

Phase 1 Cultural Heritage Impact Assessment:

THE PROPOSED KILLARNEY COUNTRY CLUB STORM WATER MANAGEMENT UPGRADES, CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE

Prepared for:

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Specialist competency:

Johan A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 40 years. Originally based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape Province, Northern Cape Province, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. Based on this work, he has curated various exhibitions at different museums and has published more than 70 papers, most in scientifically accredited journals. During this period, he has done more than 2000 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.



J A van Schalkwyk
Heritage Consultant
September 2018

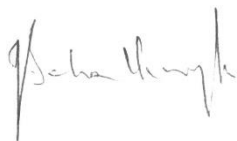


SPECIALIST DECLARATION

I, J A van Schalkwyk, as the appointed independent specialist, in terms of the 2014 EIA Regulations (as amended), hereby declare that I:

- I act as the independent specialist in this application;
- I perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 (as amended) and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist



J A van Schalkwyk
September 2018

EXECUTIVE SUMMARY

**Phase 1 Cultural Heritage Impact Assessment:
THE PROPOSED KILLARNEY COUNTRY CLUB STORM WATER MANAGEMENT UPGRADES, CITY OF
JOHANNESBURG METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE**

Mapoxe Engineering Consulting Engineers (Pty) Ltd was contracted by *Johannesburg Roads Agency (Pty) Ltd* for the Design and Supervision of Storm Water Improvement Mechanisms at the Killarney Country Club, City of Johannesburg Metropolitan Municipality, Gauteng Province.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by *Spoor Environmental Services (Pty) Ltd* to conduct a cultural heritage assessment to determine if the proposed upgrade of the storm water management system would have an impact on any sites, features or objects of cultural heritage significance.

This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. The HIA consisted of a desktop study (archival sources, database survey, maps and aerial imagery) and a physical survey. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one, most of which developed during the last 150 years or less.

Identified sites

During the physical survey, no sites, features or objects of cultural significance were identified.

Impact assessment

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

- As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.

Heritage sites	Significance of impact	Mitigation measures
Killarney Canal Upgrade: Construction Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a
Killarney Canal Upgrade: Operation Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report. For this proposed project, the assessment has determined that no sites, features or objects of heritage significance occur in the study area. If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

- Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.



J A van Schalkwyk
Heritage Consultant
September 2018

TECHNICAL SUMMARY

Project description	
Description	Upgrade of an existing storm water canal
Project name	Killarney Country Club Storm Water Management

Applicant
Johannesburg Roads Agency (Pty) Ltd

Environmental assessors
Spoor Environmental Services
Mr J C van Rooyen

Property details						
Province	Gauteng					
Magisterial district	Johannesburg					
Local municipality	City of Johannesburg					
Topo-cadastral map	2628AA					
Farm name	Braamfontein 53IR					
Closest town	Johannesburg					
Coordinates	End points (approximate)					
	No	Latitude	Longitude	No	Latitude	Longitude
	1	S 26,16541	E 28,05513	2	S 26,14176	E 28,06072

Development criteria in terms of Section 38(1) of the NHR Act	Yes/No
Construction of road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length	Yes
Construction of bridge or similar structure exceeding 50m in length	No
Development exceeding 5000 sq m	No
Development involving three or more existing erven or subdivisions	No
Development involving three or more erven or divisions that have been consolidated within past five years	No
Rezoning of site exceeding 10 000 sq m	No
Any other development category, public open space, squares, parks, recreation grounds	No

Land use	
Previous land use	Farming
Current land use	Golf course

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GLOSSARY OF TERMS AND ABBREVIATIONS

TERMS

Bioturbation: The burrowing by small mammals, insects and termites that disturb archaeological deposits.

Cumulative impacts: “Cumulative Impact”, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Debitage: Stone chips discarded during the manufacture of stone tools.

Factory site: A specialised archaeological site where a specific set of technological activities has taken place – usually used to describe a place where stone tools were made.

Historic Period: Since the arrival of the white settlers - c. AD 1830 - in this part of the country.

Holocene: The most recent time period, which commenced c. 10 000 years ago.

Iron Age (also referred to as **Early Farming Communities**): Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age	AD 200 - AD 900
Middle Iron Age	AD 900 - AD 1300
Later Iron Age	AD 1300 - AD 1830

Midden: The accumulated debris resulting from human occupation of a site.

Mitigation, means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

National Estate: The collective heritage assets of the Nation.

Pleistocene: Geological time period of 3 000 000 to 20 000 years ago.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.

Early Stone Age	2 500 000 - 150 000 Before Present
Middle Stone Age	150 000 - 30 000 BP
Later Stone Age	30 000 - until c. AD 200

Tradition: As used in archaeology, it is a seriated sequence of artefact assemblages, particularly ceramics.

ACRONYMS and ABBREVIATIONS

ASAPA	Association of Southern African Professional Archaeologists
BCE	Before the Common Era (the year 0)

BP	Before Present (calculated from 1950 when radio-carbon dating was established)
CE	Common Era (the year 0)
ESA	Early Stone Age
EIA	Early Iron Age
HIA	Heritage Impact Assessment
I & AP's	Interested and Affected Parties
LIA	Late Iron Age
LSA	Later Stone Age
MIA	Middle Iron Age
MSA	Middle Stone Age
NASA	National Archives of South Africa
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS (AS AMENDED)

Requirements of Appendix 6 – GN R982	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain-	
a) details of-	
i. the specialist who prepared the report; and	Front page
ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page i Addendum Section 6
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 4
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 7.3
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 4.2.2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 4
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Addendum Section 5 Fig. 9
g) an identification of any areas to be avoided, including buffers;	Section 8
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 13 Addendum Section 5
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 7
k) any mitigation measures for inclusion in the EMPr;	Section 9 & 10
l) any conditions for inclusion in the environmental authorisation;	Section 10
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9
n) a reasoned opinion-	
i. whether the proposed activity, activities or portions thereof should be authorised;	Section 10
(iA) regarding the acceptability of the proposed activity or activities; and	
ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 8, 9, 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	-
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	-
q) any other information requested by the competent authority.	-
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	-

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1. INTRODUCTION

1.1 Background

Mapoxe Engineering Consulting Engineers (Pty) Ltd was contracted by *Johannesburg Roads Agency (Pty) Ltd* for the Design and Supervision of Storm Water Improvement Mechanisms at the Killarney Country Club, City of Johannesburg Metropolitan Municipality, Gauteng Province.

South Africa's heritage resources, also described as the 'national estate', comprise a wide range of sites, features, objects and beliefs. However, according to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site.

In accordance with Section 38 of the NHRA, an independent heritage consultant was appointed by *Spoor Environmental Services (Pty) Ltd* to conduct a cultural heritage assessment to determine if the proposed upgrade of the storm water management system would have an impact on any sites, features or objects of cultural heritage significance.

This report forms part of the Environmental Impact Assessment (EIA) as required by the EIA Regulations in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended and is intended for submission to the South African Heritage Resources Agency (SAHRA).

1.2 Terms and references

The aim of a full HIA investigation is to provide an informed heritage-related opinion about the proposed development by an appropriate heritage specialist. The objectives are to identify heritage resources (involving site inspections, existing heritage data and additional heritage specialists if necessary); assess their significances; assess alternatives in order to promote heritage conservation issues; and to assess the acceptability of the proposed development from a heritage perspective.

The result of this investigation is a heritage impact assessment report indicating the presence/absence of heritage resources and how to manage them in the context of the proposed development.

Depending on SAHRA's acceptance of this report, the developer will receive permission to proceed with the proposed development, on condition of successful implementation of proposed mitigation measures.

1.2.1 Scope of work

The aim of this study is to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where the proposed upgrade of the storm water management system is to take place. This included:

- Conducting a desk-top investigation of the area;
- A visit to the proposed development site.

The objectives were to:

- Identify possible archaeological, cultural and historic sites within the proposed development areas;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

1.2.2 Assumptions and Limitations

The investigation has been influenced by the following factors:

- It is assumed that the description of the proposed project, provided by the client, is accurate.
- The unpredictability of buried archaeological remains.
- No subsurface investigation (i.e. excavations or sampling) were undertaken, since a permit from SAHRA is required for such activities.
- It is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is sufficient and that it does not have to be repeated as part of the heritage impact assessment.
- This report does not consider the palaeontological potential of the site.

2. LEGISLATIVE FRAMEWORK

2.1 Background

Heritage Impact Assessments are governed by national legislation and standards and International Best Practise. These include:

- South African Legislation
 - National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA);
 - Mineral and Petroleum Resources Development Act, 2002 (Act No. 22 of 2002) (MPRDA);
 - National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA); and
 - National Water Act, 1998 (Act No. 36 of 1998) (NWA).
- Standards and Regulations
 - South African Heritage Resources Agency (SAHRA) Minimum Standards;
 - Association of Southern African Professional Archaeologists (ASAPA) Constitution and Code of Ethics;
 - Anthropological Association of Southern Africa Constitution and Code of Ethics.
- International Best Practise and Guidelines
 - ICOMOS Standards (Guidance on Heritage Impact Assessments for Cultural World Heritage Properties); and
 - The UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (1972).

2.2 Heritage Impact Assessment Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, Section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority.

The National Heritage Resources Act (Act No. 25 of 1999, Section 38) provides guidelines for Cultural Resources Management and prospective developments:

“38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as:

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m 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 provincial heritage resources authority, 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.”*

And:

“38 (3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

- (a) The identification and mapping of all heritage resources in the area affected;*
- (b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (c) an assessment of the impact of the development on such heritage resources;*
- (d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (f) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) plans for mitigation of any adverse effects during and after the completion of the proposed development.”*

3. HERITAGE RESOURCES

3.1 The National Estate

The National Heritage Resources Act (No. 25 of 1999) defines the heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations that must be considered part of the national estate to include:

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, including-
 - ancestral graves;
 - royal graves and graves of traditional leaders;
 - graves of victims of conflict;

- graves of individuals designated by the Minister by notice in the Gazette;
- historical graves and cemeteries; and
- other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- sites of significance relating to the history of slavery in South Africa;
- movable objects, including-
 - objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - objects to which oral traditions are attached or which are associated with living heritage;
 - ethnographic art and objects;
 - military objects;
 - objects of decorative or fine art;
 - objects of scientific or technological interest; and
 - books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

3.2 Cultural significance

In the NHRA, Section 2 (vi), it is stated that “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This is determined in relation to a site or feature’s uniqueness, condition of preservation and research potential.

According to Section 3(3) of the NHRA, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of

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

A matrix (see **Section 2 of Addendum**) was developed whereby the above criteria were applied for the determination of the significance of each identified site. This allowed some form of control over the application of similar values for similar identified sites.

4. STUDY APPROACH AND METHODOLOGY

4.1 Extent of the Study

This survey and impact assessment covers all facets of cultural heritage located in the study area as presented in Section 5 below and illustrated in Figures 3 & 4.

4.2 Methodology

4.2.1.1 Survey of the literature

A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological and historical sources were consulted – see list of references in Section 11.

- Information on events, sites and features in the larger region were obtained from these sources.

4.2.1.2 Survey of heritage impact assessments (HIAs)

A survey of HIAs done for projects in the region by various heritage consultants was conducted with the aim of determining the heritage potential of the area – see list of references in Section 11.

- Information on sites and features in the larger region were obtained from these sources.

4.2.1.3 Data bases

The *Heritage Atlas Database*, various SAHRA databases, the *Environmental Potential Atlas*, the *Chief Surveyor General* and the *National Archives of South Africa* were consulted.

- Database surveys produced a number of sites located in the larger region of the proposed development.

4.2.1.4 Other sources

Aerial photographs and topocadastral and other maps were also studied - see the list of references below.

- Information of a very general nature were obtained from these sources

The results of the above investigation are presented in Figure 1 below – see list of references in Section 11 – and can be summarised as follows:

- Stone Age tools, dating to the MSA occur as low-density scatters on some outcrops in the larger region;
- Stone walled sites dating to the dating the Late Iron Age occur to the north of the study;
- A number of formally declared historic structures, inclusive of buildings, monuments and bridges, occur sporadically all over.
- The www.heritageregister.org.za indicated a number of buildings (houses and apartment buildings) that have not yet been ascribed a heritage significance, mostly located to the south of the study area.
- Formal burial sites occur sporadically throughout the larger region.

Based on the above assessment, the probability of cultural heritage sites, features and objects occurring in the study area is deemed to be low.

Table 1: Pre-Feasibility Assessment

Category	Period	Probability	Reference
Early hominin	Pliocene – Lower Pleistocene		
	Early hominin	None	
Stone Age	Lower Pleistocene – Holocene		

	Early Stone Age	None	
	Middle Stone Age	Low	Heritage Database
	Later Stone Age	None	
	Rock Art	None	
Iron Age	Holocene		
	Early Iron Age	None	
	Middle Iron Age	None	
	Late Iron Age	Low	Mason (1986)
Colonial period	Holocene		
	Contact period	Low	Brodie (2008)
	Recent history	High	Brodie (2008); heritageregister.org.za: Heritage Database; Van der Waal (1979);
	Industrial heritage	Medium	Mendelsohn & Potgieter (1986); Praagh (1906)

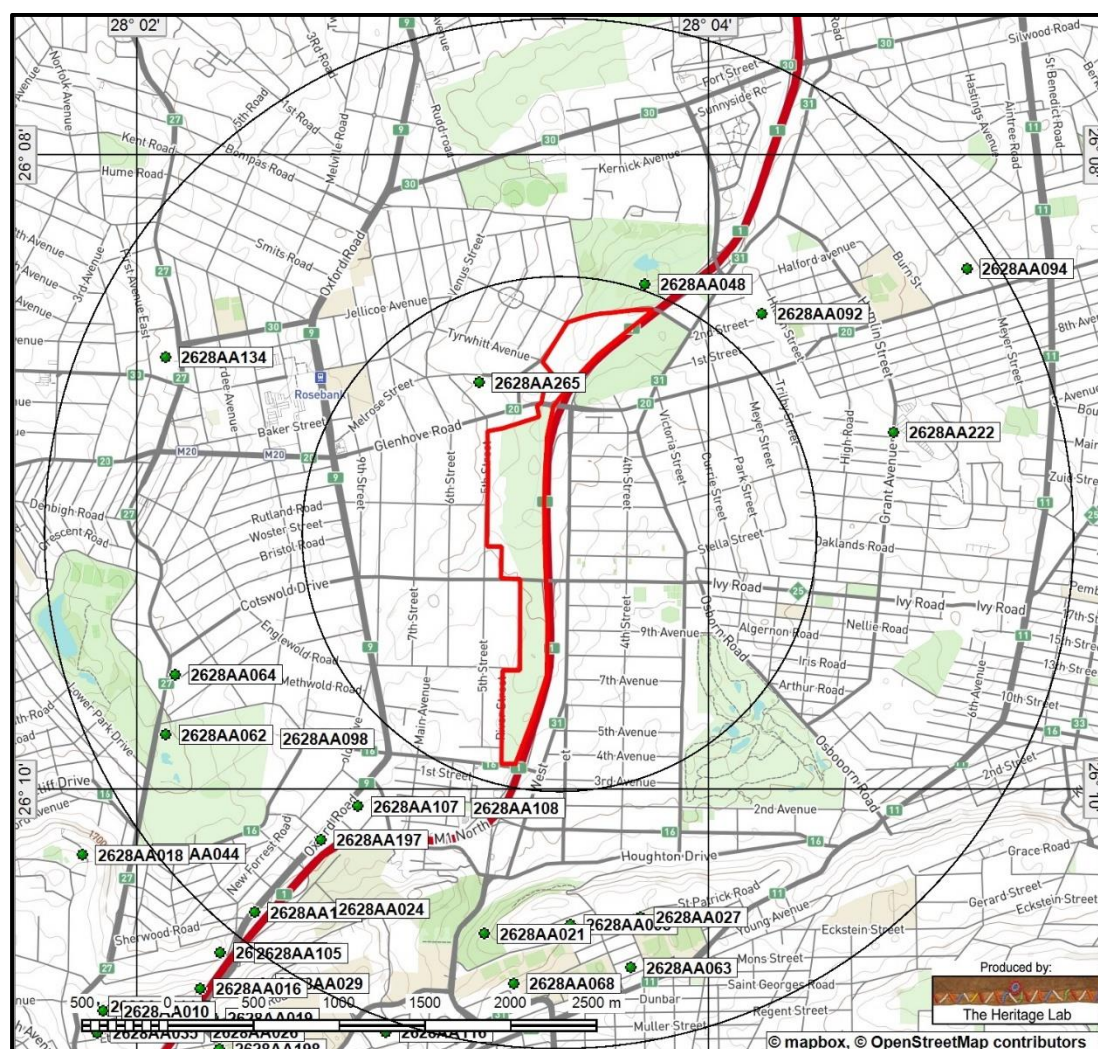


Figure 1. Location of known heritage sites and features in relation to the study area (Circles spaced at a distance of 1,5km: heritage sites = coded green dots)

4.2.2 Field survey

The field survey was done according to generally accepted archaeological practices, and was aimed at locating all possible sites, objects and structures. The area that had to be investigated was identified by the *Spoor Environmental Services* by means of maps and .kml files indicating the development area. This was loaded onto an ASUS digital device and used in Google Earth during the field survey to access the areas.

The site was visited on 20 September 2018 and was investigated by walking both sides of the water canal – see Fig. 2 below.

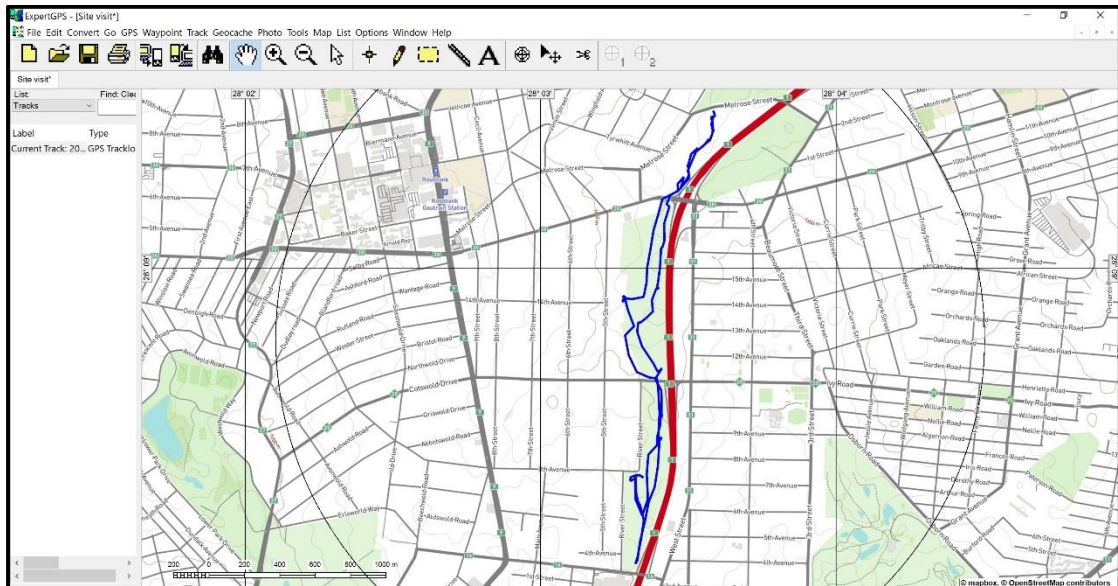


Figure 2. Map indicating the track log of the field survey.
(Track log = blue line)

Factors influencing the field survey

- During the site visit, archaeological visibility was impacted on by the fact that the whole golf course has a well-maintained grass cover.
- Apparently different sections of the canal, which forms the focus of this study, has over the past number of years been upgraded a number of times (Theron 2018). The result is that it is difficult to determine original sections as well as the date of the original development

In order to overcome these difficulties, special attention was given to sections where the 'original' stream bed was exposed; areas perceived to be original banks of the stream; areas where erosion exposed the original stream banks; and areas where the stream banks were filled in to level it off (Fig. 3 below).

- In the latter case, the occurrence of for example plastic knives and spoons associated with take-away meals served as indicator that the fill material was of recent origin.

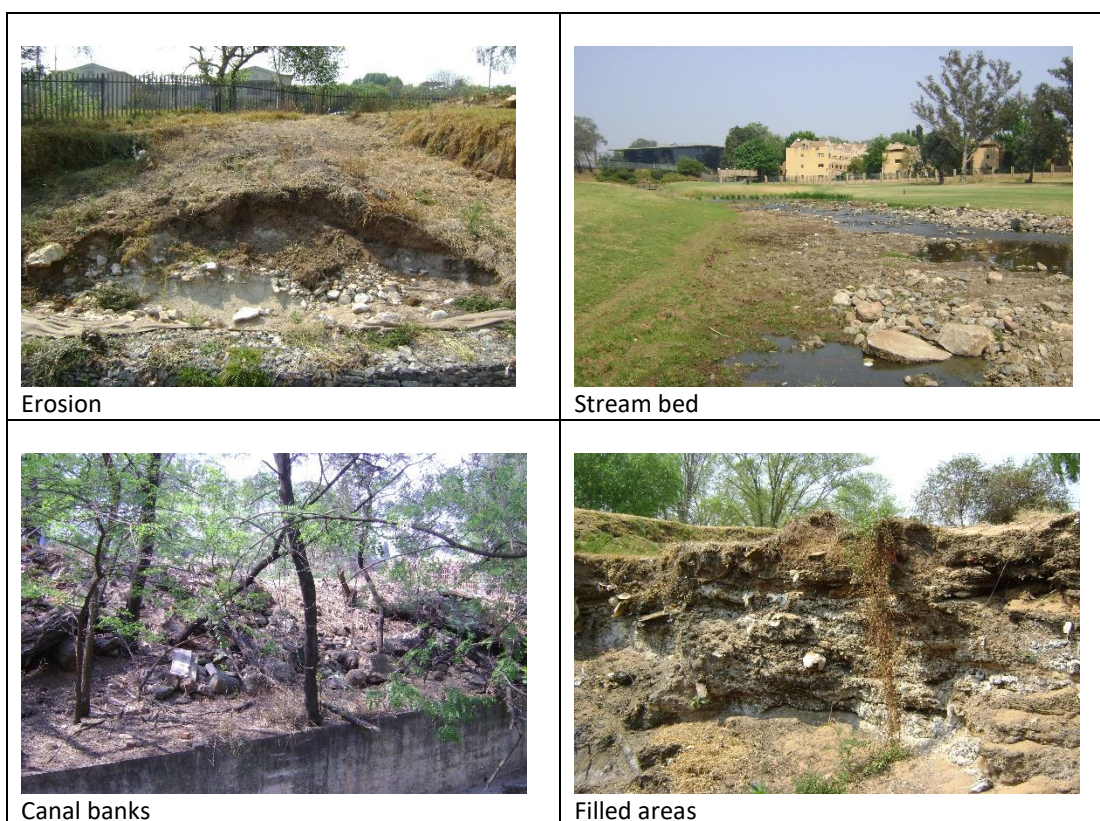


Figure 3. Types of areas given special attention.

4.2.3 Documentation

All sites, objects and structures that are identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual localities are determined by means of the *Global Positioning System* (GPS) and plotted on a map. This information is added to the description in order to facilitate the identification of each locality.

The track log and identified sites were recorded by means of a Garmin Oregon 550 handheld GPS device. Photographic recording was done by means of a Canon EOS 550D digital camera.

Map datum used: Hartebeeshoek 94 (WGS84).

5. PROJECT DESCRIPTION

5.1 Site location

The project is located in what is known as the Killarney Country Club. This area mostly a golf club, stretching from Riviera Road in the south, northwards, on the western side of the M1, all the way past Glenhove Road to Melrose Street. It runs through suburbs such as Riviera, Houghton, Houghton Estate and Oaklands in the City of Johannesburg Metropolitan Municipality, Gauteng Province (Fig. 4). For more information, see the Technical Summary on p. iv above.

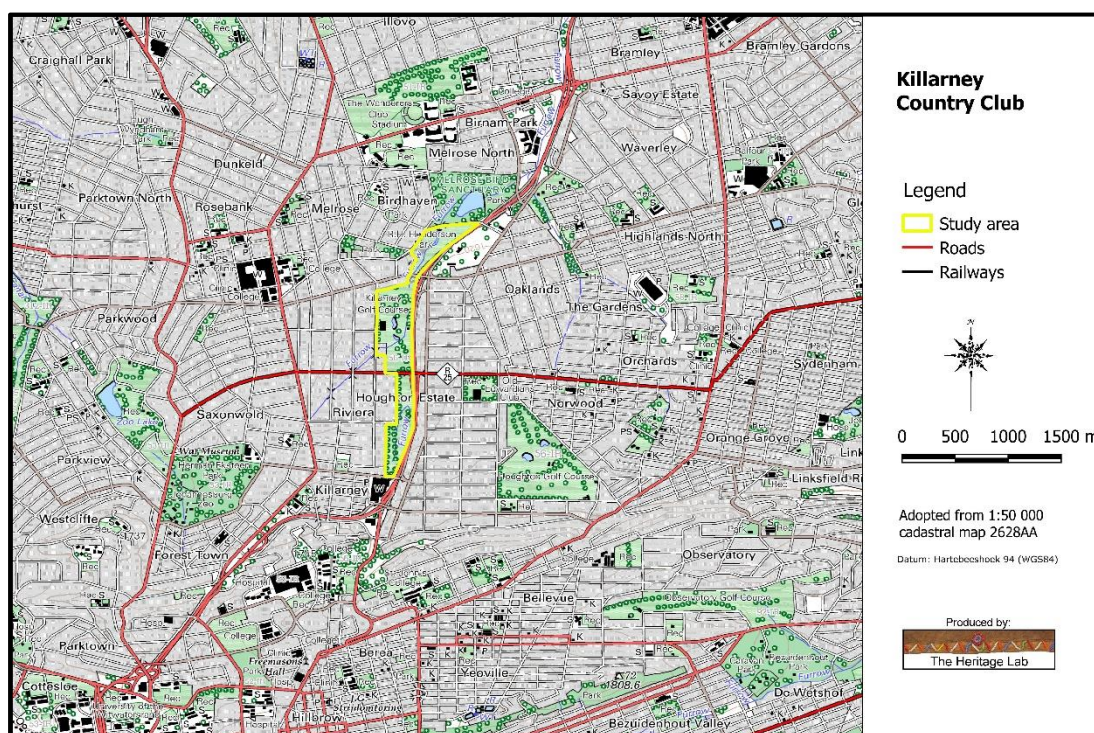


Figure 4. Location of the study area in regional context.
(Study area = yellow polygon)

5.2 Development proposal

The project aims to repair and improve existing structures damaged by flood water during the past few years. The infrastructure associated with the project, and included in this report includes, amongst other (Theron 2018a):

- Rectangular canal sections;
- Gabion lined channel sections;
- Foundations of various small bridges across the canal;
- Stormwater retention ponds in the canal system;
- Retaining wall structures; and
- Environmental compliance in stream modification activities.

Three distinct portions of work were identified and should be scheduled according to the available budget. These three work packages are:

- Replacement of the retaining wall structure;
- Repairs to the gabion lined channel section; and
- General repairs and refurbishment of canal system.

6. DESCRIPTION OF THE AFFECTED ENVIRONMENT

6.1 Natural Environment

The study area lies in a totally transformed environment, having been used, consecutively as agricultural fields, sporting facility, urban development and industrial site.

The geology of the study area is made up of granite, changing to quartzite a short distance to the south of the study area. The topography is described as hills, changing to hills and lowlands to the south of the study area. The original vegetation in the study area is classified as Egoli Granite Grassland, which is part of the of the Mesic Highveld Grassland Bioregion (Muncina & Rutherford 2006) (Fig. 5).



Figure 5. Views over the study area

The map in Figure 6 below contains the various suburbs surrounding the study area, indicating the dates of their development. In the discussion that follows, 11th Avenue will be used as basis line for orientation when referring to specific features.

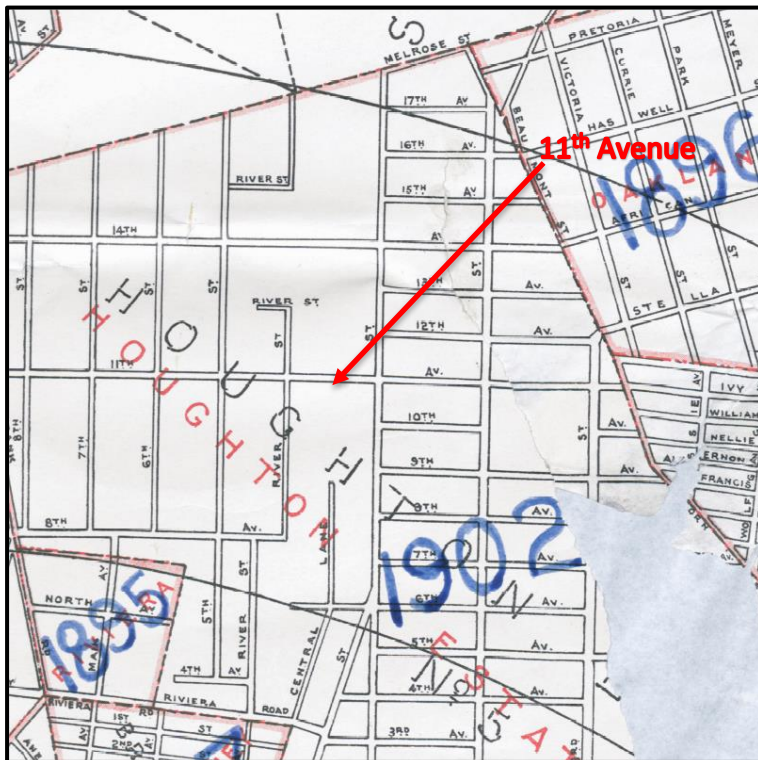


Figure 6. Map of the suburbs and date of their development dating to 1927

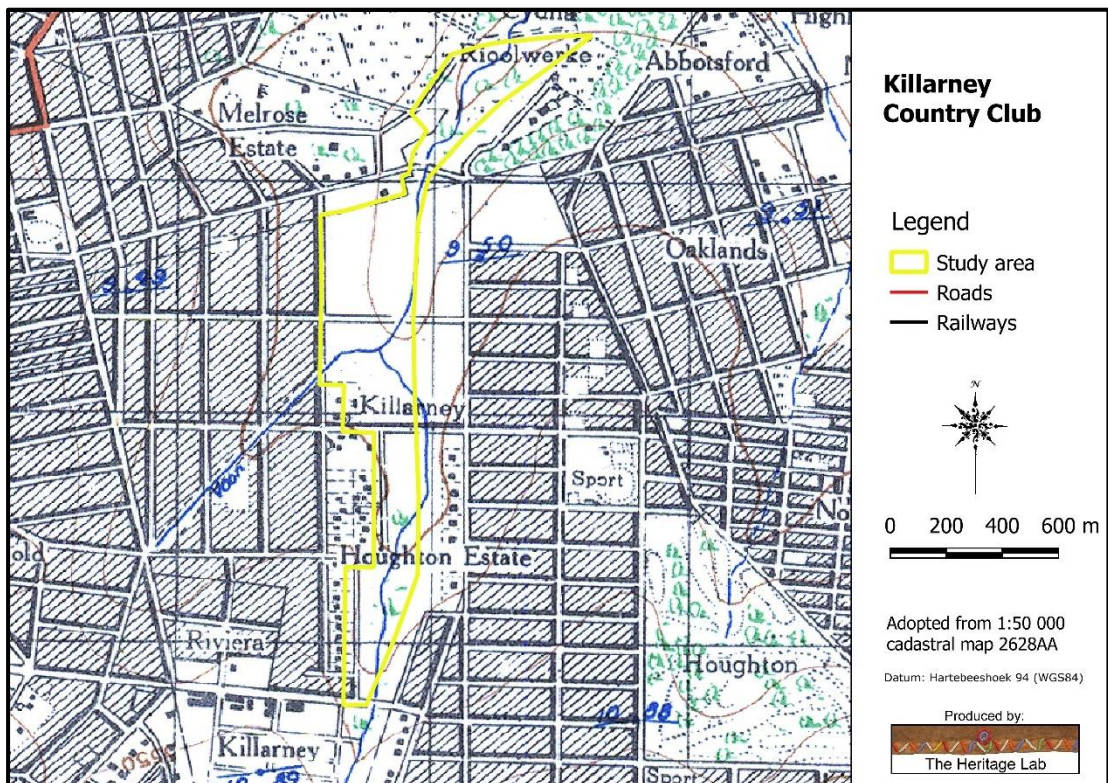


Figure 7. The study area on the 1939 version of the 1:50 000 topocadastral map

The cadastral map (1939) in Fig. 7 above, shows only the main features adjacent to the study area. However, the aerial photograph in Fig. 8 below, dating to 1938, shows more detail. It can be seen that sections of the study area, especially north of 11th Avenue, were used as agricultural fields. A covered canal, running from southwest to northeast, emptying in the stream bed north of 11th Avenue, is still in use today. A Waste Water Treatment Works exited to the northeast, in the area between Glenhove Avenue and Melrose Street. This feature was decommissioned in approximately 1968 and is shown in the process of been dismantled in Figure 11. Apart from the above, a number of tracks crisscross the area. Some dark spots might even be interpreted as 'greens' on a newly developed golf course.

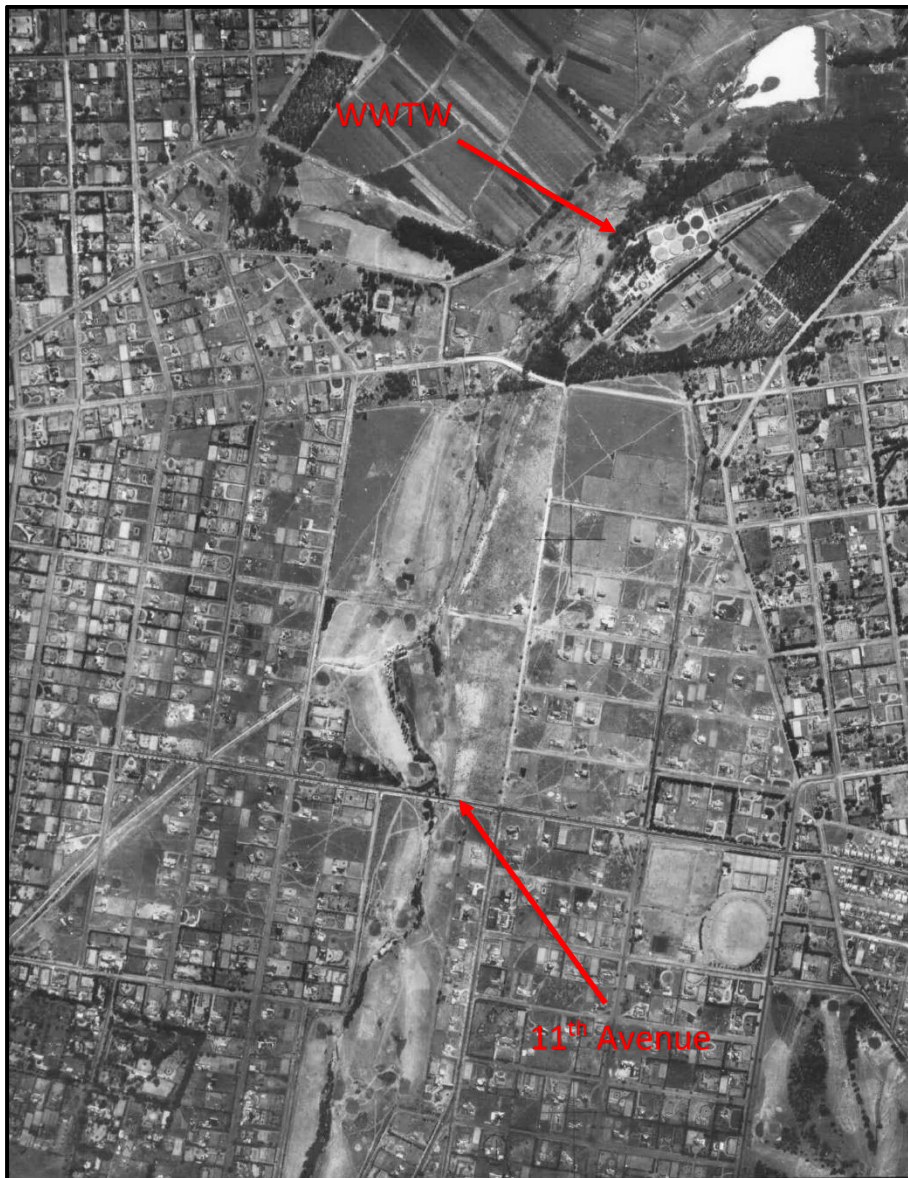


Figure 8. Aerial view of the study area dating to 1938
(Photo: 133_009_06050)

The aerial photograph dating to 1952 below (Fig. 9) show a more formal layout starting to develop on the site. This is the result of lanes of trees that have been planted. Also significant is the urban

densification that has taken place, with many of the empty stands (vide Fig. 8) now containing buildings. The WWTW is still in operation – unfortunately it shows a lot of trees, which makes it difficult to distinguish features on the ground. However, it can clearly be seen that the golf course now extends as far as Glenhove Avenue.

The same scenario holds true for the aerial photograph dating to 1961 (Fig. 11 below).



Figure 9. Aerial view of the study area dating to 1952
(Photo: 314_004_44452)

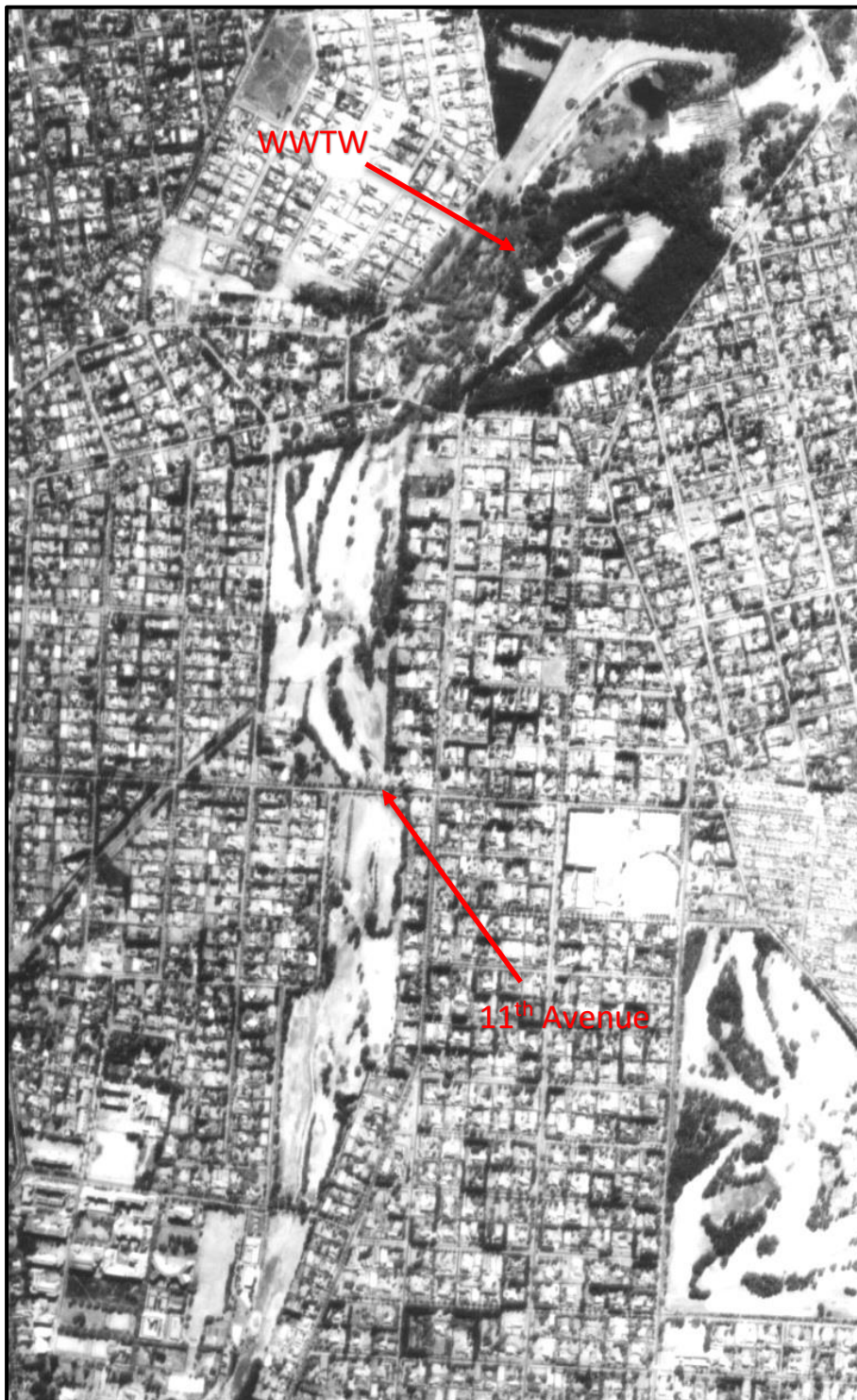


Figure 10. Aerial view of the study area dating to 1961
(Photo: 438_013_02790)

Figure 11 below shows the same scenario, except for the fact, as already indicated above, that the WWTW is in the process of been dismantled. Also, for the first time can see what seems to be the concrete retaining dam on the southern side of Melrose Street.

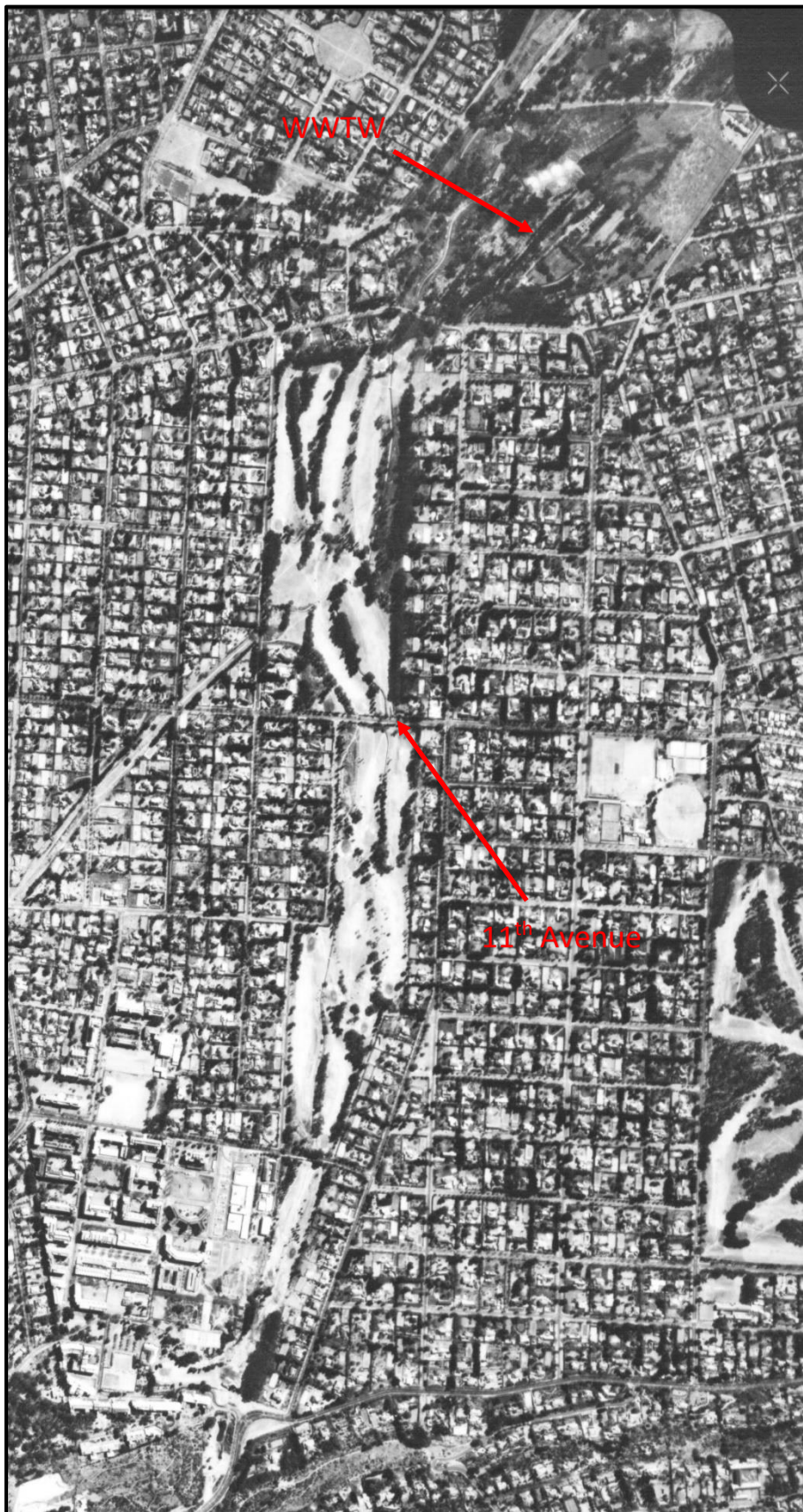


Figure 11. Aerial view of the study area dating to 1968
(Photo: 603_021_08017)

By the early 1980s the M1 motorway has been completed and the golf course has been extended to include the section north of Glenhove Avenue, adjacent to the area where the old WWTW existed (Fig. 12).

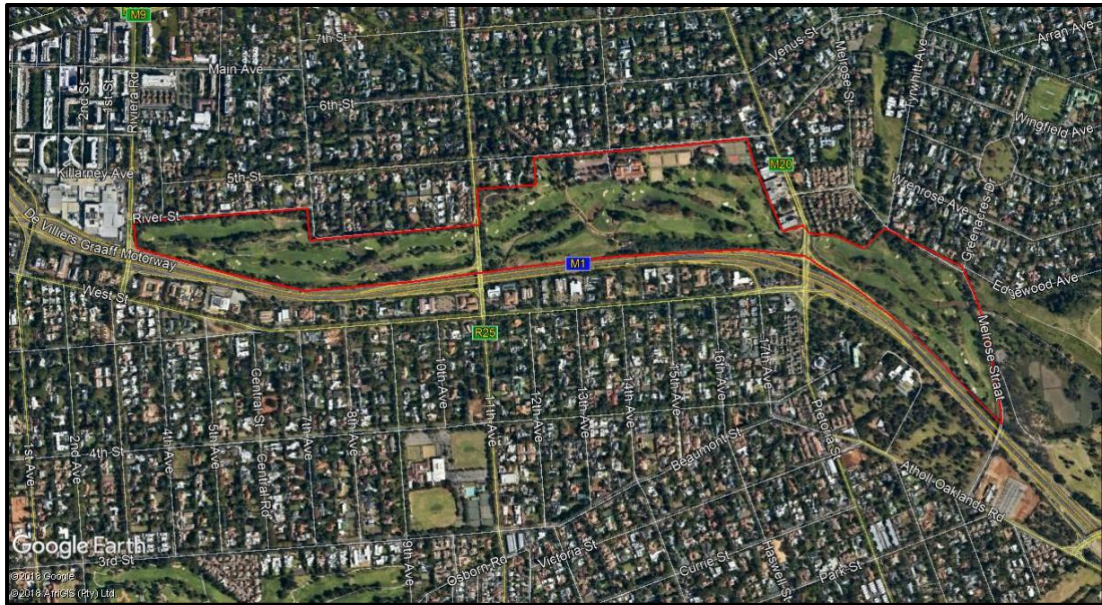


Figure 12. Aerial view of the study area (2017)
(Image: Google Earth; north to the right of the page)

6.2 Cultural Landscape

The aim of this section is to present an overview of the history of the larger region in order to eventually determine the significance of heritage sites identified in the study area, within the context of their historic, aesthetic, scientific and social value, rarity and representivity.

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one, most of which developed during the last 150 years or less.

- The following discussion is largely based on the City of Johannesburg State of the Environment Report (2008).

In geological terms, Johannesburg is located in the Witwatersrand Basin. Its sedimentary rocks, including the gold-bearing conglomerates in the upper part of the sequence of Witwatersrand rocks (the Witwatersrand Supergroup) were deposited between 3000 and 2700 million years ago in a fluvial and shallow marine environment by rivers. Most of the rocks are now buried beneath younger rock formations, but the upturned northern margin of the basin is well preserved in an arc stretching from Heidelberg in the east through Johannesburg and the West Rand to Carletonville. The central part of this arc, which represents the shoreline of the ancient sea, is commonly referred to as the *Rand* or *Reef*.

The older basement consists of ancient volcanic rocks termed *greenstones*, which have been intruded by a variety of granitic rocks. These rocks are exposed at places in the Johannesburg Granite Dome in the Midrand area. The age of the basement rocks ranges from 3000 million to 3400 million years. The lower division of the Witwatersrand sedimentary sequence is known as the West Rand Group. The lowermost sedimentary unit is the Orange Grove Quartzite, a hard erosion-resistant ridge stretching from Linksfield through Parktown and Northcliff to the Walter Sisulu Botanical Garden. This quartzite is ideal building stone and many of the mansions on Parktown Ridge are built of this rock. The sediments above the Orange Grove Quartzite are mainly shales (Parktown Shales) containing several magnetite-bearing beds. The overlying Brixton Quartzite contains evidence of shallow-water tidal conditions. The upper division of the Witwatersrand Supergroup, known as the Central Rand Group, consists mainly of quartzites and quartz-pebble conglomerates laid down by high-energy streams and rivers about 2750 million years ago. The most important conglomerates from an economic point of view are the gold-bearing Main Reef, Main Reef Leader and South Reef.

The Witwatersrand sediments are overlain by vast outpourings of lava belonging to the Ventersdorp Supergroup. These lavas are resistant to erosion in the southern Johannesburg area and give rise to the Klipriviersberg range.

Very little is known about the earliest human occupation of Johannesburg. However, there is little doubt that the first humans in the area may have been *Homo erectus* who roamed the area during the Acheulian period of the Early Stone Age, 500 000 years ago. The ancestor of *Homo erectus*, *Australopithecus*, considered to be the earliest ancestor of humans, lived in the Sterkfontein Valley around Krugersdorp (today the Cradle of Humankind – a World Heritage Site) several million years ago.

During the Middle Stone Age, 200 000 years ago, modern man or *Homo sapiens* had emerged, manufacturing a wider range of tools with technologies more advanced than those from earlier periods. This enabled skilled hunter-gatherer bands to adapt to different environments. From this time onwards, rock shelters and caves were used for occupation and reoccupation over very long periods of time.

The Late Stone Age, considered to have started some 30 000 years ago, is associated with the predecessors of the San and Khoi Khoi. San hunter-gatherer bands with their small (microlithic) stone tools lived in Johannesburg.

Evidence of Stone Age habitation in the Johannesburg area can be found at sites such as the Waterfall Quarry, The Boulders, Glenferness Cave, Witkoppen, Lone Hill and the Klipriviersberg.

Because colonial farmers, settlers and miners have continuously and intensively used the development area for the past 150 years, very few signs of Stone Age occupation in the form of surface deposits and finds of artefacts have survived.

The excavations at The Boulders indicate that between 350 AD and 600 AD early Tswana communities lived in the Midrand area, building semi-permanent settlements of stone, wood and clay, growing crops, farming with livestock and manufacturing pots and iron implements. They moved out after 600 AD and returned about 1200 AD.

Between 1100 AD and 1200 AD San communities inhabited the area. Tswana communities returned in about 1500 AD and stayed in the area until their displacement by the Matabele kingdom during the 1820s and early 1830s and by colonial settlers since the 1840s.

Evidence of Iron Age habitation in Johannesburg can be found at various places, including the stone-walled sites on the Klipriviersberg Nature Reserve (more than 100 individual sites), Melville Koppies, Lonehill, Bruma Lake and Hearn Drive.

The Iron Age heritage of the Johannesburg area is the most visible in the Klipriviersberg Nature Reserve. Between 1400 and 1650, Iron Age Tswana communities inhabited this area and archaeologists have uncovered nearly 20 settlements dating from about 1500 in the reserve, their position indicating a large, settled, pastoral community. The Tswana built large stonewall enclosures to accommodate huts and demarcate family enclosures. Villages were laid out in a circular, scalloped pattern, resembling a sunflower, with an animal enclosure in the middle where herds were kept for protection. Each 'petal' housed an individual household and between these enclosures were smaller enclosures for calves, goats and chickens. Some of these villages were large and would have housed as many as 100 people. The communities in the Klipriviersberg did not smelt their own iron but acquired iron tools and objects from their Tswana neighbours, living in the areas now known as Melville Koppies and Lone Hill.

The first white colonists who settled in the Midrand area came for very much the same reasons as the Iron Age groups: water and grazing for cattle, water for crop-farming, trees, thatching grass, clay for making bricks and pots, mild climate, wildlife and the presence of the hills as shelter and protection.

In the 1820s the first white people appeared on the scene, hunters, traders, missionaries and other travellers. Permanent occupation by whites began in the early 1840s, when Voortrekker farmers established the farms that today form Johannesburg. These farms were subdivided many times over in more recent years and more farmsteads were established. Gradually the entire area was divided into farms. However, it was only since the 1880s that these farms were formally surveyed and mapped, and when not only their names but also the names of rivers and other features became permanent fixtures on maps. A number of farmsteads and cemeteries (white farmers and African farm workers) are preserved that were established during this era.

The dolomitic rocks of the Transvaal Supergroup attracted the attention of early prospectors due to their similarity to the rocks of the already active Pilgrim's Rest goldfields. Gold deposits were discovered as early as 1874 in the Blaauwbank area near Magaliesburg. In January 1886, finally, two prospectors, George Harrison and George Walker, discovered the Main Reef Leader on the farm Langlaagte. Other deposits on other farms followed soon and on 20 September 1886 nine farms on the Central Rand were declared public diggings.

The Boer government soon realised the need for proclaiming a town to serve as a centre for the new goldfields. The fledgling town of Johannesburg was laid out on a triangular wedge of "uitvalgrond" (area excluded when farms were surveyed) named Randjeslaagte, situated between the farms Doornfontein, Braamfontein and Turffontein.

The town was much the same as any small prospecting settlement, but, as word spread, people flocked to the area from all other regions of the country, as well as from North America, Great Britain and the European continent, making Johannesburg the fastest-growing town in South Africa. The original mining village with its corrugated iron buildings was transformed into a town with solid buildings such as banks, hotels, stock exchange, stores, government buildings and public open spaces, around which mining magnates erected their mansions. The village site soon became too small and suburbs such as Doornfontein, Berea, Jeppestown, Yeoville, Fordsburg and others had been established by 1890.

Now part of Johannesburg, Roodepoort, meaning "red valley" in Afrikaans, was the second town to be established on the Witwatersrand after Johannesburg. It dates back to 1884, when Fred Struben discovered the first payable gold in the area at what he called the Confidence Reef, a large rocky outcrop in the centre of Roodepoort. At the time the area was settled by scattered Boer farmers on nine farms. Four of the farms - Roodepoort, Vogelstruisfontein, Paardekraal and Wilgespruit - were soon declared public diggings. The diggers needed a place to pitch their tents and so the farm Roodepoort opened up its land. A shantytown sprang up. Four mining towns, Roodepoort, Florida, Hamberg and Maraisburg, were proclaimed between 1886 and 1888. These towns were consolidated into a new municipality, Roodepoort-Maraisburg, after the Anglo-Boer War.

Early Johannesburg did not offer its Black citizens much in the way of housing. While the mines generally looked after their own, and most domestics could expect to have sleep-in quarters, the remainder had to fend for themselves. Almost from the onset, when the town was first laid out, separate suburbs, or "locations" as they were known, were allocated for Black, Malay and Asian occupation. This is an aspect of colonial town planning that was not unique to the Transvaal, but was common to most other parts of southern Africa. Not only did it conform to existing Zuid Afrikaansche Republiek (ZAR), or Transvaal, policies, but the idea of separate residential areas for Black and White also suited the mining companies, who had recently adopted the "compound" as a means of housing their Black labourers.

Many memorials and cemeteries commemorate the Anglo-Boer War (1899-1902) in Johannesburg. Its residents fought on both sides in the war. Occupied by the British in 1900, the city became a centre of military administration with new barracks and hospitals, but also was chosen a site for Boer and African concentration camps.

After the war proper municipal government was instituted for Johannesburg and the Roodepoort area. Both areas saw tremendous urban expansion with the development of many new (white) suburbs. The Inner City developed into a showpiece of Art Deco architecture. Art Deco hit South Africa a decade later than it took off in the rest of the world. America and Europe in the 1920s saw the birth of the Art Deco movement, with its eclectic style capturing industrial modernity and, in contrast, fantasy. The depression of 1929 slowed things, but South Africa was buoyed by gold at that time, and Johannesburg experienced a boom, as reflected in the rush of new buildings that went up in the city centre.

Johannesburg's (white) suburbs are the product of extensive urban sprawl and are regionalised into north, south, east and west, and they generally have different personalities. While the CBD and the immediate surrounding areas were formerly desirable living areas, the spatial accommodation of the suburbs has tended to see a flight from the city and immediate surrounds. The inner-city buildings have gradually been let out to the lower income groups and illegal immigrants and as a result abandoned buildings and crime have become a feature of inner city life. The suburbs to the south of the city are mainly blue collar neighbourhoods and situated closer to some townships. The suburbs to the west have in recent years floundered with the decline of the mining industry but have in some cases experienced some revival with properties being bought up by the black middle class.

The biggest sprawl lies to the east and north. The eastern suburbs are relatively prosperous and close to various industrial zones. The northern suburbs have been the recipient of most of the flight from the inner city and some residential areas have become commercialised particularly around the area of Sandton, stretching north towards Midrand, a half way point between Johannesburg and the capital Pretoria. Formerly peri-urban areas, the northern suburbs exploded in the 1950s and 1960s, with the result that new municipalities (including Sandton, Randburg and Midrand) were established.

The history of the African, Indian and Coloured populations of Johannesburg followed a different pattern. The successive white governments tried to manage the urbanisation of Africans for most of the 20th century through a complex series of laws that tried to control the movement of populations by racial group. This attempt to control human movement was legally codified from 1948 when the National Party took power and it became the cornerstone of the apartheid legislation.

In Johannesburg this took on the form of the system of forced removals, which resulted in the forced relocation of the population of non-European descent into specified areas. It is this system that created the sprawling towns of Soweto (**S**outh **W**estern **T**ownships), one of the areas where blacks were forced to live during the apartheid era, and Lenasia, established for Indians in the 1950s.

Killarney

The suburb of Killarney was originally part of the farm Braamfontein 531R. In 1899, the eastern section was sold by the Houghton Estate Gold Mining Company to William Cook, who gave it the name

Killarney. In 1905, Isadore William Schlesinger, an American entrepreneur and financier, bought the farm. The property was subdivided into erven and sold to the public. Cook's original house was, from 1916, used as the headquarters of the "Transvaal Automobile Club", and was only demolished in the early 1970s.

Among many other enterprises, Schlesinger was the founder of African Theatres and Film Trusts and built a film studio in Killarney, on the site of the present Killarney Shopping Mall. The studio was responsible for the popular newsreel African Mirror. Schlesinger built the grand three-storey mansion Whitehall in 1924, in colonial style, where he had the second floor as his living quarters. The rest of the building was used as his offices. Whitehall was later converted to luxury apartments. He died in 1949, and a decade later his son sold his film company to 20th Century Fox (Van der Waal 1979; Davie <http://www.theheritageportal.co.za/article/killarney>).

Killarney Country Club

According to the Killarney Country Club website (www.killarneycountryclub.co.za), the TAC was originally founded in 1908 to promote "automobilism", which included the "compilation of road maps, organising hill climbs and campaigning against the prevailing speed limit of ten miles an hour within a radius of two miles from the Rissik Street Post Office". Schlesinger oversaw the building of the Transvaal Automobile Club (TAC).

But the club wasn't just for those driving cars. Its first bowling green was laid in Killarney in 1917, followed by badminton courts and croquet lawns. In 1926, squash and tennis courts were built, then a swimming pool, followed by the first ten-pin skittle alley in the Transvaal, which was used until 1953. The golf course, its southerly border in Killarney, was opened in 1929.

By 1930, the automobile functions were handed over to the Automobile Association for the "furthering of motoring interests in the Transvaal", and the club became known as the Killarney Country Club.

In 1950, the African Realty Trust wanted portions of the southern end of the golf club for development – in 1961, the present shopping mall was opened. In 1965 the club had to give up some of its land to the city council for the building of the M1.

In 1970, the city and the club reached agreement on a 50-year lease on 63ha of ground between Riviera Road in Killarney and Melrose Street Extension in Melrose until the year 2020. The lease was later extended to mid-2040.

7. SURVEY RESULTS

During the physical survey, the following sites, features and objects of cultural significance were identified in the study area (Fig. 14):

7.1 Stone Age

- No sites, features or objects of cultural significance dating to the Stone Age were identified in the study area

7.2 Iron Age

- No sites, features or objects of cultural significance dating to the Iron Age were identified in the study area.

7.3 Historic period

- A small footbridge consisting of three stone-built columns, spanned by a wooden deck, commonly referred to “heritage bridge”, is located close to the northern end of the golf course. As yet it was not possible to get any information on the date of this structure, but a visual inspection indicates that the wooden superstructure is not all that old. From this it is deduced that the bridge might have been upgraded in the past.
 - It is unlikely that this feature is older than 60 years; it does not show any particular unique construction techniques; it forms an integral part of the golf course pathway, it is unlikely that it would be impacted on by the proposed canal upgrades. This feature is therefore perceived to have low significance.



Figure 13. “Heritage Bridge”

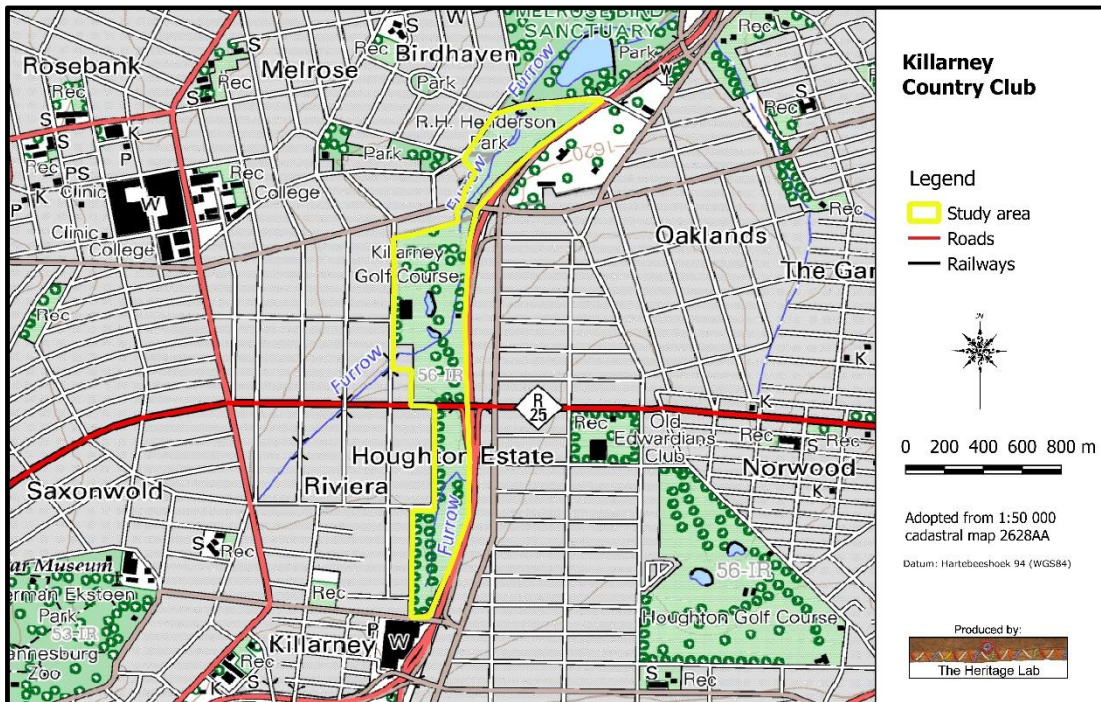


Figure 14. Location of heritage sites in the study area
 (Please note that as no heritage sites were identified, nothing is indicated on the map)

8. RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATINGS

8.1 Impact assessment

Heritage impacts are categorised as:

- Direct or physical impacts, implying alteration or destruction of heritage features within the project boundaries;
- Indirect impacts, e.g. restriction of access or visual intrusion concerning the broader environment;
- Cumulative impacts that are combinations of the above.

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development and is summarised in Table 2 below:

- As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.

Table 2: Impact assessment

Heritage sites	Significance of impact	Mitigation measures
Killarney Canal Upgrade: Construction Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a
Killarney Canal Upgrade: Operation Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a

9. MANAGEMENT AND MITIGATION MEASURES

Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon them is permanent and non-reversible. Those resources that cannot be avoided and that are directly impacted by the proposed development can be excavated/recorded and a management plan can be developed for future action. Those sites that are not impacted on can be written into the management plan, whence they can be avoided or cared for in the future.

Sources of risk were considered with regards to development activities defined in Section 2(viii) of the NHRA that may be triggered and are summarised in Table 3A and 3B below. These issues formed the basis of the impact assessment described. The potential risks are discussed according to the various phases of the project below.

9.1 Objectives

- Protection of archaeological, historical and any other site or land considered being of cultural value within the project boundary against vandalism, destruction and theft.
- The preservation and appropriate management of new discoveries in accordance with the NHRA, should these be discovered during construction activities.

The following shall apply:

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.
- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51. (1).

9.2 Control

In order to achieve this, the following should be in place:

- A person or entity, e.g. the Environmental Control Officer, should be tasked to take responsibility for the heritage sites and should be held accountable for any damage.
- Known sites should be located and isolated, e.g. by fencing them off. All construction workers should be informed that these are no-go areas, unless accompanied by the individual or persons representing the Environmental Control Officer as identified above.
- In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.

Table 3A: Construction Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	The identified risk is damage or changes to resources that are generally protected in terms of Sections 27, 28, 31, 32, 34, 35, 36 and 37 of the NHRA that may occur in the proposed project area.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	Mitigation: Action/control	Responsibility	Timeframe
1. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During construction only
Monitoring	See discussion in Section 9.2 above		

Table 3B: Operation Phase: Environmental Management Programme for the project

Action required	Protection of heritage sites, features and objects		
Potential Impact	It is unlikely that the negative impacts identified for pre-mitigation will occur if the recommendations are followed.		
Risk if impact is not mitigated	Loss or damage to sites, features or objects of cultural heritage significance		
Activity / issue	Mitigation: Action/control	Responsibility	Timeframe
1. Removal of Vegetation 2. Construction of required infrastructure, e.g. access roads, water pipelines	See discussion in Section 9.1 above	Environmental Control Officer	During construction only
Monitoring	See discussion in Section 9.2 above		

9.3 Mitigation measures

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

- For the current study, as no sites, features or objects of cultural historic significance have been identified in the study area, no mitigation measures are proposed.

10. CONCLUSIONS AND RECOMMENDATIONS

Mapoxe Engineering Consulting Engineers (Pty) Ltd was contracted by Johannesburg Roads Agency (Pty) Ltd for the Design and Supervision of Storm Water Improvement Mechanisms at the Killarney Country Club, City of Johannesburg Metropolitan Municipality, Gauteng Province.

This report describes the methodology used, the limitations encountered, the heritage features that were identified and the recommendations and mitigation measures proposed relevant to this. The HIA

consisted of a desktop study (archival sources, database survey, maps and aerial imagery) and a physical survey. It should be noted that the implementation of the mitigation measures is subject to SAHRA/PHRA's approval.

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one, most of which developed during the last 150 years or less.

Identified sites

During the physical survey, no sites, features or objects of cultural significance were identified.

Impact assessment

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development:

- As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development.

Heritage sites	Significance of impact	Mitigation measures
Killarney Canal Upgrade: Construction Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a
Killarney Canal Upgrade: Operation Phase		
Without mitigation	n/a	n/a
With mitigation	n/a	n/a

Legal requirements

The legal requirements related to heritage specifically are specified in Section 3 of this report. For this proposed project, the assessment has determined that no sites, features or objects of heritage significance occur in the study area. If heritage features are identified during construction, as stated in the management recommendation, these finds would have to be assessed by a specialist, after which a decision will be made regarding the application for relevant permits.

Reasoned opinion as to whether the proposed activity should be authorised:

- From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the conditions proposed below.

Conditions for inclusion in the environmental authorisation:

- Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

11. REFERENCES

11.1 Data bases

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11.2 Literature

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11.3 Maps and aerial photographs

1: 50 000 Topocadastral maps
Google Earth

11.4 Web sites

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www.heritageregister.org.za/egoli-heritage-foundation

www.killarneycountryclub.co.za

12. ADDENDUM

1. Indemnity and terms of use of this report

The findings, results, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and the author reserve the right to modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. The author of this report will not be held liable for such oversights or for costs incurred as a result of such oversights.

Although the author exercises due care and diligence in rendering services and preparing documents, he accepts no liability and the client, by receiving this document, indemnifies the author against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by the author and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

2. Assessing the significance of heritage resources and potential impacts

A system for site grading was established by the NHRA and further developed by the South African Heritage Resources Agency (SAHRA 2007) and has been approved by ASAPA for use in southern Africa and was utilised during this assessment.

2.1 Significance of the identified heritage resources

According to the NHRA, Section 2(vi) the **significance** of a heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

Matrix used for assessing the significance of each identified site/feature

1. SITE EVALUATION				
1.1 Historic value				
Is it important in the community, or pattern of history				
Does it have strong or special association with the life or work of a person, group or organisation of importance in history				
Does it have significance relating to the history of slavery				
1.2 Aesthetic value				
It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group				
1.3 Scientific value				
Does it have potential to yield information that will contribute to an understanding of natural or cultural heritage				
Is it important in demonstrating a high degree of creative or technical achievement at a particular period				
1.4 Social value				
Does it have strong or special association with a particular community or cultural group for social, cultural or spiritual reasons				
1.5 Rarity				
Does it possess uncommon, rare or endangered aspects of natural or cultural heritage				
1.6 Representivity				
Is it important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects				
Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class				
Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province, region or locality.				
2. Sphere of Significance		High	Medium	Low
International				
National				
Provincial				
Regional				
Local				
Specific community				
3. Field Register Rating				
1.	National/Grade 1: High significance - No alteration whatsoever without permit from SAHRA			
2.	Provincial/Grade 2: High significance - No alteration whatsoever without permit from provincial heritage authority.			
3.	Local/Grade 3A: High significance - Mitigation as part of development process not advised.			

4.	Local/Grade 3B: High significance - Could be mitigated and (part) retained as heritage register site	
5.	Generally protected A: High/medium significance - Should be mitigated before destruction	
6.	Generally protected B: Medium significance - Should be recorded before destruction	
7.	Generally protected C: Low significance - Requires no further recording before destruction	

2.2 Significance of the anticipated impact on heritage resources

All impacts identified during the HIA stage of the study will be classified in terms of their significance. Issues would be assessed in terms of the following criteria:

Nature of the impact

A description of what causes the effect, what will be affected and how it will be affected.

Extent

The physical **extent**, wherein it is indicated whether:

- 1 - The impact will be limited to the site;
- 2 - The impact will be limited to the local area;
- 3 - The impact will be limited to the region;
- 4 - The impact will be national; or
- 5 - The impact will be international.

Duration

Here it should be indicated whether the lifespan of the impact will be:

- 1 - Of a very short duration (0–1 years);
- 2 - Of a short duration (2-5 years);
- 3 - Medium-term (5–15 years);
- 4 - Long term (where the impact will persist possibly beyond the operational life of the activity); or
- 5 - Permanent (where the impact will persist indefinitely).

Magnitude (Intensity)

The magnitude of impact, quantified on a scale from 0-10, where a score is assigned:

- 0 - Small and will have no effect;
- 2 - Minor and will not result in an impact;
- 4 - Low and will cause a slight impact;
- 6 - Moderate and will result in processes continuing but in a modified way;
- 8 - High, (processes are altered to the extent that they temporarily cease); or
- 10 - Very high and results in complete destruction of patterns and permanent cessation of processes.

Probability

This describes the likelihood of the impact actually occurring and is estimated on a scale where:

- 1 - Very improbable (probably will not happen);
- 2 - Improbable (some possibility, but low likelihood);
- 3 - Probable (distinct possibility);
- 4 - Highly probable (most likely); or
- 5 - Definite (impact will occur regardless of any prevention measures).

Significance

The significance is determined through a synthesis of the characteristics described above (refer to the formula below) and can be assessed as low, medium or high:

$S = (E+D+M) \times P$; where

S = Significance weighting

E = Extent
 D = Duration
 M = Magnitude
 P = Probability

Significance of impact		
Points	Significant Weighting	Discussion
< 30 points	Low	Where this impact would not have a direct influence on the decision to develop in the area.
31-60 points	Medium	Where the impact could influence the decision to develop in the area unless it is effectively mitigated.
> 60 points	High	Where the impact must have an influence on the decision process to develop in the area.

Confidence

This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.
- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

Status

- The status, which is described as either positive, negative or neutral.

Reversibility

- The degree to which the impact can be reversed.

Mitigation

- The degree to which the impact can be mitigated.

Nature:		
	Without mitigation	With mitigation
Construction Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Operation Phase		
Probability		
Duration		
Extent		
Magnitude		
Significance		
Status (positive or negative)		
Reversibility		
Irreplaceable loss of resources?		
Can impacts be mitigated		

3. Mitigation measures

- *Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.*

Impacts can be managed through one or a combination of the following mitigation measures:

- Avoidance
- Investigation (archaeological)
- Rehabilitation
- Interpretation
- Memorialisation
- Enhancement (positive impacts)

For the current study, the following mitigation measures are proposed, to be implemented only if any of the identified sites or features are to be impacted on by the proposed development activities:

- (1) Avoidance/Preserve: This is viewed to be the primary form of mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources. The site should be retained *in situ* and a buffer zone should be created around it, either temporary (by means of danger tape) or permanently (wire fence or built wall). Depending on the type of site, the buffer zone can vary from
 - 10 metres for a single grave, or a built structure, to
 - 50 metres where the boundaries are less obvious, e.g. a Late Iron Age site.
- (2) Archaeological investigation/Relocation of graves: This option can be implemented with additional design and construction inputs. This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated. Mitigation is to excavate the site by archaeological techniques, document the site (map and photograph) and analyse the recovered material to acceptable standards. This can only be done by a suitably qualified archaeologist.
 - This option should be implemented when it is impossible to avoid impacting on an identified site or feature.
 - This also applies for graves older than 60 years that are to be relocated. For graves younger than 60 years a permit from SAHRA is not required. However, all other legal requirements must be adhered to.
 - Impacts can be beneficial – e.g. mitigation contribute to knowledge
- (3) Rehabilitation: When features, e.g. buildings or other structures are to be re-used. Rehabilitation is considered in heritage management terms as an intervention typically involving the adding of a new heritage layer to enable a new sustainable use.
 - The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation.
 - Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric.
 - Conservation measures would be to record the buildings/structures as they are (at a particular point in time). The records and recordings would then become the ‘artefacts’ to be preserved and managed as heritage features or (movable) objects.
 - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (4) Mitigation is also possible with additional design and construction inputs. Although linked to the previous measure (rehabilitation) a secondary though 'indirect' conservation measure would be to use the existing architectural 'vocabulary' of the structure as guideline for any new designs.
 - The following principle should be considered: **heritage informs design**.
 - This approach automatically also leads to the enhancement of the sites or features that are re-used.

- (5) No further action required: This is applicable only where sites or features have been rated to be of such low significance that it does not warrant further documentation, as it is viewed to be fully documented after inclusion in this report.
 - Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage/remains are destroyed.

4. Relocation of graves

If the graves are younger than 60 years, an undertaker can be contracted to deal with the exhumation and reburial. This will include public participation, organising cemeteries, coffins, etc. They need permits and have their own requirements that must be adhered to.

If the graves are older than 60 years old or of undetermined age, an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. This is a requirement by law.

Once it has been decided to relocate particular graves, the following steps should be taken:

- Notices of the intention to relocate the graves need to be put up at the burial site for a period of 60 days. This should contain information where communities and family members can contact the developer/archaeologist/public-relations officer/undertaker. All information pertaining to the identification of the graves needs to be documented for the application of a SAHRA permit. The notices need to be in at least 3 languages, English, and two other languages. This is a requirement by law.
- Notices of the intention needs to be placed in at least two local newspapers and have the same information as the above point. This is a requirement by law.
- Local radio stations can also be used to try contact family members. This is not required by law, but is helpful in trying to contact family members.
- During this time (60 days) a suitable cemetery need to be identified close to the development area or otherwise one specified by the family of the deceased.
- An open day for family members should be arranged after the period of 60 days so that they can gather to discuss the way forward, and to sort out any problems. The developer needs to take the families requirements into account. This is a requirement by law.
- Once the 60 days has passed and all the information from the family members have been received, a permit can be requested from SAHRA. This is a requirement by law.
- Once the permit has been received, the graves may be exhumed and relocated.
- All headstones must be relocated with the graves as well as any items found in the grave.

Information needed for the SAHRA permit application

- The permit application needs to be done by an archaeologist.
- A map of the area where the graves have been located.
- A survey report of the area prepared by an archaeologist.
- All the information on the families that have identified graves.
- If graves have not been identified and there are no headstones to indicate the grave, these are then unknown graves and should be handled as if they are older than 60 years. This information also needs to be given to SAHRA.
- A letter from the landowner giving permission to the developer to exhume and relocate the graves.
- A letter from the new cemetery confirming that the graves will be reburied there.
- Details of the farm name and number, magisterial district and GPS coordinates of the gravesite.

5. Inventory of identified cultural heritage sites

Nil

6. Curriculum vitae

Johan Abraham van Schalkwyk

Personal particulars

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Qualifications

1995 DLitt et Phil (Anthropology), University of South Africa
1985 MA (Anthropology), University of Pretoria
1981 BA (Hons), Anthropology, University of Pretoria
1979 Post Graduate Diploma in Museology, University of Pretoria
1978 BA (Hons), Archaeology, University of Pretoria
1976 BA, University of Pretoria

Non-academic qualifications

12th HSRC-School in Research Methodology - July 1990
Dept. of Education and Training Management Course - June 1992
Social Assessment Professional Development Course - 1994
Integrated Environmental Management Course, UCT - 1994

Professional experience

Private Practice
2017 - current: Professional Heritage Consultant

National Museum of Cultural History

1992 - 2017: Senior researcher: Head of Department of Research. Manage an average of seven researchers in this department and supervise them in their research projects. Did various projects relating to Anthropology and Archaeology in Limpopo Province, Mpumalanga, North West Province and Gauteng. Headed the Museum's Section for Heritage Impact Assessments.
1978 - 1991: Curator of the Anthropological Department of the Museum. Carried out extensive fieldwork in both anthropology and archaeology

Department of Archaeology, University of Pretoria

1976 - 1977: Assistant researcher responsible for excavations at various sites in Limpopo Province and Mpumalanga.

Awards and grants

1. Hanisch Book Prize for the best final year Archaeology student, University of Pretoria - 1976.
2. Special merit award, National Cultural History Museum - 1986.
3. Special merit award, National Cultural History Museum - 1991.
4. Grant by the Department of Arts, Culture, Science and Technology, to visit the various African countries to study museums, sites and cultural programmes - 1993.
5. Grant by the USA National Parks Service, to visit the United States of America to study museums, sites, tourism development, cultural programmes and impact assessment programmes - 1998.
6. Grant by the USA embassy, Pretoria, under the Bi-national Commission Exchange Support Fund, to visit cultural institutions in the USA and to attend a conference in Charleston - 2000.
7. Grant by the National Research Foundation to develop a model for community-based tourism - 2001.

8. Grant by the National Research Foundation to develop a model for community-based tourism - 2013. In association with RARI, Wits University.

Publications

Published more than 70 papers, mostly in scientifically accredited journals, but also as chapters in books.

Conference Contributions

Regularly presented papers at conferences, locally as well as internationally, on various research topics, ranging in scope from archaeology, anthropological, historical, cultural historical and tourism development.

Heritage Impact Assessments

Since 1992, I have done more than 2000 Phase 1 and Phase 2 impact assessments (archaeological, anthropological, historical and social) for various government departments and developers. Projects include environmental management frameworks, roads, pipeline-, and power line developments, dams, mining, water purification works, historical landscapes, refuse dumps and urban developments.