A HERITAGE IMPACT ASSESSMENT STUDY OF A BUILT ENVIRONMENT AND LANDSCAPE FEATURE LOCATED IN PILANESBERG NATURE RESERVE, PILANESBERG, NORTH WEST PROVINCE, SOUTH AFRICA.

PROJECTS & HERITAGE CONSULTANTS (PTY)LTD

1st Draft

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AKNOWLEDGEMENT OF RECEIPT

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DECLARATION OF INDEPENDENCE

This report has been compiled by Nkosinathi Tomose, leading archaeologist and heritage consultant for NGT Project and Heritage Consultants. He was assisted in this regard by Mr. Lwazi Bhengu, assistant archaeologist and heritage specialist from NGT Projects & Heritage Consultants. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the project.

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EXECUTIVE SUMMARY

NGT Projects and Heritage Consultants (Pty) Ltd has been contracted by Aurecon South Africa (Pty) Ltd (Aurecon) to conduct an Heritage Impact Assessment (HIA), inclusive of permit application, but exclusive of Palaeontological desktop study) for the proposed demolishing of a historic dam located within Pilanesberg Nature Reserve, North West Province, South Africa, as part the Environmental Impact Assessment process required for the Working for Wetlands Rehabilitation Programme. Demolition of the dam is required to address an erosion headcut that has developed where the dam wall is breached and is threatening an upstream wetland.

Nkosinathi Tomose, the lead archaeologist and heritage consultant of NGT Projects and Heritage Consultants, conducted the field survey and the HIA study. He was assisted in this regard, in terms of background information search and report compilation, by Mr. Lwazi Bhengu (assistant archaeologist and heritage specialist from NGT Projects & Heritage Consultants).

The survey of the dam was conducted on the 4th February 2013 and yielded the following results:

- The dam is older than 60 years based on the age and size of trees which have grown on its walls / dam embankment.

Following the field survey, an assessment of the heritage significance of the dam was conducted. This process involved using the different strands of data such as the assessment of maps dating as far back as the 1950s in order to obtain a relative date of the dam.

- An assessment of a 1952, 1:50.000 topographic map that was revised in 1976 after the proclamation of Bophuthatswana as an independent state shows the dam. This means that the dam can be relatively dated to being 62 years old (in 2014).

Using the data obtained from the physical survey and the relative age of 62 years old obtained from the assessment of a 1952 topographic map, the dam was further assessed, evaluated and graded in terms of its heritage significance. The assessment yielded the following results:

- The dam is of low heritage significance and it graded as local site with GRADE 3E heritage status.

- It was concluded that there are no objections to the proposed demolishing of the dam.
- It is also recommended that both SAHRA and NW-PHRA approve the proposed demolishing of the dam

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ABBREVIATIONS

Acronyms	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
ARCH	Archaeological
BA	Basic Assessment
BEL	Built Environment and Landscape
BGG	Burial Grounds and Graves
BGG	Proven not to be Burial Ground and Grave
CBD	Central Business District
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DoE	Department of Energy
EAP	Environmental Assessment Practitioner
EIR	Environmental Impact Report
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GIS	Geographic Information System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
K.y.a	Thousand years ago
LHRA	Limpopo Province Heritage Resources Authority
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NHRA	National Heritage Resources Act
NEMA	National Environmental Management Act
NWA	National Water Act
PHRA	Provincial Heritage Resources Authority

NW-PHRA	North West Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
PDAFP	Proposed Development Area Footprint
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute

TERMS AND DEFINITIONS

Archaeological resources

This includes:

- material remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in the 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 in 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 boards;
- 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

Heritage resources

This means any place or object of cultural significance

1. INTRODUCTION

1.1. Project Background

The study is for the proposed assessment of the heritage value and significance of a stone cladded dam and the application of a destruction permit with the relevant heritage resources authority. The dam is located within Pilanesberg Nature Reserve, North West Province, South Africa. The project forms part of specialists input studies aimed to inform the Basic EIA process conducted by Aurecon for the South African National Biodiversity Institute (SANBI) Working for Wetlands Programme. During the Phase 2 site visit for this project, an erosion headcut was identified where the dam wall is breached. This headcut is migrating upstream where it threatens a number of wetlands. As such, the removal of the dam wall would restore natural overland flow as well as protect upstream wetlands.

NGT Projects & Heritage Consultants was commissioned by Aurecon on behalf of SANBI to conduct the HIA and apply for relevant destruction permit for the dam with the South African Heritage Resources Agency (SAHRA) and the North West Provincial Heritage Resources Authority (WP-PHRA).

1.1.1. Proposed Project Aims

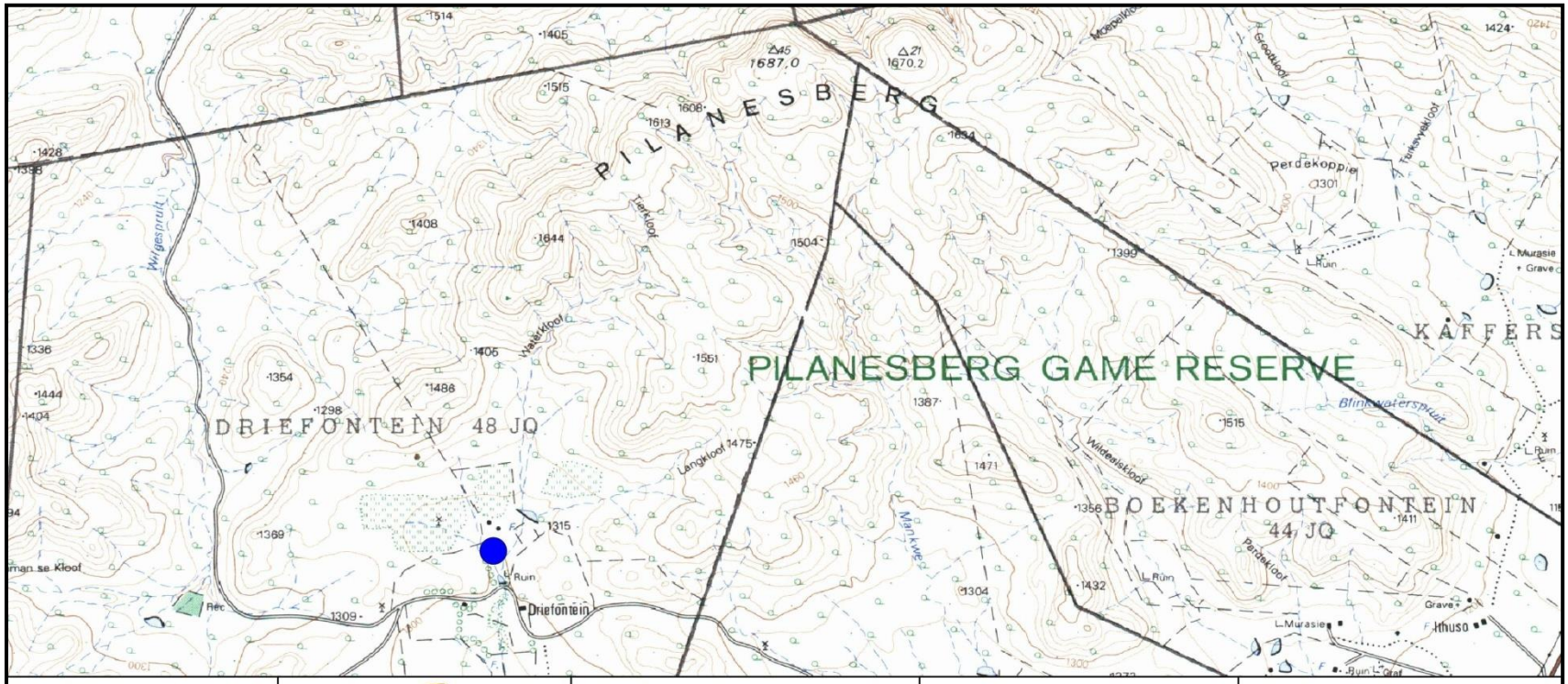
The aim of the overall project is to rehabilitate wetlands within Pilanesberg Nature Reserve under a programme called Working for Wetlands. Aurecon is the lead consultant undertaking planning, assessment and application work associated with the wetland rehabilitation project. The proposed dam assessment and the application of its demolition permit forms part Pilanesberg Nature Reserve management strategy of reducing/breaching some of its dams (in particular those that are no longer functional) to help reduce headcut erosions that threaten to deplete some wetlands within the reserve.

1.1.2. Terms of Reference for the Appointment of Archaeologist and Heritage Specialist

Because of the nature and size of the proposed development i.e. rehabilitation of wetlands within Pilanesberg Nature Reserve, breaching and reduction of some old dams to help reduce the number of water points for elephants in the reserve. A project which exceeds a total area of more than 5000m^2 within an already developed area requires a BAR. The overall environmental application process developed in terms of National Environmental Management Act (NEMA), No. 107 of 1998 and the Applicable EIA Regulation published in 2010. The environmental process involves the identification and assessment of environmental impacts through specialist studies.

Aurecon was appointed by SANBI as a lead consultant undertaking planning, assessment and application work associated with the wetland rehabilitation project. In order to fulfil all the requirements for the completion of the BAR process, Aurecon appointment of NGT Projects & Heritage Consultants (Pty) Ltd as an independent and lead CRM firm to conduct an HIA (exclusive of Palaeontological desktop study) for the proposed project as part of specialists (inputs) impact assessment studies. The focus is, however, given to a single dam with stone cladding located within Pilanesberg Nature Reserve not the entire Reserve. Nkosinathi Tomose, the lead archaeologist & heritage consultant from NGT Projects & Heritage Consultants, conducted the field survey and HIA study for the stone cladded dam in Pilanesberg Nature Reserve, Pilanesberg, North West Province, South Africa (*Figure 1*). He was assisted by Mr. Lwazi Bhengu, assistant archaeologist and heritage specialist from NGT Project & Heritage Consultants, in terms of background information search.

The appointment of NGT Projects & Heritage Consultants (as an independent CRM firm) is in terms of the NHRA, No. 25 of 1999 (as amended), the NEMA, No.107 of 1998 (as amended & the applicable 2010 Regulations), as well as other applicable legislations.



Legend		**Study Area:**	**Pilanesberg Nature Reserve**	**Created By:**	**Nkosinathi Tomose**	**Site Plan:**	**Pilanesberg Dam-Pilanesberg Nature Reserve**
Location of the Dam		**Province:**	**North West Province**	**For:**	**NGT Projects & Heritage Consultants**		
WGS2527AA	PROJECTS & HERITAGE CONSULTANTS (PTY)LTD	**Country:**	**South Africa**	**Date:**	**25 February 2014**	N	2,000 1,000 0 2,000 Meters
		Map Type:	**1:50.000 Boputhatswana**				
		Map Ref:	**WGS 2527AA**				

Figure 1- A 1952 Topographic 1:50.000 Topographic Map of Bophuthatswana showing the location of the dam (in blue) within Pilanesberg, Game Reserve.

2. BACKGROUND OF THE STUDY AREA

2.1. Historical Background

South Africa is rich in diverse forms and types of heritage resources, ranging from natural to cultural heritage. The natural heritage includes among other things: Geological, Palaeontological, and the various plant and animal species that define the country. The cultural heritage, which dates as far back as 2.5 million years ago (m.y.a), includes - the different periods of Stone Age Archaeology, the Iron Age Archaeology, Historical and Industrial Archaeology, as well as the "Political/Historic" geographies of South Africa (reference - Tomose, 2013a, b, c). The region in which the study area (i.e. North West Province and Pilanesberg to be specific) is known for Sotho-Tswana and Ndebele Iron Age activities and the late historical period activities e.g. associated with the settlers in the region which includes among other things farming, development of towns and industrial mining in the former Western Transvaal. The dam falls within the later historical context - the past 500 years associated with the Late Iron Age, Stone Age and the Settler farming communities.

Pilanesberg was named after a chief, Pilane, who ruled between 1825 and 1850 (Coetzee 1994). The park was initially degraded and had very little indigenous game because it had been intensely occupied by commercial farmers (Leigh 1987). These farmers had been interested in occupying the crater of the extinct volcano within Pilanesberg. Since the 1970s, game has been transferred from other national parks, KwaZulu Natal, Namibia and the Transvaal to form Pilanesberg Nature Reserve *(Ibid.)*. The nature Reserve was proclaimed in 1979 (Coetzee 1994). The diversity in fauna and flora within the reserve means that the park attracts a wide range of tourists (Leigh 1987). After its proclamation, game rangers patrolling the park for wildlife management also discovered the distribution of Iron Age stone-walled sites, archaeological finds, throughout the area and this is explored in the subsequent section (Coetzee 1994).

2.2 The Archaeology of Pilanesberg

The study area falls within the Pilanesberg Nature Reserve which is known for both the Stone Age and Iron Age - the Iron Age is the more prevalent archaeological record within the park (Coetzee 1994). Evidence of Stone Age occupation in the park inferred based on Middle Stone Age artifacts throughout the park. Among known Stone Age occupants of the park are the San hunter-gatherers between 40 000 and 500 years ago.

The Iron Age stone-wall structures that are found throughout its precincts are evidence for Iron Age activities within the park (*Ibid.)*. To date, more than sixty archaeological Iron Age sites have been documented within the Pilanesberg Nature Reserve (*Ibid.)*. These sites are commonly located close to water sources at the foothills *(Ibid.)*. The close proximity to water sources may be interpreted as being a strategy for the people that occupied the area to have easier access to water and grazing. The occupation of the base (or foothills) of the hills is interpreted within the archaeological fraternity to mean protection of livestock whilst also allowing people's line of sight to discern approaching enemies *(Ibid.)*.

The sites have been closely linked to cattle farming. This owes to the fact that the stone wall structures on the park repeatedly exhibit large cattle kraals. It can therefore be inferred that these stone wall structures may have been utilized as cattle outposts. This ties in with the presence of some isolated cattle kraals on the landscape. There is strong evidence to suggest that some of these cattle outposts were occupied from time to time by herders; there is presence of a few domestic structures attached to the main stone wall structures. This then calls on the investigation of the ethnography to determine the groups of people that may have occupied the sites in the past (Coetzee 1994).

Ethnographic studies have given pointers to possible groups that occupied the Pilanesberg nature reserve. These include:

- Bakgatla ba ga Kgafela, linguistically associated with Tswana people. They occupied the area of Pilanesberg since the latter half of the eighteenth century.
- Before the Bakgatla, the baTlhako are known to have occupied many site within Pilanesberg.
- This layered occupation is further attested for by the fact that the Bakgatla claimed a tribute from who occupied Pilanesberg before them.

It is also important to contextualize the stone cladded dam within the provided strands of data about the occupants of Pilanesberg. However, the provided archaeological information about

Pilanesburg only puts emphasis in the African Iron Age communities. It has been noted from historical documents that within the past 500 years, the landscape was also occupied far the settler pioneers who left the Cape Colony in the mid 1830 to settle lands in the interior and northern regions of what is today South Africa. This exodus of people from the Cape Colony, to avoid the British rule, is called the Great Trek - associated with the Afrikaans communities or the Pioneers as they came to be known. Their evidence in the landscape is attested to by presence of modern towns such as Brits located south and east of Pilanesberg and Rustenburg located south of Pilanesburg. Dams and irrigation furrows as well as modern farming implements such as wagons etc form part of the historic evidence associated with these groups in the landscape.

In order to un-pack more information about the stone cladded dam under consideration; a scan of the SAHRA online database (SAHRIS) was conducted to assess if any HIA had been conducted within Pilanesberg Nature Reserve and the following information was yielded:

- Pistorius, J. 2009. HIA Pilanesberg Waste Dump.
- Coetzee. 2012. HIA Kabi Vaalkop PV. Savannah Environmental (Pty) Ltd

None of these studies were undertaken within the Pilanesburg Nature Reserve.

2.2. Description of the affected environment

Table 1 -Stone Cladded Dam, Pilanesberg Nature Reserve, Pilanesberg , North West Province, South Africa

Location	• The study is located within Pilanesberg Nature Reserve, in North West Province, South Africa. The dam wall covers approximately 77m in length with a catchment of over 5929m^2 (*Figure 3 and 4*). The site centre GPS Coordinates are: S25^o 12' 40.5" E27^o 02' 37.0" E (*Figure 1*).
Township within the Study Area	• None within Pilanesberg Nature Reserve. The nature reserve is a protected area (*Figure 1*).
Land Uses within the study area	• Conservation

Land Owner(s)	• South African National Parks (SANParks) - Government
Current Conditions (on site)	• The dam is dilapidated (portion breached) and the walls are covered with grass and trees (*Figure 5*). • It is currently not in use.
Applicant	• Aurecon on behalf of SANBI.
Proposed Development	• Heritage assessment of a stone cladded dam and application of a destruction permit with the relevant heritage authority.
Access	Existing national, provincial and local roads will take you to the main gate of Pilanesberg Nature Reserve. These roads include the: N1 form Aurecon (Pretoria Office), the N4 north of the Magaliesberg Mountain Range, and R510 from south of the town of Rustenburg. From the main gate of Pilanesberg Nature Reserve to the dam, internal reserve roads are used
Defining natural features	The study is located in a protected area, defined by the Pilanesberg Mountain range, dams and trees (*Figure 1 & 2*).
Zoned for	• Conservation Area

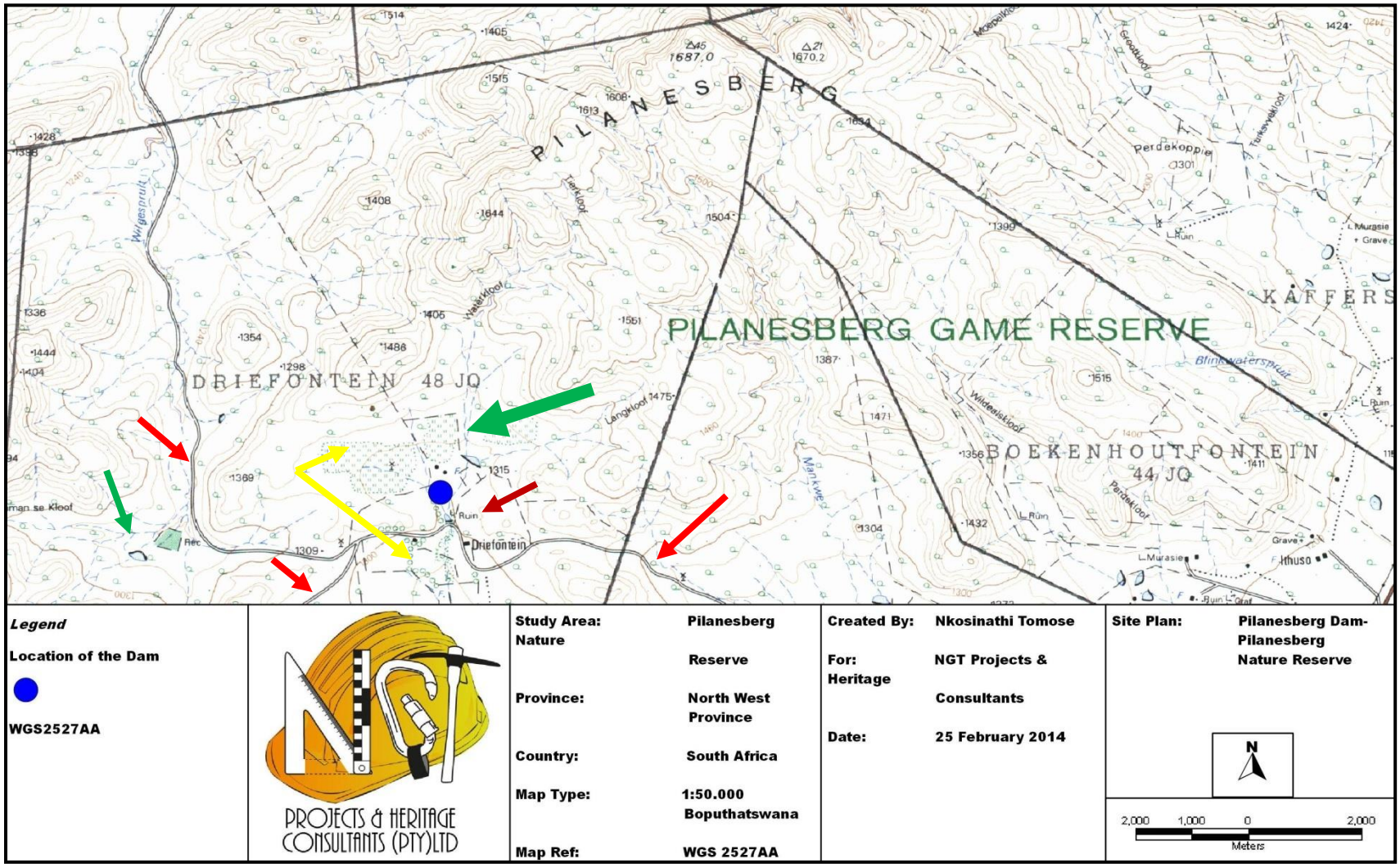


Figure 2- Location of the study area in relation to the roads (red arrows), water courses (green arrows) and other features on the landscape (e.g. brown arrow showing ruins - south of the dam). Patches of plantation and trees are also shown on the map (yellow arrows).

Figure 3-approximate size of the dam - area with trees is the dam wall and embankment

Figure 4-Panaromic view of the dam catchment from the dam wall/embankment

2.2. Description of proposed activities: Proposed Infrastructure

Table 2 - List of Activities

Activity 1	• Wetland rehabilitation project on behalf of the Working for Wetlands programme from SANBI - which includes breaching and of some dams within the reserve to address an erosion headcut that has developed where the dam wall is breached and is threatening an upstream wetland.
Activity 2	• Application of demolition permits with NW-PHRA for the demolition of the dam.

2.3. Needs and Desirability

Table 3 –List of activities in-line with the project scope

Activity 1	• Desktop study of the heritage value and integrity of the area under consideration and its surrounding with a particular focus on stone cladded dam and its immediate surrounding (*refer to 2.4 below for detailed overview of resources in the region under consideration*). • Physical identification, documentation and recording of cultural resource - the stone cladded dam located within Pilanesberg Nature Reserve
Activity 2	• The mapping, assessment and evaluation of the heritage value and integrity of the dam and assessment of potential impacts as a result of the proposed development on this resources
Activity 3	• Proposing heritage management measures for inclusion in the BAR and later EMP document • Making recommendations to SAHRA and provincial heritage resources authority NW- PHRA

3. METHODOLOGY

This chapter outlines the methodology used in conducting the HIA study for the stone cladded dam located within Pilanesberg Nature Reserve. The study is done according to the Terms of Reference provided by the client based on proposal developed by NGT Projects & Heritage Consultants for the completion of an HIA study for the dam. Some areas of the report follow minimum standards for completion of professional HIA as stipulated in SAHRA minimum standard (2012) such as detailed account to the archaeological and historical background of the study area or region.

3. 1. Step I – Literature Review (Desktop Phase):

- Sources used in this study included, but not limited to published academic papers, books and internet publications.
- There was limited use of archival maps -two historical maps and a recent industrial zone map showing the proposed development area and its surround were assessed to aid information about the proposed area of development and its surrounding.

- The above also included a review and assessment of relevant environmental and heritage legislations such as the NEMA (together with the 2010 EIA Regulations) and the NHRA.

3.2. Step II – Physical Survey:

The physical survey of the study area aimed to address the following main areas of concern raised by the client in the specialist Terms of Reference:

- To conduct an onsite verification survey of the dam.
- To map and record the dam.
- The survey was conducted on the 4th February 2014 and it covered the already known boundaries of the stone cladded dam.
- The survey was on foot and track logs of the survey were recorded using Garmin GPSmap 62s.
- The physical survey was deemed necessary since the desktop phase of the project yielded known archaeological resources and other heritage/historic resources about the Pilanesberg Nature Reserve and the broader North West Province (region) in which the current study area is located.

The following technological tools and platforms were deemed important for documenting and recording located and/or identified sites:

- Garmin GPSmap 62s – to take Lat/Long coordinates of the identified sites and to take track logs of the dam
- Lenovo ThinkCentre aided with Garmin Basecamp Software, Google Earth – to plot the propose development area.
- Quantum GIS Lisboa (1.8.0) was used to plot the stone cladded dam in the landscape - its walls and the approximate size of its catchment
- Project plan schedule provided by the client before the survey also proved invaluable
- Survey coordinates and data provided by the client were used to map the development area footprint.
- Samsung camera – was used to take photos of the affected environment and the identified heritage sites.

3.3. Step III – Data Consolidation and Report Writing:

During field work and on the return from the field the following were addressed:

- Assessment of the significance of the cultural resources in terms of their archaeological, built environment and landscape, historical, scientific, social, religious, aesthetic and tourism value"
- Description of possible impact of the proposed development on these cultural remains, according to a set of standard and conventions for the management of the cultural environment;
- Proposal of suitable mitigation measures to minimize possible negative impacts on the cultural resources;
- Review of applicable legislative requirements - *Section 3.1. of this Chapter (i.e. Chapter 3) addresses this concern as well as Section 5.5 of Chapter 5 discusses Sections of the NHRA, No. 25 triggered by the current study findings*
- Highlighting of assumptions, exclusions and key uncertainties". *Chapter 4 (below) of this report address this concern.*
- The final step involved the consolidation of the data collected using the various sources as described above. This involved the manipulation of data through Quantum GIS. Assessing the significance and potential impact of the identified sites, discussing the finds, report writing and making recommendation on the management and mitigation measures of the identified sites and resources as well as the impact and influence of these sites and resources on the proposed corridor.

3.3. Assessment of Site Significance in Terms of Heritage Resources Management Methodologies

The significance of heritage sites was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context)
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures)
  - Density of scatter (dispersed scatter)
  - Low - $<10/50m^2$
  - Medium - $10\text{-}50/50m^2$
  - High - $>50/50m^2$
- Uniqueness and
- Potential to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

- A - No further action necessary;
- B - Mapping of the site and controlled sampling required;
- C - No-go or relocate pylon position

- D - Preserve site, or extensive data collection and mapping of the site;
- E - Preserve site; and
- F - Impacts on these sites by the development.

Measure of Heritage Sites Significance

The following site significance classification minimum standards as prescribed by the SAHRA (2006) and approved by the Association of Southern African Professional Archaeologists (ASAPA) for the Southern African Developing Community (SADC) region were used for the purpose of this report.

Table 4: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 3C	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 3D	Medium Significance	Recording before destruction
Generally Protected C (GP.C)	Grade 3E	Low Significance	Destruction

3.4. Methodology for Impact Assessment in terms of Environmental Impact Assessment Methodologies including Measures for Environmental Management Plan Consideration

The determination of the effects of environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is

undertaken using information that is available to the environmental practitioner through the process of the BAR. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts. This is in line with specialist requirements as required by the client. For example, the request that:-

The impact methodology [should] focus on addressing key issues identified by the heritage consultant. This methodology to be employed in the report thus results in a circular route, which allows for the evaluation of the efficiency of the process itself. The assessment of actions in each phase [that should] be conducted in the following order:

- Assessment of key issues;
- Analysis of the activities relating to the proposed wetlands rehabilitation project and breaching of dams that are no longer functional;
- Assessment of the potential impacts arising from the activities, without mitigation; and
- Investigation of the relevant mitigation measures for both the construction and operational phases.

The following assessment criteria is used for impact assessment

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Probability: describes the likelihood of the impact actually occurring

- **Improbable:** the possibility of the impact occurring is very low, due to the circumstances, design or experience.
- **Probable:** there is a probability that the impact will occur to the extent that provision must be made therefore.
- **Highly Probable:** it is most likely that the impact will occur at some stage of the development.
- **Definite:** the impact will take place regardless of any prevention plans and there can only be relied on mitigatory measures or contingency plans to contain the effect.

Duration: the lifetime of the impact

- **Short Term**: the impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
- **Medium Term:** the impact will last up to the end of the phases, where after it will be negated.
- **Long Term:** the impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
- **Permanent:** the impact is non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale: the physical and spatial size of the impact

- **Local:** the impacted area extends only as far as the activity, e.g. footprint
- **Site:** the impact could affect the whole, or measurable portion of the above mentioned properties.
- **Regional:** the impact could affect the area including the neighbouring residential areas.

Magnitude/Severity: Does the impact destroy the environment, or alter its function

- **Low:** the impact alters the affected environment in such a way that natural processes are not affected.
- **Medium:** the affected environment is altered, but functions and processes continue in a modified way.
- **High:** function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

- **Negligible:** the impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
- **Low:** the impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
- **Moderate:** the impact is of importance to one or more stakeholders, and its intensity will

be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

- **High:** The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The significance is calculated by combining the criteria in the following formula:

Sum (Duration, Scale, Magnitude) x Probability(*Table -2*)

S = Significance weighting; Sc = Scale; D = Duration; M = Magnitude; P = Probability

Table 5 -The significance weightings for each potential impact are as follows:

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	≤20
	Low	>20≤40

	Moderate	>40≤60
	High	>60

The significance of each activity was rated without mitigation measures (WOM) and with mitigation(WM) measures for both construction, operational and closure phases of the proposed development. To address the question of Heritage Management Plan the following table is used for Measures to be included in the EMP. This table is relevant in that it addresses key issues at the various stages of the project by also addresses how some of the key concerns that develop from a heritage point of view can be mitigated.

Table 6 -Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE: Description of the objective, which is necessary in order to meet the overall goal; this takes into account the findings of the environmental impact assessment specialist studies			
Project component/s	List of project components affecting the objective		
Potential Impact	Brief description of potential environmental impact if objective is not met		
Activity/risk source	Description of activities which could impact on achieving objective		
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion		
Mitigation: Action/control		Responsibility	Timeframe
List specific action(s) required to meet the mitigation target/objective described above		Who is responsible for the measures	Time periods for implementation of measures
Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.		
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting		

4. ASSUMPTIONS, EXCLUSIONS AND UNCERTAINTIES

The assumptions, exclusions and uncertainties that exist in terms of the present study are discussed in the following sub-sections.

4.1. Assumptions

The current study is Phase 1 HIA. As such, a historical and archival desktop study as well as a field survey were undertaken as part of the study. The field survey was conducted in order to inspect, map and verify the stone cladded dam. The assumption is that a heritage social consultative process would have taken place with old farm owners within the dam to ascertain known archaeological and heritage sites located in close proximity to the dam such as presence or existence of graves and cemeteries, other historic built environment and landscape features which may be associated with the dam itself. However, there was no formal heritage social consultation that took place as part of this study. The study, therefore, assumes that the stone cladded dam does not have any other features associated with it, in terms of built environment and landscape, except its walls or embankment.

4.2. Exclusions

The following exclusions or limitations have direct consequence to the study and its results:

- There was no deeds search for the proposed study - the study area is owned by SANParks
- The survey was conducted in Summer - as such there was high level of vegetation cover within the project footprint which would have posed a constraint in terms of identification of other archaeological resources that may be directly linked to the dam and its boundaries such as unmarked graves or implements used during its construction.
- The survey only focused on the dam and its immediate surroundings and did not cover the entire park land.

4.3. Uncertainties

Heritage studies like most other specialist studies often experience many challenges during and after the physical survey of the proposed development area. From an archaeological and general heritage perspective, the assumption is often made that, the amount of identified archaeological and heritage resources during physical survey of the proposed development area represent some of the total amount of resources that exist within the development area. This is not often true because the nature of some the archaeological and heritage resources are subterranean in nature and as such, one cannot totally rule out their presence or existence within the proposed development area even though they are not recorded and map as part of the current study. These resources may be exposed or brought to the surface of the earth during the construction phase of the project which will involve excavation for infrastructure

development and clearing of vegetation and top soil in some instances. This presents one of the major uncertainties regarding the 'holistic' management or archaeological and heritage resources within and around the proposed development area.

Archaeologist and heritage specialist alike refer to discovery of such resources as chance finds and to mitigate such uncertainty, it is advisable that should such chance finds be made on site during the destruction phase, the Environmental Control Officer (ECO) responsible for the site should report them to the nearest SAHRA and PHRA office or the nearest museum or call an archaeologist and heritage specialist to investigate the finds make necessary recommendations.

5. FINDINGS

5.1. Cadastral Search

The only cadastral material used dated to 1952 - in order to obtain a relative date for the dam.

5.2. Deeds Search:

No deeds search was conducted as part of the study. The project area belong to the state - under SANParks

5.3. Field Survey and Identified Archaeological/Heritage Resources

The physical survey of the project area took place on the 4 February 2014. The survey did not yield any other archaeological (from Stone Age to industrial archaeology), burial grounds and graves, and other cultural features such as *places or spaces of prayer* both within and immediate outside the stone cladded dam. The existence of the stone cladded dam, of which NGT Projects & Heritage Consultants, was commissioned for was verified during the physical survey. No other built environment and landscape features were found in association with the dam except its walls and embankment.

Site Name: PSCD (Pilanesberg Stone Cladded Dam)

Type: Built environment & landscape site

Density (Low**):** Dam

Location/GPS Coordinates: S25° 12' 40.5" E27° 02' 37.0" E

Approximate Age: Over 60 years old (+/-62 years)

Applicable NHRA Section: Section 34

Site Description:

The site is an old farm dam made of soil with stone cladding. The stone cladding part of the dam is on the upstream side (*Figure 6 & 7*). The rest is a soil embankment - on what now looks to be the discharge area (*Figure 7*). The height of the highest wall measures 1m (*Figure 6*). Its length measures approximately 77m. Its width varies between 2m and 2.6m (*Figure 8*). The wall is eroded and the water has created a discharge channel creating further erosion on both the dam and its embankment.

Nature of Impacts - the impact of the proposed destruction of the dam as part of Wetland rehabilitation programme

Assessments and prediction of potential impacts on the dam in terms of standard heritage and basic assessment (i.e. adopted from standard environmentally basic assessment guidelines) (refer to Table 4 & 5):

Field Rating	Grade	Impact Scale	Impact Significance	Heritage Significance	Certainty of Impacts	Duration	Mitigation
GP.C	Grade 3E	Local	Negligible - without mitigation (**WOM**) and with mitigation(**WM**)	Low significance	Highly probable (**WOM/WM**)	Permanent: Construction and post construction phase	Destruction

Nature of Activities:

1. Construction Phase: *The site will be directly affected by the proposed dam (s) breaching/demolition to mitigate an upstream erosion cut that threatens a wetland in Pilanesberg Nature Reserve*

2. Operation Phase*: The site will be affected, but is of low heritage significance and its impact*

significance is negligible		
	WOM	**WM**
Probability	Highly probable (4)	Highly probable (4)
Duration	Short term(1)	Short term (1)
Scale	Local (1)	Local (1)
Magnitude/Severity	Low (2)	Low (2)
Significance	**(16)Negligible**	**(16) Negligible**
Status (positive or negative)	Negative	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, but this does not require any impact mitigation	
Mitigation: No further action required - the site is of very low heritage significance and does not warrant it to be documented further than the work conducted during site survey conducted on the 4 February 2013.		
Cumulative impacts: *There are no cumulative impacts predicted for the dam post its destruction*		
Residual Impacts: • The project will positively contribute to rehabilitation of natural wetlands within the park. • There are no negative impact regarding this site - it is of low heritage significance and its impact significance are negligible		

Measures for inclusion in the draft Environmental Management Plan:

OBJECTIVE: The overall goal of the current study was to conduct an onsite verification of stone cladded dam within Pilanesberg Nature Reserve, assess it heritage value and fabric, and proposed heritage management and conservation management measures for its management and conservation if it is found to be of high heritage significance.

Project component	Construction phase of the project
Potential Impact	The site will be directly affected by the proposed dam breaching forming part of wetland rehabilitation programme planned within the nature reserve.
Project component	Operational phase of the project
Potential Impact	The site will be directly affected by the proposed dam breaching forming part of wetland rehabilitation programme planned within the nature reserve.
Activity/risk source	N/A
Mitigation: Target/Objective	There are not mitigation measures proposed for the site - it is of low heritage significance and its impact significance is negligible.

Mitigation: Action/control	**Responsibility**	**Timeframe**
There are no further mitigation measures proposed for the site - it is of low heritage significance and its impact significance is negligible. It can be destructed.	ECO	During the construction phase of the project.

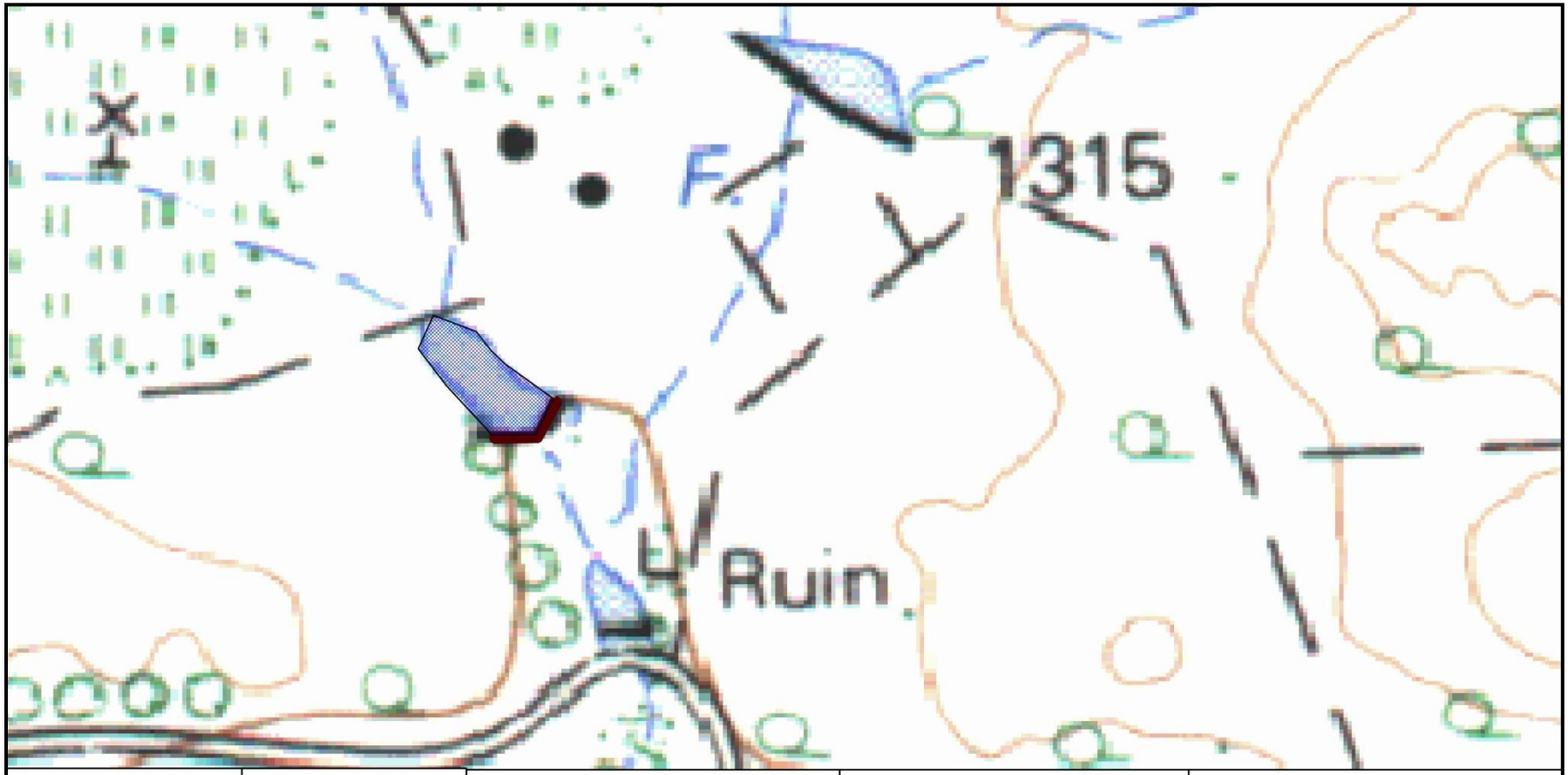
Performance Indicator	The type of indicator used here will be **Actionable Indicators** – this will measure action/progress in terms of completion of the above objectives with the approval of the EMP against their actual implementation.
Monitoring	No archaeological resources found in direct association with the stone cladded dam. However, should such resources (e.g. unmarked graves) be uncovered during the construction phase, SAHRA and NW-PHRA should be informed of such finds immediately.

Figure 5- Stone cladded side of the dam. (Note the two Nature Reserve rangers - testimony to site visit and as scale for the height of the dam).

Figure 6- Height of the dam which measures approximately a meter .

Figure 7- Soil embankment side of the dam - note the erosion which has been caused by water being channelled through the opening

Figure 8- Approximate width of the dam measures between2m and 2.6m



Legend		**Study Area:** Pilanesberg Nature Reserve	**Created By:** Nkosinathi Tomose	**Site Plan:** Pilanesberg Dam-Pilanesberg Nature Reserve
The Dam-1		**Province:** North West Province	**For:** NGT Projects & Heritage Consultants	
The Dam Wall-1		**Country:** South Africa	**Date:** 25 February 2014	
WGS2527AA	PROJECTS & HERITAGE CONSULTANTS (PTY)LTD	**Map Type:** 1:50.000 Boputhatswana		N
		Map Ref: WGS 2527AA		2,000 1,000 0 2,000 Meters

Figure 9 - Location of the dam wall/embankment and the dam (as measured on site) within the landscape, Pilanesberg Nature Reserve, Pilanesberg, North West Province, South Africa

6. FIELD SURVEY RESULTS AND PROPOSED INFRASTRUCTURE

The onsite investigation of the dam yield information about the type and structure of the dam; for example, its approximate age based on the size and age of the trees, the length and width and size of the actual dam catchment. No other heritage sites were found in association with the dam - such as culverts (built environment) or burial grounds and graves or archaeological stonewalls. Following the onsite investigation of the dam it was allocated Unique IDs PSCD. The dam was recorded and mapped in the landscape (*Figure 9*). An assessment of 1:150.000 topographic maps showed the dam in the 1952 topographic map. This gave NGT Project & Heritage Consultant a relative date of 62 years for the dam. Based on this information about the dam, as a built environment and landscape feature; the dam is generally protected in terms of the National Heritage Resources Act, No.25 of 1999 because it is older than 60 years. The 60 year bench mark is stipulated in the heritage legislation for historical structures in term of Section 34 of the NHRA, No. 25 of 1999. Accounting for its general protection in term of the heritage law; the dam was further assessed and evaluated in terms of its heritage value and fabric. This assessment and evaluation process was based on physical features and condition of the dam and it resulted to low heritage significance rating. In terms of field grading the dam is graded to Grade 3E. A calculation of impacts of proposed development (i.e. rehabilitation of a wetland and breaching of a within the reserve) on the dam resulted to negligible impact.

7. CONCLUSIONS

In conclusion, this built environment and landscape feature is of low heritage significance with negligible impact significance; as such, it is not worthy to be considered for protection and/or conservation regardless of its age.

No archaeological resources, burial grounds and graves, as well as other places of cultural significance such as sites of gathering, worship and prayer or initiation sites were identified within close proximity of the dam even though the 1952 map shows ruins not far from the dam (e.g. *Figure 1, 2 & 9*).

However, it has noted that some archaeological and heritage resources such as unmarked graves are subterranean in nature and might have been missed by the current study.

8. RECOMMENDATIONS

- It is recommend that SAHRA and NW-PHRA grant Aurecon and its client SANBI a positive review comment as the proposed breaching or destruction of the dam will have low and negligible impact from a heritage resource perspective.
- The developer should take note of potential archaeological remains that could potentially be unearthed during the removal of the dam wall.
- Should such resources be unearthed it is recommended that the construction should stop, SAHRA and NW-PHRA should be contacted immediately.

9. REFERENCES

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