



TITLE: HERITAGE IMPACT ASSESSMENT STUDY FOR THE PROPOSED MODIMOLLE BULK WATER SUPPLY AND STORAGE RESERVOIR, MODIMOLLE, LIMPOPO PROVINCE

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EXECUTIVE SUMMARY

Green Vision Consulting has appointed NGT Consulting (Pty) Ltd (hereafter referred to NGT Consulting) to carry out a Heritage Impact Assessment (HIA) for the proposed Modimolle Bulk Water Supply and Storage Reservoirs. The study forms part of a Basic Assessment Report (BAR) application and Water Use Licence Application (WULA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1988) and the National Water Act, 1998 (Act No. 107 of 1998). The proposed development is situated in Modimolle Local Municipality in the Limpopo Province, South Africa.

The appointment of NGT Consulting is in terms of the National Heritage Resources Act (NHRA), No. 25 of 1999. The HIA is completed in accordance to requirements of Section 38 (1) (a, b, c) of the NHRA, No. 25 of 1999. This is due to the nature of the proposed development, linear development which involves:

- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length.
- The construction of a bridge or similar structure exceeding 50 m in length.
- Any development or other activity which will change the character of a site exceeding 5 000 m² in extent.

The study approach involved: a detailed background information search of the affected environment in order to contextualise the project footprint and get an overview of the history and heritage of the area. A physical survey of the project footprint was carried out on the 10th of September 2016 by Roy Muroyi (archaeologist) assisted by Mthokozisi Zulu and Sibusiso Tomose (field technicians). The aim of the physical survey was to identify, record/document and map out any archaeological or heritage resources within the project area, along the proposed water pipeline as well as the footprint of the proposed reservoirs. The survey followed the pipeline route from Donkerpoort dam to Modimolle. Areas earmarked for the proposed reservoirs were also assessed. The physical investigation did not produce any archaeological or heritage resources such as graves, historic built environment and landscape features. As such, the following conclusions and recommendations are made about the project:

Conclusions:

The area under investigation did not yield any archaeological or heritage resources. As such, the proposed development will not have negative impacts on the cultural environment.

Recommendations:

Due to the fact that there were no archaeological or heritage resources found within the project infrastructure footprint – it is recommended that the Modimolle Local Municipality be allowed to proceed with the proposed infrastructure development. However, this does not rule out the possibility of discovering subterranean archaeological and heritage resources/artefacts which may be brought to the surface during excavation for the proposed pipeline and foundations for the reservoirs. Archaeologists and heritage practitioners refer to such findings as chance finds. In the case of the discovery of chance finds during the project construction phase it is highly recommended that the contractor stop construction activities and notify the provincial heritage authority. An archaeologist and/or a heritage practitioner should be called on site to investigate the finds and make necessary recommendations.

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NGT Consulting takes full liability of its specialists working on the project for all heritage related matters concerning the project. NGT Consulting (or any of its other divisions) will not take any liability for any environmental related issues or challenges for the project - these are the liability of the client.

DECLARATION OF INDEPENDENCE

This report has been compiled by Roy Muroyi for NGT Consulting. The views expressed in this report are entirely those of the authors and no other interests were redisplayed during the decision making process for the project.


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ABBREVIATIONS

Acronyms	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
BAR	Basic Assessment Report
CEMPr	Construction Environmental Management Programme
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DoE	Department of Energy
EIA Practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GIS	Geographic Information System
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
K.y.a	Thousand years ago
LSA	Late Stone Age
LIA	Late Iron Age
MIA	Middle Iron Age
MLM	Modimolle Local Municipality
MSA	Middle Stone Age
M.y.a	Million years ago
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NEMA	National Environmental Management Act
PHRA-L	Provincial Heritage Resources Agency Limpopo
PSSA	Paleontological Society of South Africa
ROD	Record of Decision
RDP	Reconstruction and Development Programme
PDAFP	Proposed Development Area Footprint
SADC	Southern African Development Community

SAHRA	South African Heritage Resources Agency
WTW	Water Treatment Works

TERMS & DEFINITION

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 10 m 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:

- i. Construction, alteration, demolition, removal or change in use of a place or a structure at a place.
- ii. Carrying out any works on or over or under a place.
- iii. Subdivision or consolidation of land comprising a place, including the structures or airspace of a place.
- iv. Constructing or putting up for display signs or boards.

- v. Any change to the natural or existing condition or topography of land.
- vi. 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

Green Vision Consulting has been appointed by MSW Engineering and Project Management Consultants on behalf of MLM to conduct a BAR and for Water Use Licence Application (WULA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1988) and the National Water Act, 1998 (Act No. 107 of 1998). The BAR and WULA are for the proposed Modimolle Bulk Water Supply and Storage Reservoirs. The project scope of work involves the following:

- i. Construction of 600mm \varnothing x 800m long steel raw water gravity main from the Donkerpoort Dam to the Donkerpoort Water Treatment Works (WTW).
- ii. Construction of new 58 ℓ /s clear water pump station at the Donkerpoort Dam WTW.
- iii. Construction of new 315mm \varnothing x 900m long PVC potable water rising main from the WTW to a new intermediate storage reservoir.
- iv. Construction of an intermediate 4.3M ℓ ground level reinforced concrete reservoir.
- v. Construction of a new 450mm \varnothing x 12 900m long steel potable water gravity main from the intermediate reservoir to the Bosveldsig Reservoir Site.
- vi. Construction of a new 13M ℓ reinforced concrete ground level reservoir at the existing Bosveldsig Reservoir Site.
- vii. Construction of a new 14M ℓ reinforced concrete ground level concrete reservoir at the existing Phagameng Reservoir Site.

1.2 Motivation

The project objective is to augment potable water transmission to Modimolle Town and surrounding communities. The current system cannot cope with the demand. The water supply is increasingly becoming unreliable and irregular due to numerous reasons some of which include the following:

- Inadequate conveyance capacity of both raw and potable water to the Donkerpoort Water Treatment Works and service reservoirs respectively.
- Alignment of potable water transmission pipeline through privately owned property hence delayed repairs due to access issues.
- Frequent breakdowns of pipelines.
- Lack of preventive maintenance.

- Some of the components have reached the end of their design life.
- Construction material (asbestos cement) of the transmission pipelines.

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

NGT Consulting has been appointed by Green Vision Consulting to conduct the HIA for the proposed construction of the Modimolle Bulk Water Supply and Storage Reservoir, which requires a full HIA, in terms of Section 38 (1) of the NHRA, No. 25 of 1999. The development involves the construction of a linear development exceeding 300m in length; involving three or more existing erven or subdivisions as required for a HIA in terms of Section 38 (1) of the NHRA, No. 25 of 1999. The study forms part of a BAR conducted by Green Vision Consulting.

2. LOCATION OF THE STUDY AREA

The study area is located in Modimolle in the Limpopo Province. The proposed development footprint is found on the following coordinates:

- Start at dam wall S24°40'09.7" E028°19'26.4"
- Raw water river crossing
- End of pipe at plant S24°40'20.7" E028°19'25.5"
- Second crossing reservoir in town S24°40'40.65" E028°20'8.06"
- Third river crossing S24°41'38.0"E028°23'52.4"
- Bosveldsig Reservoir site
- Reservoir in town S24°42'30.1" E028°23'08.8"
- Phagameng Reservoir S24°41'2.38" E028°25'29.21"

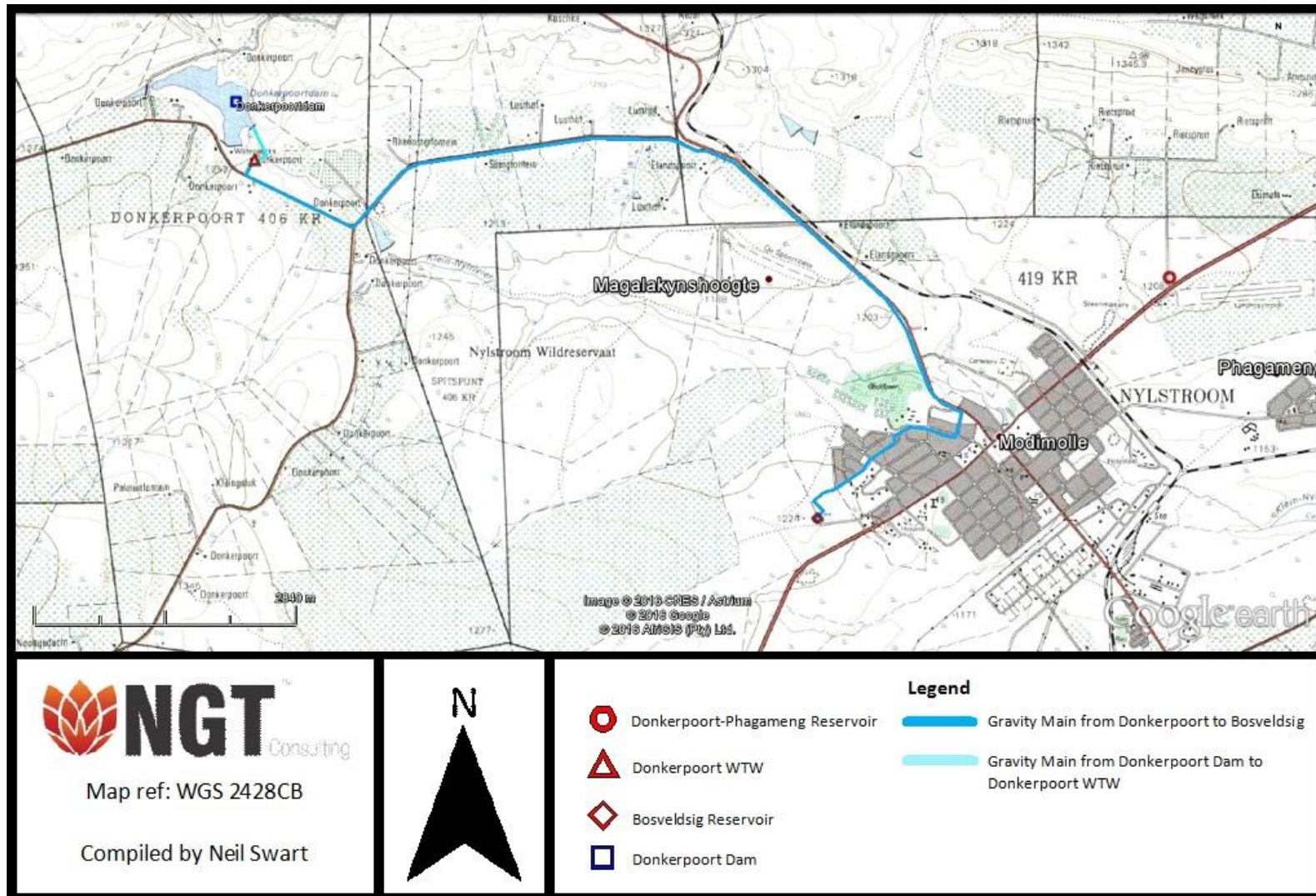


Figure 1- Location of the proposed pipeline (blue) and the proposed reservoirs
 Developed for Green Vision Consulting

3. LITERATURE REVIEW/DESKTOP STUDY

Stone Age Archaeology

South Africa has a rich hominid fossil record and a seemingly uninterrupted archaeological sequence spanning at least the last 2 million years. It has an up to date and integrated overview that is accessible to researchers from a range of disciplines. The Stone Age is divided in 3 distinct periods namely: the Early Stone Age (ESA), Middle Stone Age (MSA), and Late Stone Age (LSA).

The Early Stone Age of South Africa is associated with the Homo erectus hominid. These hominids used a selection of stone tools such as hand axes, which were used for the butchering of animals, scraping their hides and digging for plant foods (Kenna, 2011). These tools are characterised by their large sizes and being created from a single core. In the Limpopo province these sites date back to about 1.7 million years ago (mya), but they tend to be quite scarce in this region (Mitchell, 2002).

The Middle Stone Age is characterised by the use of smaller stone tools and were used by the Homo sapiens hominid about 200 thousand years ago (kya). Instead of using large cores as tools in the ESA, flakes that were struck off from prepared stone cores were used as tools. These were much smaller and could be transported much easier. Stone tools could also be found in the form of blades (elongated flakes that were hafted to wooden bases) (Smith et al, 2000). Many MSA sites can be found in the Limpopo province.

The Late Stone Age is characterised by even smaller, finely worked stone implements, known as microliths. These stone tools started appearing about 400 kya and their creation shows a great degree of variation across Southern Africa in various different industries (Kenna, 2011). This era is also characterised by the use of pottery, and the domestication of animals by the Khoi societies as opposed to the hunter-gatherer societies of the San.

The Limpopo area contains a broad range of stone tool types with mostly Early and Middle Stone Age artefacts found on the higher ground and Late Stone Age pieces found primarily on the Limpopo's floodplain. Core axes are well represented in the deposit and are the qualifying reason for attributing this assemblage to the Sangoan Industrial Complex (Pikirayi, 2011). Flaking strategies are mostly discoidal, and Levallois cores are present but rare. Hand axes are rare and a range of tool types occur that have been made of flakes (Pikirayi, 2011).

Rock Art

Rock art is characterised by paintings and engravings on rock surfaces from about 25 kya to present. These can be found in caves, rock shelters and boulders. Many such sites can be found all over South Africa, and are not only associated with the Khoi/San, but also the Bantu, Korana and Settler societies. Images would depict major events within these societies but would also depict their beliefs and their interactions with the supernatural world. Information regarding these beliefs was gained through anthropological studies of existing San communities that still practice their hunter-gatherer traditions in Southern Africa (Kenna, 2011). The Waterberg region in the Limpopo province is particularly rich in rock art sites, some of which are quite close to Modimolle, such as those found on the Welgevonden Game Reserve (Hollmann, n.d).

The Iron Age

The Iron Age by, as the name states, is characterised by the use of iron tools. This era was also characterised the introduction of agriculture, and the eventual establishment of states in Southern Africa, such as Great Zimbabwe and Mapungubwe. This technology was brought to the region by the southward migrations of Bantu societies about 2 kya. These sites are characterised by complex villages, burials, the use of metal tools, and the smelting sites, the use of pottery, agriculture and pastoralism sites, and later a distinct difference in classes. The most prominent city state in the area was the Pedi Empire. The Limpopo province is rich in Iron Age sites, some of which still play a very important role in the traditions of the people living in the area (Kenna, 2011).

History of Modimolle Area

The name Modimolle is a Tswana phrase meaning “the forefather’s spirit has eaten” or “God has eaten” (Breuts, 1989). Originally the town was named Nylstroom (renamed to Modimolle in 2002). The site was settled by a group Voortrekkers from the Groot Marico area in the early 1860’s, known as the ‘*Jerusalem gangers*’. In order to escape British rule they decided to trek all the way to the Holy Land. Upon entering the area, it showed similarities to descriptions of Egypt and realising that the conditions of the area would be ideal for farming they decided to settle in the area. The northern flowing river was assumed to be the Nile (*Nyl*) and was named as such by the trekkers, and they named their settlement Nylstroom. The town was laid out on 16 February 1866 and served (and still

serves) as a trade centre for the outlying farms (Erasmus, 2004). Modimolle and its surrounds have played an important role in the events that shaped South Africa. It saw conflict between the Boers and the Pedi Empire in the 1970's (Stapleton, 2013) as well as conflict between Boers and the British in the South African War (Anglo-Boer War) between 1899 and 1902. It was also the site of a concentration camp where Boer women, children and elders were held during this conflict (Heyningen, 2003).

Significant sites in Modimolle and surrounds

- Concentration Camp Graveyard and Moth Memorial – South African War (*Figure 2*).
- Strijdom House – Home to former prime minister of South Africa JG Strijdom.
- General CF Beyers statue – Boer commander in South African War and 1914 Rebellion (*Figure 3*).
- Architectural Gems:
 - Historic churches – such as the Dutch Reformed Church designed by Gerhard Moerdijk (architect of the Voortrekker Monument).
 - Bakker's Pharmacy.
 - Ons Hoop Building.
 - FH Odendaal Hospital.
- Many archaeological sites between the Modimolle and Tjate Mountains.
- Modimolle Mountain – Sacred site.



Figure 2- Concentration camp graveyard



Figure 3- General C F Beyers Statue

4. METHODOLOGY

This chapter outlines the approach used in conducting the study for the proposed Modimolle Bulk Water Supply pipeline and the Storage Reservoirs.

4.1. Literature review

The background information search of the proposed development area was conducted following the receipt of the appointment letter and sites maps from the client. Sources used in this study included, but were not limited to:

- Published academic papers and HIA studies conducted in and around the region where the proposed infrastructure development will take place.
- Map Archives - Historical maps of the proposed area of development and its surrounds were assessed to aid information gathering of the proposed area of development and its surrounds.
- A review and assessment of relevant environmental and heritage legislations such as the NEMA (together with the 2014 EIA Regulations) and the NHRA.

4.2. Physical survey

The physical survey of the proposed development area was conducted by NGT Consulting on the 9th of September 2016.

- The survey covered all proposed development areas on foot and track logs of the survey were recorded using Garmin GPSmap 62s.
- The objective of the survey was to locate and identify archaeological and heritage resources and/or sites in the project footprint area; record them using the necessary and applicable tools and technologies.
- The physical survey was deemed necessary since the desktop phase of the project yielded fossil and archaeological resources and other heritage/historic resources in the nearby area.
- The survey also paid special attention to disturbed and exposed layers of soils such as eroded surfaces, because these areas are more likely to be exposed or yield archaeological and other heritage resources that may be buried underneath the soil and be brought to the surface by animal and human activities, such as animal barrow pits and human excavated

grounds. The surface was also inspected for possible Stone Age scatters as well as exposed Iron Age implements and other resources.

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

- Garmin GPSmap 62s – to take Latitude/Longitude coordinates of the identified sites and to take track logs of the footprint area.
- Samsung camera – was used to take dated photos of the affected environment and the identified heritage sites.

4.3. Data Consolidation and Report Writing

All the data captured on the development area, by means of a desktop study and physical survey, are used as a baseline for this HIA. This data is also used to establish assessment for any possible current and future impacts within the development footprint. This includes the following:

- 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.
- A description of possible impacts of the proposed development, especially during the construction phase, in accordance with the standards and conventions for the management of cultural environments.
- Proposal of suitable mitigation measures to minimize possible negative impacts on the cultural environment and resources that may result during construction.
- Review of applicable legislative requirements. As discussed above under Terms of Reference for the Appointment of Archaeologist and Heritage Specialist.
- The consolidation of the data collected using the various sources as described above.
- Acknowledgement of impacts on heritage resources (such as unearthed graves) predicted to occur during construction.
- A discussion of the results of this study with conclusions and recommendations based on the available data and study findings.

4.4. 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 - <10/50m².
 - Medium - 10-50/50m².
 - High - >50/50m².
- Uniqueness.
- 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 area.
- D - Preserve site, or extensive data collection and mapping of the site.
- E - Preserve site.

Impacts on these sites by the development will be evaluated as indicated in Table 1 below:

Site Significance

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

Table 1: 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)	-	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	-	Low Significance	Destruction

4.5. Methodology for Impact Assessment in terms of Environmental Impact Assessment

Methodologies including Measures for Environmental Management Plan Consideration

The basic assessment methodology assists in evaluating the overall effect of a proposed activity on the environment. 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 Basic Assessment (BA) & Environmental Impact Assessment (EIA). The impact

evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts:

The Basic Assessment included:

- An indication of the methodology used in determining the significance of potential environmental impacts.
- A description of all environmental issues that were identified during the environmental impact assessment process.
- An assessment of the significance of direct, indirect and cumulative impacts in terms of the following criteria:
 - The *nature* of the impact, which shall include a description of what causes the effect, what will be affected and how it will be affected.
 - The *extent* of the impact, indicating whether the impact will be local (limited to the immediate area or site of development), regional, national or international.
 - The *duration* of the impact, indicating whether the lifetime of the impact will be of a short-term duration (0–5 years), medium-term (5–15 years), long-term (> 15 years, where the impact will cease after the operational life of the activity) or permanent.
 - The *probability* of the impact, describing the likelihood of the impact actually occurring, indicated as improbable (low likelihood), probable (distinct possibility), highly probable (most likely), or definite (impact will occur regardless of any preventative measures).
 - The *severity/beneficial scale*, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit, with no real alternative to achieving this benefit), severe/beneficial (long-term impact that could be mitigated/long-term benefit), moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit), slight or have no effect.
 - The *significance*, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high.
 - The *status*, which will be described as either positive, negative or neutral.
 - The *degree* to which the impact can be reversed.
 - The *degree* to which the impact may cause irreplaceable loss of resources.

- The *degree* to which the impact can be *mitigated*.
- A description and comparative assessment of all alternatives identified during the environmental impact assessment process.
- Recommendations regarding practical mitigation measures for potentially significant impacts, for inclusion in the Environmental Management Plan (EMP).
- An indication of the extent to which the issue could be addressed by the adoption of mitigation measures.
- A description of any assumptions, uncertainties and gaps in knowledge.
- An EIA which contains:
 - A summary of the key findings of the EIA.
 - An assessment of the positive and negative implications of the proposed activity.
 - A comparative assessment of the positive and negative implications of identified alternatives.

4.5.1. Assessment of Impacts

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the BAR must be assessed in terms of the following criteria:

- The nature, which shall include a description of what causes the effect, what will be affected and how it will be affected
- The extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high)
- The duration, wherein it will be indicated whether:
 - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1.
 - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2.
 - Medium-term (5–15 years) – assigned a score of 3.

- Long term (> 15 years) - assigned a score of 4.
- Permanent - assigned a score of 5.
- The magnitude, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The probability *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures)
- The significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high.
- The status, which will be described as positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated*.

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

$$S = (E+D+M) P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The significance weightings for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area).
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated).
- 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Table 2 -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

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included.

Table 3 – Table summarising the significance of impacts

Example of Impact table summarising the significance of impacts (with and without mitigation)		
Nature:		
	Without Mitigation	With Mitigation
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term(3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	36 (Medium)	24 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: Mitigation Measures		
Cumulative impacts: Cumulative Impacts		
Residual Impacts: Residual Impacts		

4.6 Assumptions and Limitations

The heritage impact assessments (HIA) are undertaken to ensure that the client complies with the National Heritage Resources Act (NHRA), number 25 of 1999. The field survey did not include any form of subsurface inspection or tests beyond the inspection of burrows, road sections, the dam area, cliff exposed by natural erosion and previous road works (on the road). Some assumptions were made as part of the study and therefore some limitations, uncertainties and gaps in information apply including:

- The proposed pipeline will follow the existing surfaced and unsurfaced roads from the Donkerpoort Dam to the Bosveldsig Reservoir Site road. The pipeline work will be limited to the road reserve without any major deviation.
- Since the pipeline will be aligned most of the time on the road which is already in use, it is anticipated that no significant archaeological materials are likely to be situated in situ along the route given the current extensive nature of the disturbance to the vegetation and upper soil layers in the construction of the road.
- The chances of encountering settlement sites (both Stone and Iron Age) within the road route directly affected by the proposed project are limited given the lack of rock shelters in the immediate vicinity of the road.
- Available data suggests that the Stone Age communities in this region favoured rock shelters and caves as settlement and camp sites whereas Iron Age farming communities preferred areas suitable for settled homesteads with access to agricultural fields, water and grazing. The survey did not expect to find any evidence of Stone or Iron Age settlements within the project footprint though this does not mean that the project area was not used for non-settlement activities by prehistoric communities.
- No excavations or sampling were undertaken, since a permit from PHRA-L is required to disturb a heritage resource.

5. DISCUSSION

The survey for the Modimolle Bulk Water Supply and Storage Reservoir project area did not result in the identification of any heritage or archaeological resources. The affected area is characterised by existing water supply infrastructure such as a dam (*Figure 8*), reservoirs (*Figure 11 & 12*), water treatment plant (*Figures 4, 6 & 7*). The proposed pipeline route is also covered in vegetation and travels along the road, which is unsurfaced for the first 5.6 km and then surfaced for the remaining 7.3 km (*Figure 5 & 10*). The buildings identified also fell outside the proposed pipeline servitude and were assessed to be less than 60 years in age (*Figure 9*).

The Pipeline route from Donkerpoort WTW to Bosveldsig Reservoir Site

The Donkerpoort Dam is located 11km north-west of the Modimolle CBD. It is accessible via the R37 and an unsurfaced road that tees off from the R37. The proposed pipeline route's natural status has

undergone a lot of alterations and can be described as massively disturbed. Although unlikely, sub surface remains of heritage importance could still be found during construction although currently unidentifiable due to a high state of alteration/disturbance as well as the thick vegetation cover in areas close to the proposed development routes and sites.



Figure 4-Vegetaion cover outside the WTW



Figure 5-General outlook and vegetation along the proposed pipeline route

End of the pipeline at the Plant Coordinates

The area is in a rocky area with mountainous terrain. The plant area is however a developed area. The WTW comprises inlet water, flocculation channels, sedimentation tanks, filtration and clear water sumps.



Figure 6-Two clarifiers at the WTW



Figure 7- Part of the plant area showing the clarifier that is not in use and the filter beds



Figure 8 -Donkerpoort Dam overflow weir flanked by the cliff



Figure 9- The old tanks at a homestead next to the dam

Second crossing the site is found on the Coordinates S24°41'38.0"E028°23'52.4"



Figure 10- Second crossing along the road to the dam

Bosveldsig Reservoir Site (town), site Coordinates S24°42'30.1" E028°23'08.8"



Figure 11- Bosveldsig ground level Reservoir and the vegetation on site



Figure 12- Bosveldsig ground level reservoir and water tower

7. CONCLUSIONS

The investigations did not yield any archaeological or heritage resources. As such, the proposed infrastructure development will not have negative impacts on the cultural environment.

8. RECOMMENDATIONS

The proposed infrastructure development will go a long way in aiding MLM to carry out its mandate to provide potable water to its citizens and thus improve the livelihood of the people. Based on this and the fact that there were no archaeological or heritage resources found within the project area, it is recommended that MLM should be allowed to proceed with the proposed infrastructure development. However, this does not rule out the possibility of discovering subterranean archaeological and heritage resources/artefacts which may be brought to the surface during excavation for the proposed pipeline and foundations for the reservoirs. Archaeologists and heritage practitioners refer to such findings as chance finds. In the case of the discovery of chance finds during the project construction phase it is highly recommended that the developer stop construction activities and notify the provincial heritage authority. An archaeologist and/or a heritage practitioner should be called on site to investigate the finds and make necessary recommendations.

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