
- Parts of the proposed treated water pipeline route to the proposed discharge point in the Krugersdorp Game Reserve directly adjacent to the Hippo Dam were considered unsafe due to the presence of hippos, and thus only superficially surveyed.
- Parts of the proposed pipeline route traversed a high safety risk area through a dense stand of trees: criminal activity – stripping of copper cables – was observed during the survey and the area was avoided.
- Existing powerline and pipeline servitudes occur in the area, potentially affecting any heritage sites that may have occurred here.

The following limitations to this study were identified:

- Intangible heritage resources such as oral histories, indigenous knowledge systems and sacred places may only be identified through consultation with local communities: the timeframes for this HIA did not allow such consultation to take place.
- Heritage resources do not exclusively constitute visible and tangible remains, but also more intangible aspects such as sense of place and associations.

The following knowledge gaps were identified:

- The distribution of palaeontological resources is unpredictable and may only be identified by a qualified specialist after exposure.

Considering the above restrictions, limitations and knowledge gaps there is potential that additional heritage resources may be exposed or identified during the course of the project. Consequently, a Chance Find Procedure (CFP), a Fossil Find Procedure (FFP), and Fossil Monitoring must be implemented as required by the NHRA (1999). For a full Description of the CFP, FFP and Fossil Monitoring see Appendix C.

Figure 6-1: The grass cover along the proposed treated water pipeline route was thick and obscured visibility

7 SITE CONDITIONS AND LOCATION DATA

The Western Basin study area falls in the Grassland Biome that is found mainly on the high central plateau of South Africa and the inland areas of KwaZulu-Natal and the Eastern Cape. The vegetation units encountered in the Western Basin are the Carletonville Dolomite Grassland, the Soweto Highveld Grassland, and the Tsakane Clay Grassland (Mucina et al., 2006). The topography of the Western Basin is mainly flat and rolling, but includes the escarpment itself. Grasslands are dominated by a single layer of grasses and the amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localised habitats and geophytes are often abundant (Low & Rebelo, 1996). These grasslands are maintained largely by the combination of relatively high summer rainfall and fires, frost and grazing, which preclude the presence of shrubs and trees. Much of the grassland biome has been transformed by crop farming, afforestation, and dense human settlement. For a more detailed report of the site conditions, refer to the Ecology Section in the Draft Scoping Report.

During the site visit, the general conditions of the area survey were recorded. The climate was warm and sunny with a maximum of 27°C. The pipeline route to the proposed HDS treatment plant area was directed through a dense stand of trees in close proximity to a residential area (Figure 7-1). The survey, for the most part, was conducted through this stand. Where the vegetation was too thick to walk through, the survey was redirected to the road which is in close proximity to the route. Burning took place the previous week and on 22 August 2012. Features such as hills and outcrops do occur albeit along the proposed treated water pipeline route. The proposed HDS treatment plant is flat in comparison, with an absence of hills, outcrops, and streams.

Figure 7-1: The pipeline route to the proposed HDS treatment plant area was directed through a dense stand of trees

Table 7-1: GPS information

GPS type and model used	Garmin eTrex Legend HCx
Site co-ordinates	**Site Names**
Longitude: 27.7184 Latitude: -26.1328	PY013
Longitude: 27.7203 Latitude: -26.1006	PY014
Longitude: 27.7203 Latitude: -26.1008	PY015
Longitude: 27.7147 Latitude: -26.1429	BE009
Longitude: 27.7119 Latitude: -26.1355	BE010
Longitude: 27.7184 Latitude: -26.1355	BE011
Longitude: 27.7201 Latitude: -26.1355	BE016
Longitude: 27.7213 Latitude: -26.1082	G012