



DURBAN NORTHERN AQUEDUCT PROJECT

**Proposed Development of the Northern Aqueduct Water Supply Project,
eThekweni Municipality, KwaZulu-Natal Province**

Heritage Impact Assessment

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Declaration of Independence

The report has been compiled by PGS Heritage, an appointed Heritage Specialist for Strategic Environmental Focus (Pty) Ltd. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes.

HERITAGE CONSULTANT: PGS Heritage

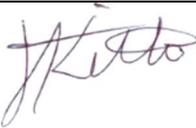
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Report Title	<i>Proposed Development of the Northern Aqueduct Water Supply Project, North-West Durban, eThekweni Municipality, KwaZulu-Natal Province</i>		
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EXECUTIVE SUMMARY

PGS Heritage was appointed by Strategic Environmental Focus to undertake a Heritage Impact Assessment (HIA), which forms part of the Environmental Impact Assessment (EIA) for the proposed Northern Aqueduct Augmentation Phase 5 project by the eThekweni Water and Sanitation (EWS).

Four development alternatives were proposed, namely the Preferred Alternative, Route 2 Alternative, Route 3 Alternative, and Route 6 Alternative. All four alternatives were assessed as part of this heritage impact assessment study. It must be stressed that priority in the fieldwork was placed on the Preferred Alternative. This allowed for a detailed walkthrough of almost the entire Preferred Alternative. The three Route Alternatives were primarily surveyed by vehicle.

An archival and historical desktop study was undertaken that was used to compile a historic layering of the study area within its regional context. This component indicated that the landscape within which the project area is located has a rich and diverse history. The desktop study also revealed that the banks of the uMngeni River possess the potential risk for graves and Iron Age sites. This potential risk was included in the impact risk calculations and recommended mitigation measures.

A palaeontological desktop study was also conducted which indicates that the study area is mostly underlain by Ordovician to Silurian aged quartzites of the Natal Group, Carboniferous to Permian Aged tillites of the Dwyka Group, Permian aged shales and sandstones of the Ecca Group, Jurassic aged dolerite and Quaternary aged alluvium. Trace fossils have been recorded from the Dwyka Group and Pietermaritzburg Formation of the Ecca Group, whereas fossils are abundantly known from rocks of the Vryheid Formation, also from the Ecca Group. The following recommendations were made in the palaeontological report:

- The project EAP and ECO must be made aware of the possibility of finding trace fossils in areas underlain by the Dwyka Group and Pietermaritzburg Formation. There is a very high possibility of fossils being present in the areas underlain by the Vryheid Formation.
- Due to the fact that the presence/absence of fossils will only be recorded during the execution of the excavation activities, it is recommended that a qualified

palaeontologist be appointed to compile a Phase 1 PIA report if fossils are recorded during the construction phase of the project.

The desktop study work was followed by fieldwork, which comprised a walkthrough of the Preferred Route by a fieldwork team comprising two archaeologists and one archaeological field assistant. The other alternatives were mainly surveyed by vehicle. As a result, four heritage sites were identified. These comprised a Stone Age occurrence (Site 1) and modern Shembe Church site (Site 2) on the Preferred Route and Route Alternative, a Hindu Temple (Site 3) on the Route 3 Alternative and at least one grave (Site 4) on the Route 6 Alternative.

Impact risk calculations were undertaken on the expected impact of the different alternative routes on the identified heritage sites as well as the possible presence of graves and Iron Age sites along a section of the study area as revealed by the desktop study. The impact risk calculations resulted in the following findings:

- The development of the Preferred and Route 2 Alternatives will have a Low Impact Risk on Site 1. As a result no mitigation would be required.
- The development of the Preferred and Route 2 Alternatives will have a Low Impact Risk on Site 2. As a result no heritage mitigation would be required. However, social mitigation would be required.
- The development of the Route 3 Alternative will have a Moderate Impact Risk on Site 3. As a result mitigation would be required.
- The development of the Route 6 Alternative will have a High Impact Risk on Site 4. As a result avoidance or mitigation would be required.
- The development will have a Moderate Impact Risk in terms of the potential for graves to be located along the northern bank of the uMngeni River in an area where the 1956 topographic map has shown a cluster of huts used to be located.
- The development will have a Moderate Impact Risk in terms of the potential for Iron Age sites to be located within an area on the northern bank of the uMngeni River where six Iron Age sites have already been discovered.

The following conclusions were drawn from the impact risk calculations in terms of the different alternatives:

- The Route 6 Alternative will have the highest development impact risk.
- The Route 3 Alternative will have the second highest development impact risk.
- Both the Preferred Route and Route 2 Alternative will have the lowest impact risk.
- As the Preferred Route was surveyed in detail on foot coupled with the fact that it still has a very low impact risk, means that this route alternative is recommended for the proposed development.

As a result, mitigation measures were outlined for the proposed construction of the Preferred Alternative. The following mitigation measures were outlined for the development impact on the possible presence of graves and Iron Age sites along a section of the proposed development:

- An archaeological watching brief (monitoring) will be required during the construction of the section of the pipeline where the desktop study has identified a risk for the possible presence of graves and Iron Age sites.
- The archaeological monitoring must be conducted during all vegetation clearing and earth-moving activities by an archaeologist for signs of the presence of informal graves and Iron Age sites.
- Archaeological monitoring must take place along the pipeline between the following coordinates: S 29° 46' 59.7" E 30° 58' 01.6" (near Sookall Drive) and S 29° 48' 05.3" E 30° 56' 32.1" (near Juba Place Road).
- Should the presence of graves or Iron Age sites be confirmed, all construction activities in that area will have to cease to allow the archaeologist to assess the discovery and provide recommendations.

Furthermore, the following social mitigation measures were outlined for the proposed development impact on the Shembe Church:

- The project social consultant must undertake consultation with the church leader(s) and/or congregation in order to reach an agreement between the applicant and the church on either moving the church or alternatively to construct the pipeline in such a way that it will not affect the church and its activities.

On the condition that the recommendations made in this report are adhered to, no heritage reasons can be given for the development not to continue.

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1 INTRODUCTION

PGS Heritage was appointed by Strategic Environmental Focus (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed development of the Northern Aqueduct Water Supply Project to be located on the north-western end of the City of Durban, Ethekewini Municipality, KwaZulu-Natal Province.

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The Heritage Impact Assessment aims to inform the final Basic Assessment Report (BAR) in the development of a comprehensive EMP, to assist the developer (EWS) in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by both the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act, Act 4 of 2008.

1.2 Specialist Qualifications

This Heritage Impact Assessment Report was compiled by PGS Heritage (PGS).

The staff at PGS has a combined experience of nearly 40 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Polke Birkholtz, the Project Manager, is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited with the CRM Section of ASAPA. He is also registered with Amafa aKwaZulu-Natali. He has 17 years' experience in the heritage assessment and management field and holds a B.A. (cum laude) from the University of Pretoria specialising in Archaeology, Anthropology and History as well as a B.A. (Hons.) in Archaeology (cum laude) from the same university.

Jennifer Kitto, co-author of this report, has 16 years' experience in the heritage sector, a large part of which involved working for a government department responsible for administering the National Heritage Resources Act, No 25 of 1999. She is therefore well versed in the legislative requirements of heritage management. She holds a BA in Archaeology and Social Anthropology and a BA (Hons) in Social Anthropology.

Dr Gideon Groenewald, the appointed Palaeontologist for this project, holds a PhD in Geology from the Nelson Mandela Metropolitan University (1996) and the National Diploma in Nature Conservation from the University of South Africa (1990). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeoecological aspects. He has extensive experience in the locating of fossil material in the Karoo Supergroup and has more than 20 years of experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the southern, western, eastern and north-eastern parts of the country. His publication record includes multiple articles in internationally recognized journals. Dr Groenewald is accredited by the Palaeontological Society of Southern Africa (society member for 25 years).

1.3 Assumptions and Limitations

Not to detract in any way from the comprehensiveness of the fieldwork undertaken, it is important to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. It should also be noted that only the preferred route was surveyed by a detailed walkthrough. The three alternative routes were all subject to a limited survey by vehicle as well as some field surveys.

Should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted. Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out below.

1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- i. National Environmental Management Act (NEMA), Act 107 of 1998
- ii. National Heritage Resources Act (NHRA), Act 25 of 1999
- iii. KwaZulu Natal Heritage Act 4 of 2008
- iv. Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002
- v. Development Facilitation Act (DFA), Act 67 of 1995

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources (CRM).

- i. National Environmental Management Act (NEMA) Act 107 of 1998:
 - a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
 - b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
 - c. Environmental Impact Assessment (EIA) – Section (32)(2)(d)
 - d. Environmental Management Plan (EMP) – Section (34)(b)
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999:
 - a. Protection of Heritage Resources – Sections 34 to 36; and
 - b. Heritage Resources Management – Section 38
- iii. KwaZulu Natal Heritage Resources Act (KwaZulu Natal HRA), Act 4 of 2008:
 - a. Heritage Resources Management - Section 27(1)
- iv. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
 - a. Section 39(3)
- v. Development Facilitation Act (DFA) Act 67 of 1995
 - a. The GNR.1 of 7 January 2000: Regulations and rules in terms of the Development Facilitation Act, 1995. Section 31.

Both the NHRA and the KwaZulu Natal Heritage Act stipulate that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...” The NHRA is utilized as the basis for the identification,

evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA and the DFA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008).

The NEMA 23(2)(b) states that an integrated environmental management plan should, "...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

1.5 Terminology and Abbreviations

Archaeological resources

This includes:

- i. material remains resulting from human activity 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;
- ii. rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- iii. 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;

- iv. 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 a 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; and
- vi. any removal or destruction of trees, or removal of vegetation or topsoil

Early Stone Age

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources

This means any place or object of cultural significance

Holocene

The most recent geological time-period which commenced 10 000 years ago.

Late Stone Age

The archaeology of the last 20 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 20 000-300 000 years ago, associated with early modern humans.

Palaeontology

Any fossilised remains or fossil trace of animals or plants, which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site that contains such fossilised remains or trace.

The table below provides a description of the abbreviations used in this report:

<i>Abbreviations</i>	<i>Description</i>
AIA	Archaeological Impact Assessment
AMAFA	Amafa aKwaZulu-Natali, the Provincial Heritage Resources Authority
ASAPA	Association of South African Professional Archaeologists
BIF	Banded Iron Formations
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
ESA	Early Stone Age
EWS	eThekweni Water and Sanitation
GPS	Global Positioning System
HIA	Heritage Impact Assessment
LIA	Late Iron Age
LSA	Later Stone Age
MSA	Middle Stone Age
KZN Heritage Act	KwaZulu Natal Heritage Act 4 of 2008
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PGS	PGS Heritage
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
ROD	Record of Decision
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

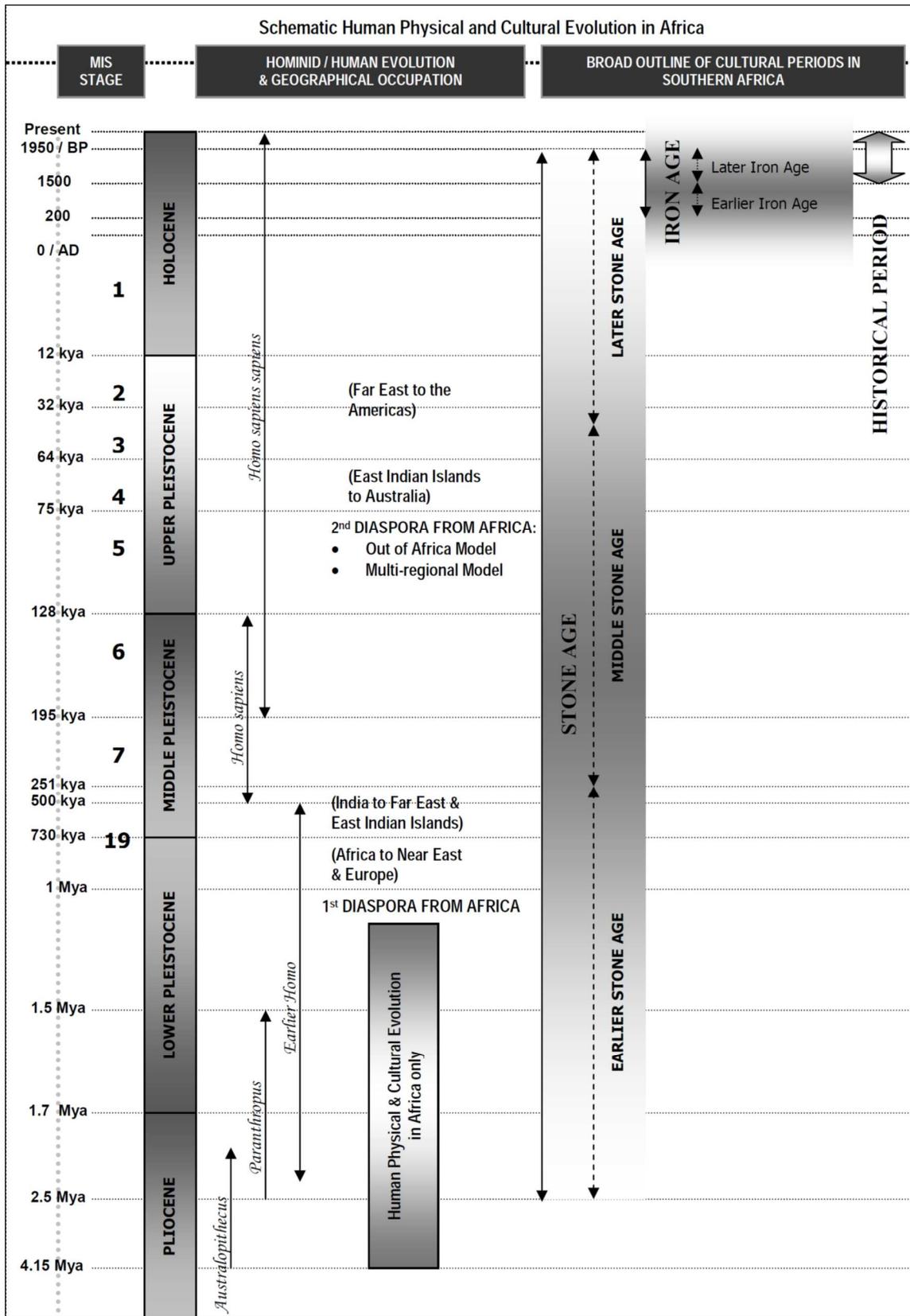


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008)

Coordinates (WGS 84)	End point 1 (northern end): S 29°44'39.18"; E 31°0'43.22" End point 2 (Southern end): S 29°48'14.40"; E 30°56'10.52"	Middle point 1 (Hippopark Avenue): S 29°46'16.71"; E 30°59'45.81" Middle point 2 (Inanda Road): S 29°47'2.87"; E 30°58'16.92
Property	The proposed pipeline will run between the suburbs of Durban Heights/Reservoir Hills and KwaMashu/Duffs Road on the north-western end of Durban, KwaZulu Natal Province.	
Location	The study area is located approximately 10 km north-west of the Durban CBD in the Ethekewini Municipality, KwaZulu-Natal Province.	
Extent	The extent of the preferred route is 11.8 km.	
Land Description	<p>The property along the route is primarily residential and urban in nature and is characterised by infrastructure such as roads, powerlines, pipelines and railway lines.</p> <p>These developed areas are interspersed with small areas of veld consisting of indigenous grassland and thorn trees, small patches of indigenous forest in especially the deep river valleys and exotic bush with dense growths of <i>Lantana camara</i> found along various sections of the proposed pipeline.</p> <p>The topography is mostly rolling hills, with the uMngeni river cutting through the section between Newlands West and Reservoir Hills.</p>	

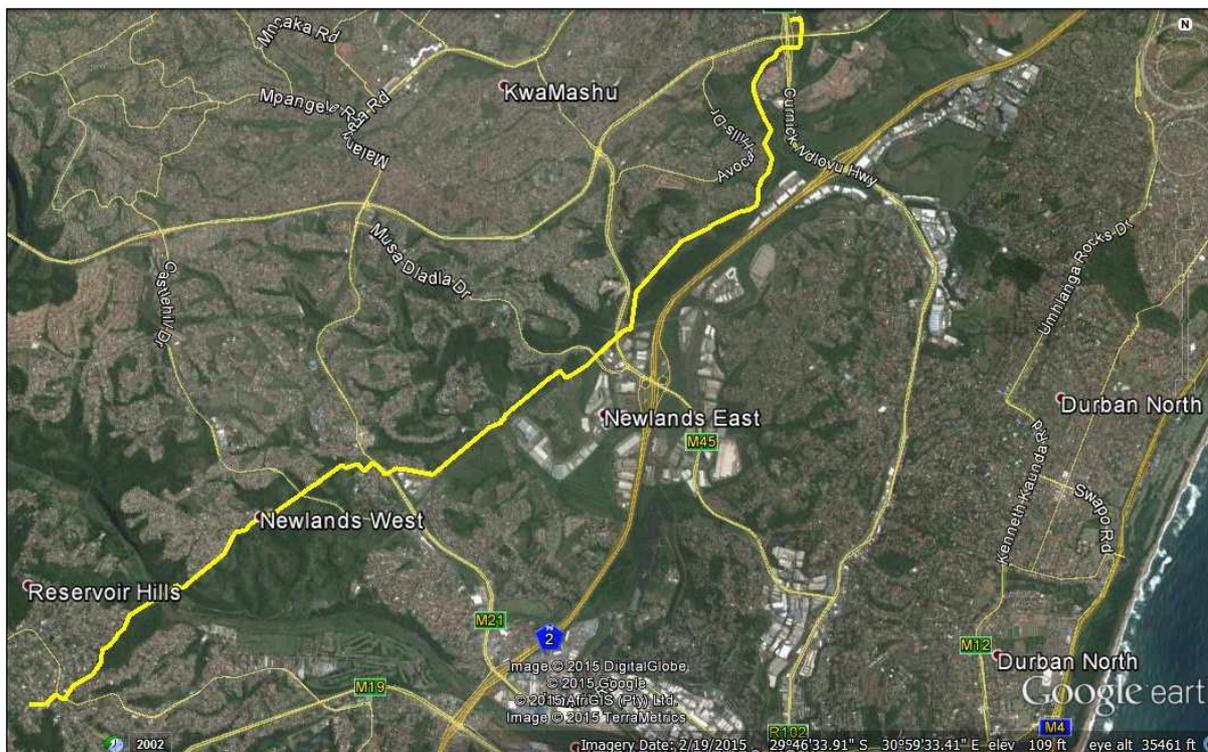


Figure 3 – View of the Preferred Route of the proposed Northern Aqueduct pipeline

2.1.2 Alternative Route 2 (see orange line on map)

This alternative route follows mostly the same line as the preferred route, with a few variations at specific places. The start point and end point are therefore the same, with a minor variation at the north end (start point) and the south end (end point), see **Figure 4**. However, there is a substantial deviation around the middle section of the route (see **Figure 5** and the table below)

Coordinates (WGS 84)	Start point (north end): S 29°44'39.18"; E 31°0'43.22" End point (South end): S 29°48'14.40"; E 30°56'10.52"	Deviation point 1 (Avocado Grove): S 29°45'32.94"; E 31° 0'31.59" Deviation point 2 (Sooklall Drive): S 29°46'59.39; E 30°58'7.30"
Property	The proposed pipeline will run between the suburbs of Durban Heights/Reservoir Hills and KwaMashu/Duffs Road on the north-western end of Durban, KwaZulu-Natal Province.	
Location	The study area is located approximately 10 km north-west of the Durban CBD in the Ethekwini Municipality, KwaZulu-Natal Province.	
Extent	The extent of the entire preferred route is 11.6 km.	
Land Description	<p>The property along the route is primarily residential and urban in nature and is characterised by infrastructure such as roads, powerlines, pipelines and railway lines.</p> <p>These developed areas are interspersed with small areas of veld consisting of indigenous grassland and thorn trees, small patches of indigenous forest in especially the deep river valleys and exotic bush with dense growths of <i>Lantana camara</i> found along various sections of the proposed pipeline.</p> <p>The topography is mostly rolling hills, with the uMngeni river cutting through the section between Newlands West and Reservoir Hills.</p>	

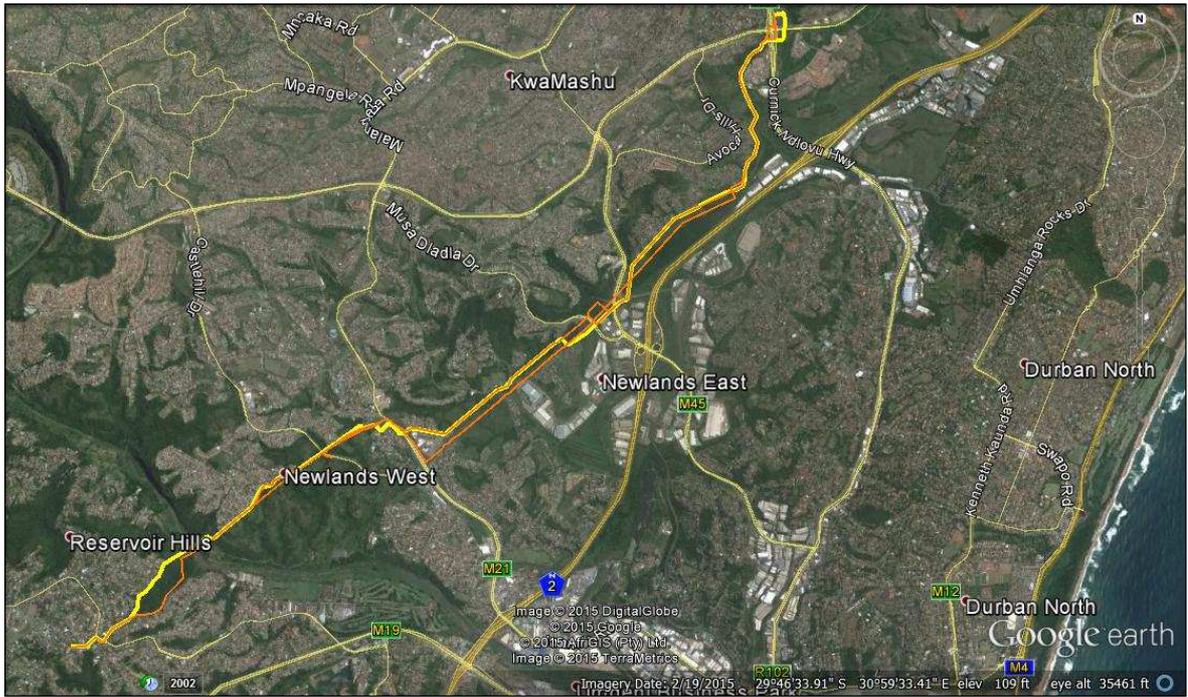


Figure 4 – Google Earth depiction of Alternative Route 2 (orange) as well as the Preferred Route, showing the places where this route deviates from the preferred route

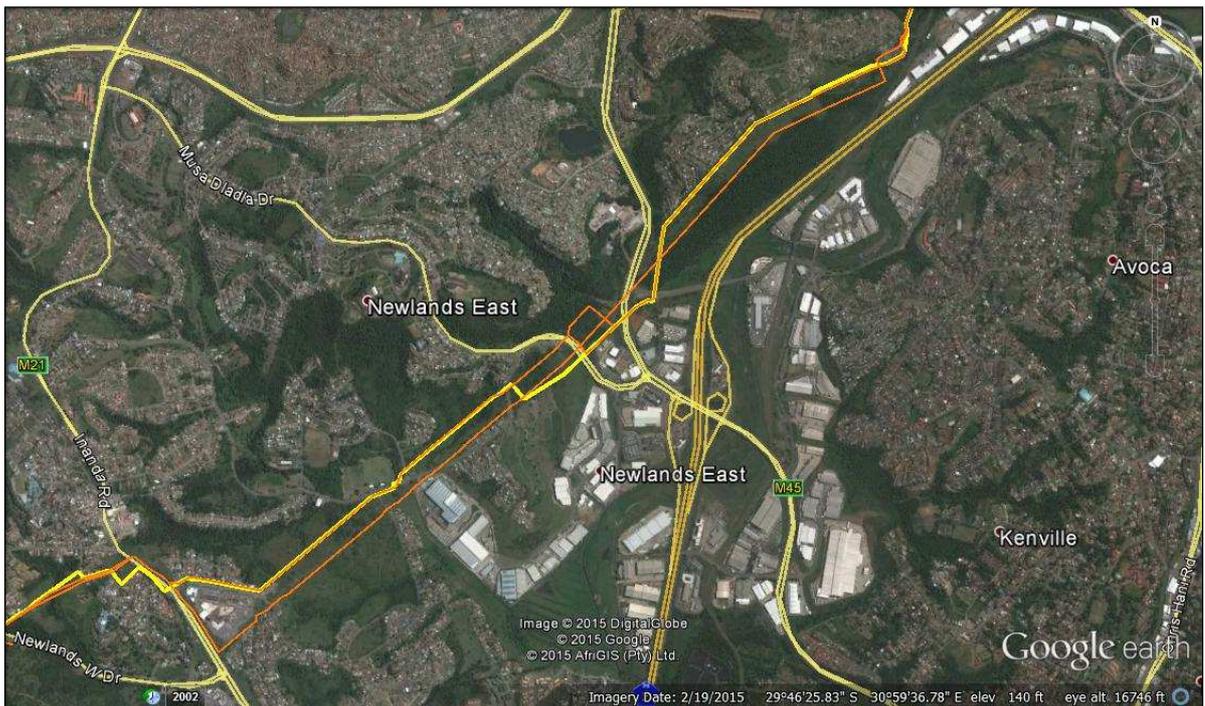


Figure 5 – Closer view showing where Alternative Route 2 deviates from the Preferred Route in the middle section

2.1.3 Alternative Route 3 (see green line on map)

This alternative route only deviates from the preferred route in its southern section between Inanda road in Steelcastle and Battersea Avenue in Reservoir Hills (**Figure 6**). Therefore, coordinates are provided for only the section of major deviation in the table below.

Coordinates (WGS 84)	Deviation Point 1 (Inanda Drive): S 29°46'57.25"; E 30°58'10.97" Deviation Point 2 (Newcentre Drive): S 29°46'44.26"; E 30°57'42.37"	Deviation Point 3 (Limehill Crescent): S 29°47'29.10" ; E 30°57'4.84" Deviation Point 4 (Battersea Avenue): S 29°47'53.48"; E 30°56'31.03"
Property	This pipeline alternative is located in the suburbs of Reservoir Hills, Newlands West and Newlands East.	
Location	The study area is located approximately 10 km north-west of the Durban CBD in the EtheKwini Municipality, KwaZulu-Natal Province.	
Extent	The extent of the entire preferred route is 6.1 km.	
Land Description	The property along the route is primarily residential and urban in nature and is characterised by infrastructure such as roads, powerlines and pipelines. These developed areas are interspersed with small patches of veld. The topography is mostly rolling hills, with the uMngeni River cutting through the section between Newlands West and Reservoir Hills.	

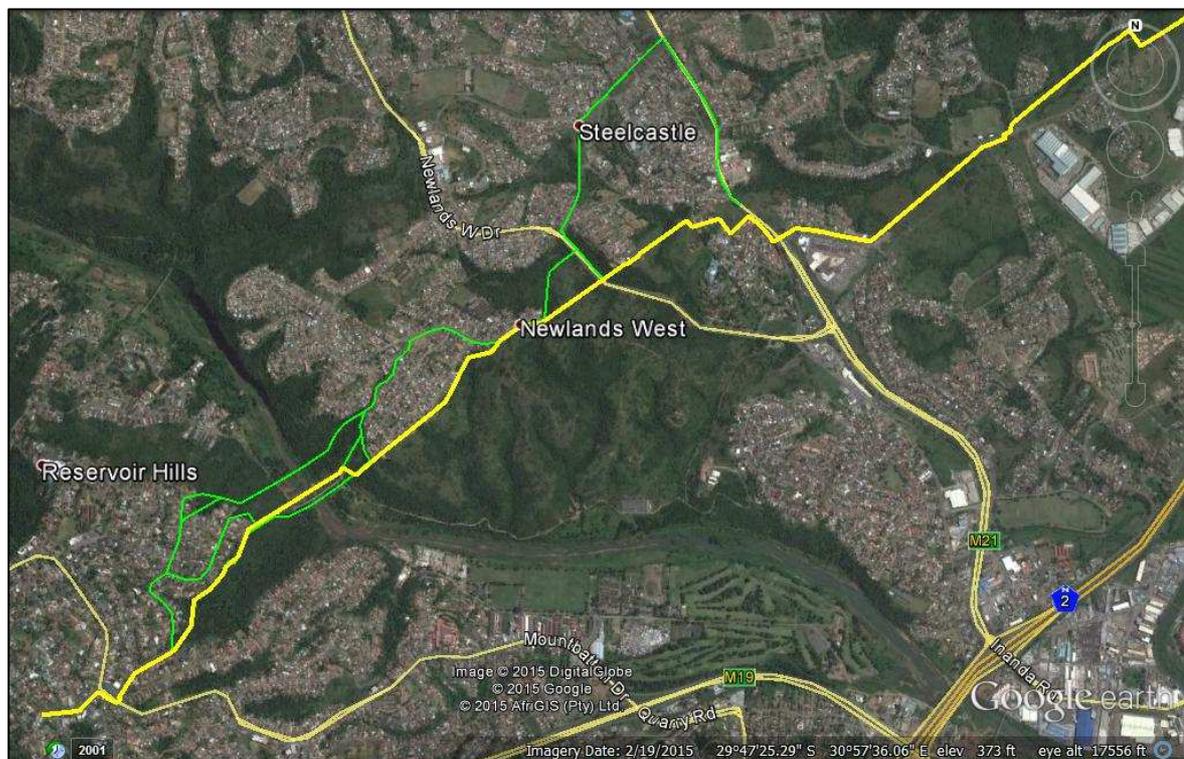


Figure 6 – Overall view of the proposed route, showing where Alternative 3 (green line) deviates from the preferred route

2.1.4 Alternative Route 6 (see blue line on map)

This alternative route only deviates from the preferred route in the mid-northern section of the proposed route between Musa Dladla Drive and the Inanda Highway/Inanda Drive in Newlands East (refer **Figure 7** and **Figure 8**). Therefore, coordinates are provided for only this section in the table below.

Coordinates (WGS 84)	Deviation Point 1 (Musa Dladla Drive): S 29°46'29.12"; E 30°59'35.08"	Deviation Point 2 (Inanda Drive): S 29°47'32.20"; E 30°58'50.50"
Property	The proposed pipeline alternative is located in the suburbs of Newlands East and Newlands West.	
Location	The study area is located approximately 9-10 km north-west of Durban CBD in the Ethekewini Municipality, KwaZulu-Natal Province	
Extent	The extent of the entire preferred route is 4.1 km.	
Land Description	The property along the route is primarily residential and urban in nature and is characterised by infrastructure such as roads, powerlines and pipelines. The proposed route passes through a section of the Newlands Municipal Cemetery.	

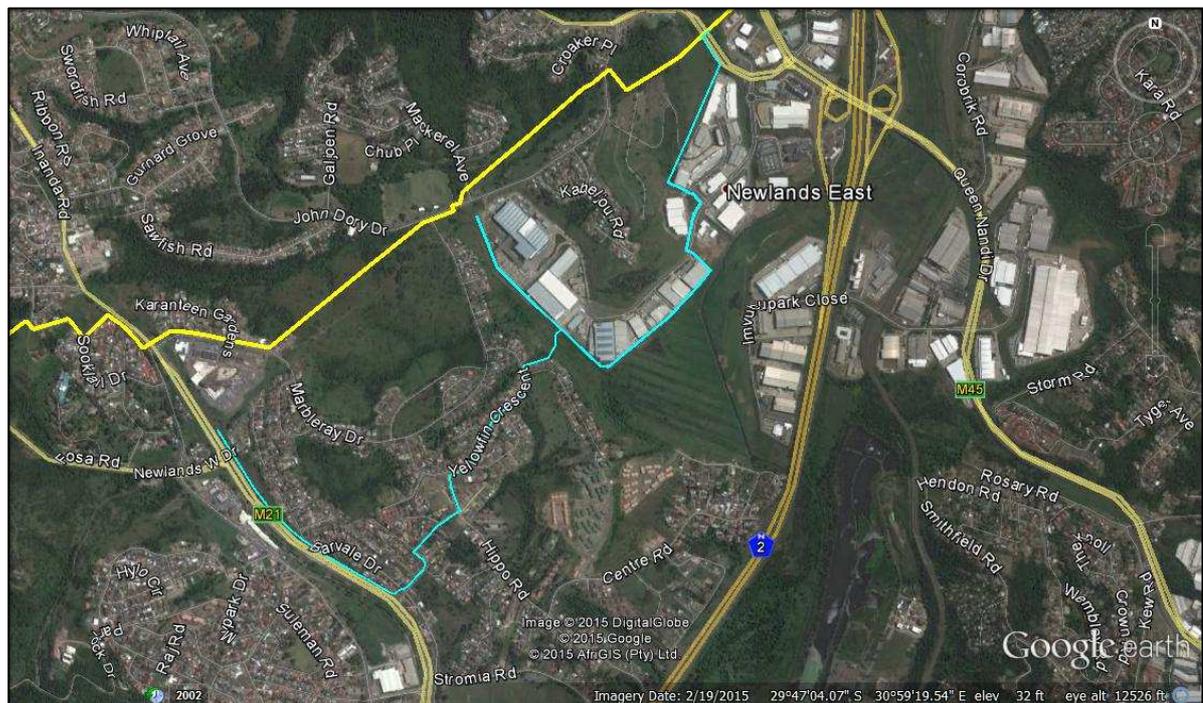


Figure 7 – This Google Earth image depicts the southern section of the proposed route, showing where Alternative Route 6 (blue line) deviates from the Preferred Route (yellow line)

2.2 Technical Project Description

eThekweni Municipality proposes the following:

- The laying and commissioning of the section of pipeline from Durban Heights to Aloes Reservoir;
- The laying and commissioning of the section of pipeline from Aloes Reservoir to Duffs Road; and
- The upsizing of the existing inlet main to Aloes Reservoir and new reservoir inlet pipework.

The approximate length of the 1200 ND welded steel pipeline is 13km. The volume of water per day (throughput) will be approximately 298 Mega Litres. The construction period will be approximately 24 months.

3 ASSESSMENT METHODOLOGY

3.1 Methodology for Assessing Heritage Site Significance

This report was compiled by PGS Heritage for the proposed construction of the North Aqueduct Phase 5 project. The applicable maps, tables and figures are included as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

Step I – Desktop Study: The background information to the field survey leans greatly on the archival and historical cartographic material assessed as part of the study as well as a study of the available literature. The desktop component also included a historic overview of the study area and surrounding landscape as well as a palaeontological desktop study. The reports and data contained on the South African Heritage Resources Information System (SAHRIS) was also accessed and utilised.

Step II – Field Survey: The field survey was primarily focussed on conducting a walkthrough of almost the entire Preferred Route. Once this task had been completed, the remaining time was used to conduct less intensive fieldwork on the alternatives. These alternatives were primarily covered by vehicle. The fieldwork was conducted from Tuesday, 24 March to Thursday, 26 March 2015.

Step III – Report: The final step involved the recording and documentation of relevant heritage resources, as well as the assessment of resources regarding the heritage impact assessment criteria and report writing, as well as mapping and recommendations.

The significance of heritage sites was based on five 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 and
- Potential to answer present research questions.

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

A - No further action necessary;

B - Mapping of the site and controlled sampling required;

C - No-go or relocate development position

D - Preserve site, or extensive data collection and mapping of the site; and

E - Preserve site

Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report (see **Table 1**).

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	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High/Medium	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium	Recording before destruction
Generally Protected C (GP.C)	Grade 4D	Low	Destruction

3.2 Methodology for Impact Assessment

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria.

A summary of each of the qualitative descriptors, along with the equivalent quantitative rating scale for each of the aforementioned criteria, is given in **Table 2**.

Table 2: Quantitative rating and equivalent descriptors for the impact assessment criteria

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	<i>Isolated corridor / proposed corridor</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

A more detailed description of each of the assessment criteria is given in the following sections.

Significance Assessment

The significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these, since their importance in the rating scale is very relative. For example, 10 structures younger than 60 years might be affected by a proposed development, and if destroyed the impact can be considered as VERY LOW in that the structures are all of Low Heritage Significance. If two of the structures are older than 60 years and of historic significance, and as a result of High Heritage Significance, the impact will be considered to be HIGH to VERY HIGH.

A more detailed description of the impact significance rating scale is given in **Table 3** below.

Table 3: Description of the significance rating scale

RATING		DESCRIPTION
5	VERY HIGH	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	HIGH	Impact is of substantial order within the bounds of impacts which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	MODERATE	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.

2	LOW	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	VERY LOW	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity is needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	NO IMPACT	There is no impact at all - not even a very low impact on a party or system.

Spatial Scale

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale.

The spatial assessment scale is described in more detail in **Table 4**.

Table 4: Description of the spatial significance rating scale

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of possible impacts, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the proposed site / corridor.
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect an area not exceeding the boundary of the study area.

1	Isolated Sites / proposed site	The impact will affect an area no bigger than the site.
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Temporal/Duration Scale

In order to describe the impact accurately, it is necessary to understand the duration and persistence of an impact in the environment.

The temporal or duration scale is rated according to criteria set out in **Table 5**.

Table 5: Description of the temporal rating scale

RATING		DESCRIPTION
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium-term	The environmental impact identified will operate for the duration of life of the project.
4	Long-term	The environmental impact identified will operate beyond the life of operation of the project.
5	Permanent	The environmental impact will be permanent.

Degree of Probability

The probability or likelihood of an impact occurring will be outlined in **Table 6** below.

Table 6: Description of the degree of probability of an impact occurring

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very likely
5	It's going to happen / has occurred

Degree of Certainty

It is not possible to be 100% certain of all facts, and for this reason, a standard “degree of certainty” scale is used, as discussed in **Table 7**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making.

Table 7: Description of the degree of certainty rating scale

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.

Quantitative Description of Impacts

To allow impacts to be described in a quantitative manner, in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus, the total value of the impact is described as the function of significance, spatial and temporal scale, as described below:

$$\text{Impact Risk} = (\text{SIGNIFICANCE} + \text{Spatial} + \text{Temporal}) \times \text{Probability}$$

3

5

An example of how this rating scale is applied is shown below:

Table 8: Example of Rating Scale

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Low	Local	Medium Term	Could Happen	Low
Impact on heritage structures	2	3	3	3	1.6

Note: The significance, spatial and temporal scales are added to give a total of 8, which is divided by 3 to give a criterion rating of 2.67. The probability (3) is divided by 5 to give a probability rating of 0.6. The criteria rating of 2.67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes as described in the table below.

Table 9: Impact Risk Classes

RATING	IMPACT CLASS	DESCRIPTION
0.1 – 1.0	1	Very Low
1.1 – 2.0	2	Low
2.1 – 3.0	3	Moderate
3.1 – 4.0	4	High
4.1 – 5.0	5	Very High

Therefore, with reference to the example used for heritage structures above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered a low impact.

4 CURRENT STATUS QUO

4.1 Description of the Study Area

The study area is located approximately 10 km north-west of the Durban CBD in the eThekweni Municipality, KwaZulu-Natal Province. The project involves the construction of a steel pipeline as part of the Northern Aqueduct Augmentation Phase 5, for the eThekweni

Municipality. The pipeline route will run from the Durban Heights Filtration Works in Reservoir Hills and across the uMngeni River in a north-eastern direction, through Newlands East and Newlands West, through KwaMashu and Avoca Hills and then end in the Duffs Road area (**Figure 2**).

The property along the route is primarily residential and urban in nature and is characterised by infrastructure such as roads, powerlines, pipelines and railway lines. These developed areas are interspersed with small areas of veld consisting of indigenous grassland and thorn trees, small patches of indigenous forest in especially the deep river valleys and exotic bush with dense growths of *Lantana camara* found along various sections of the proposed pipeline. The topography is mostly rolling hills, with the uMngeni River cutting through the section between Newlands West and Reservoir Hills.

In the section that follows, photographs will be used to depict aspects of the different pipeline routes.

4.1.1 Preferred Route



Figure 8 - General view of that section of the study area where the proposed pipeline crosses over the uMngeni River. This view is in proximity to the Preferred Route.



Figure 9 - General view of the study area to show how dense the vegetation is in certain sections of the proposed pipeline. This view is along the Preferred Route.



Figure 10 – The proposed Preferred Route runs along this section of Marbleray Drive in the suburb of Newlands West.



Figure 11 – The proposed Preferred Route crosses over the section of Newlands Drive visible in this photograph.



Figure 12 - General view along the Preferred Route in proximity of the Newlands West suburb.



Figure 13 - View along a section of the Preferred Route with John Dory Drive and Mackerel Avenue in the back.



Figure 14 - View of the railway line from the Preferred Route in proximity to the Duffs Road area.



Figure 15 - Sections of the Preferred Route and Route 2 run down the slope visible on this photograph.

4.1.2 Alternative Route 2



Figure 16 - A section of Alternative Route 2 in Reservoir Hills just after it splits off from the Preferred Route.



Figure 17 – A section of Alternative Route 2 runs all along the dense forest visible just below the houses in the back.



Figure 18 - Another section of Route 2. This view is along Inanda Highway with the proposed line located on the grass bank on the left.



Figure 19 – One of the Route 2 alternatives runs along the section of Sweetpea Close visible on this photograph. This is in Avoca Hills.

4.1.3 Alternative Route 3



Figure 20 - A section of Route 3 as it passes through Reservoir Hills before running down to the slope to cross over the uMngeni River



Figure 21 - One of the proposed Route 3 alternatives runs downhill here from the junction of Battersea Avenue and Abbey Street.



Figure 22 – A section of one of the Route 3 alternatives as it leaves Middlemiss Crescent to cross the uMngeni River below.



Figure 23 – Image taken in the uMngeni River valley in close proximity to Route 2 as well as one of the Route 3 alternatives

4.1.4 Alternative Route 6



Figure 24 - General view of the area through which Route 6 passes. Graves from the Newlands Cemetery can be seen on the right.



Figure 25 - View along the Inanda Highway (M21) in a south-eastern direction. Route 6 runs along this section of road.

5 DESKTOP STUDY FINDINGS

5.1 Archival and Historical Maps of the Study Area

5.1.1 First Edition of the 2930DD and 2931CC Topographical Map Sheets

The figure below depicts a section of the First Edition of the 2930DD and 2931CC Topographical Sheets that were surveyed in 1940 by the Trigonometrical Survey Office. The main and alternative pipeline routes comprising the study area are marked in different colours on the depicted sections.

The following observations can be made from the map:

- None of the current residential areas such as KwaMashu, Avoca Hills, Newlands East, Newlands West or Reservoir Hills are depicted on this map. This indicates that these suburbs were established after 1940.
- At the time the study area and surroundings appears to have been characterised by a rural landscape with sugar cane farms, some homesteads in the form of huts and sections of dense indigenous forest towards the south-western end of the study area.
- A temple is depicted in the section of Newlands, which would be affected by the green alternative route (Alternative Route 3). This is almost certainly a Hindu Temple and corresponds to the existing Narainsamy Temple, which is formally declared as a Provincial Heritage site.
- In the Newlands West area, all of the alternative proposed routes run across the area where huts are located. Since the huts represent Black African homesteads, the risk exists that stillborn graves as well as adult graves may have been buried in close proximity to these huts.
- In the Reservoir Hills area, the proposed pipeline routes runs through an area that is depicted as a “banana plantation”. The only built structure depicted is a single structure on the road that corresponds with the present day Pridley Road.
- Two railway lines are depicted as passing through or close to the proposed pipeline routes in the northern Avoca Hills and eastern Newlands East Area. These two railway lines still exist today.

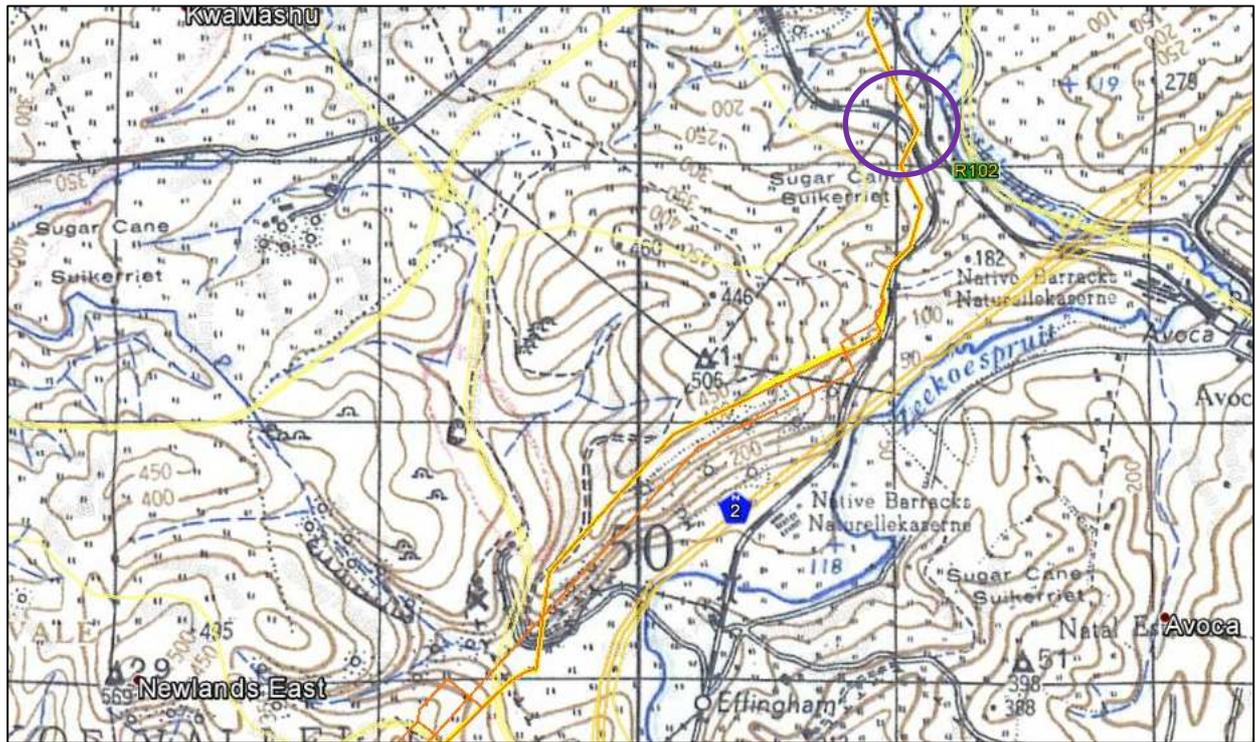


Figure 26 – Section of the First Edition of the 2930DD and 2931CC topographical sheet that was surveyed in 1940. This image depicts the area where Newlands East, Avoca Hills, KwaMashu and Duffs Road can today be found. The area is depicted as being mostly under sugar cane. The purple circle marks the location of the two railway lines that the proposed pipeline route crosses.

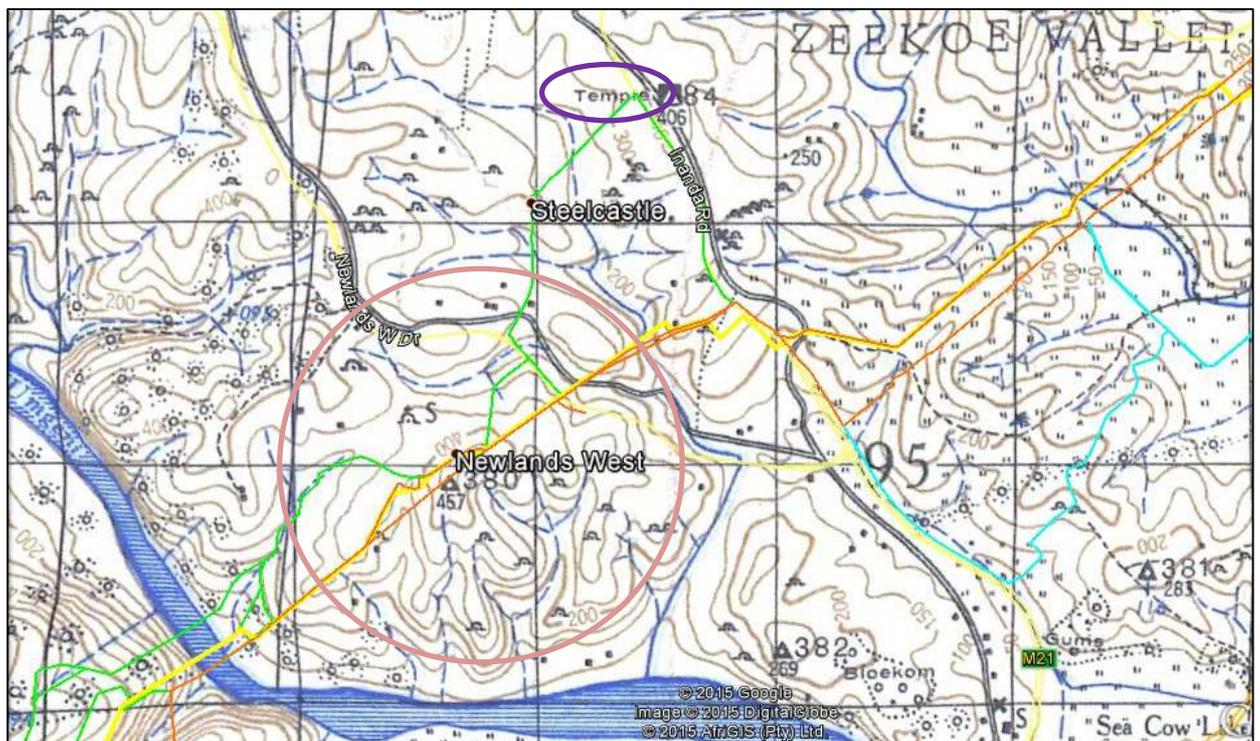


Figure 27 – Another section of the First Edition of the 2930DD and 2931CC topographical sheet. This image depicts the area where Newlands East and Newlands West can today be found. A number of huts are depicted on the eastern bank of the uMngeni River (see pink circle). A temple is also depicted in the area of present day Steelcastle, which is affected by the green pipeline route (purple circle).

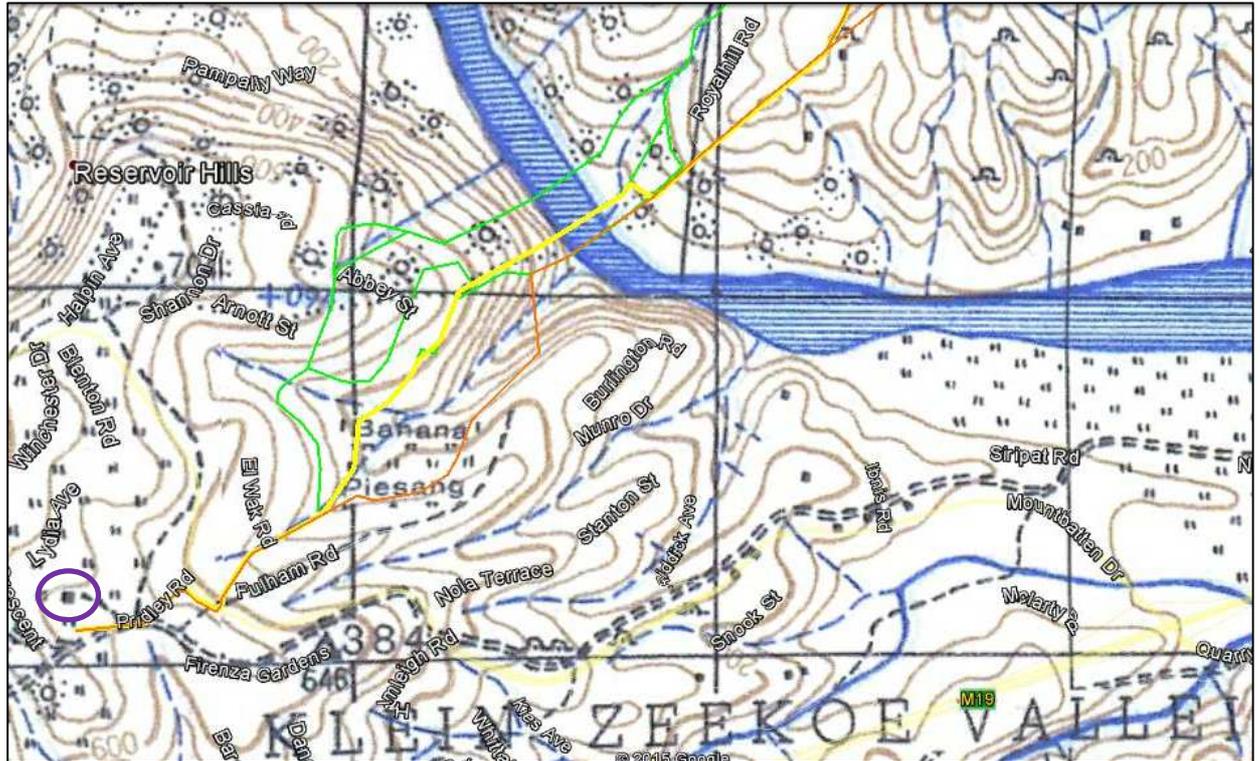


Figure 28 - Section of the First Edition of the 2930DD and 2931CC topographical sheet. This image depicts the area where Reservoir Hills and Newlands West can today be found. A banana plantation and a single structure (purple circle) located just off present day Pridley Road is shown.

5.1.2 Fifth Edition of the 2930DD and 2931CC Topographical Map Sheets

The figures below depict various sections of the Fifth Edition of the 2930DD and 2931CC topographical sheets. The map was surveyed in 1956 and drawn in 1960 by the Trigonometrical Survey Office from aerial photographs taken in 1953. The map was revised in 1972.

The main and alternative pipeline routes comprising the study area are marked in different colours on the depicted sections. The following observations can be made:

- Once again, none of the current residential areas such as KwaMashu, Avoca Hills, Newlands East, Newlands West or Reservoir Hills are depicted on this map. This indicates that these suburbs were established after 1956.
- The area of Mount Moriah and the existing suburb of KwaMashu are not visible on the section of 1956 map that is available.
- The Avoca Hills and Newlands East areas are depicted as being under vegetation, which may be sugar cane plantations. Various labour compounds are depicted in the

general area but the proposed routes do not seem to be located very close to any of these compounds.

- In the Newlands West area, there are still a number of huts depicted on the east bank of the uMngeni River. Since the different proposed routes run across this area, the risk exists for stillborn and adult graves to have been buried in close proximity to these huts. There is also a cluster of huts depicted to the north of Newlands West (in the present Steelcastle area), which the Alternative Route 3 would possibly affect. A similar potential risk of graves can be highlighted here.
- In the Reservoir Hills area, the proposed route and alternatives pass close to the old Durban Heights Filter Works but no other major structures are depicted in this area. The single structure depicted on present day Pridley Road is still depicted. If this structure still exists it is therefore likely to be 60 years or older.
- A couple of roads and railway lines are depicted as passing through or close to the proposed pipeline routes in the Newlands West area (Inanda Road and Newlands West Drive). In the Avoca Hills area, the proposed routes cross a road.

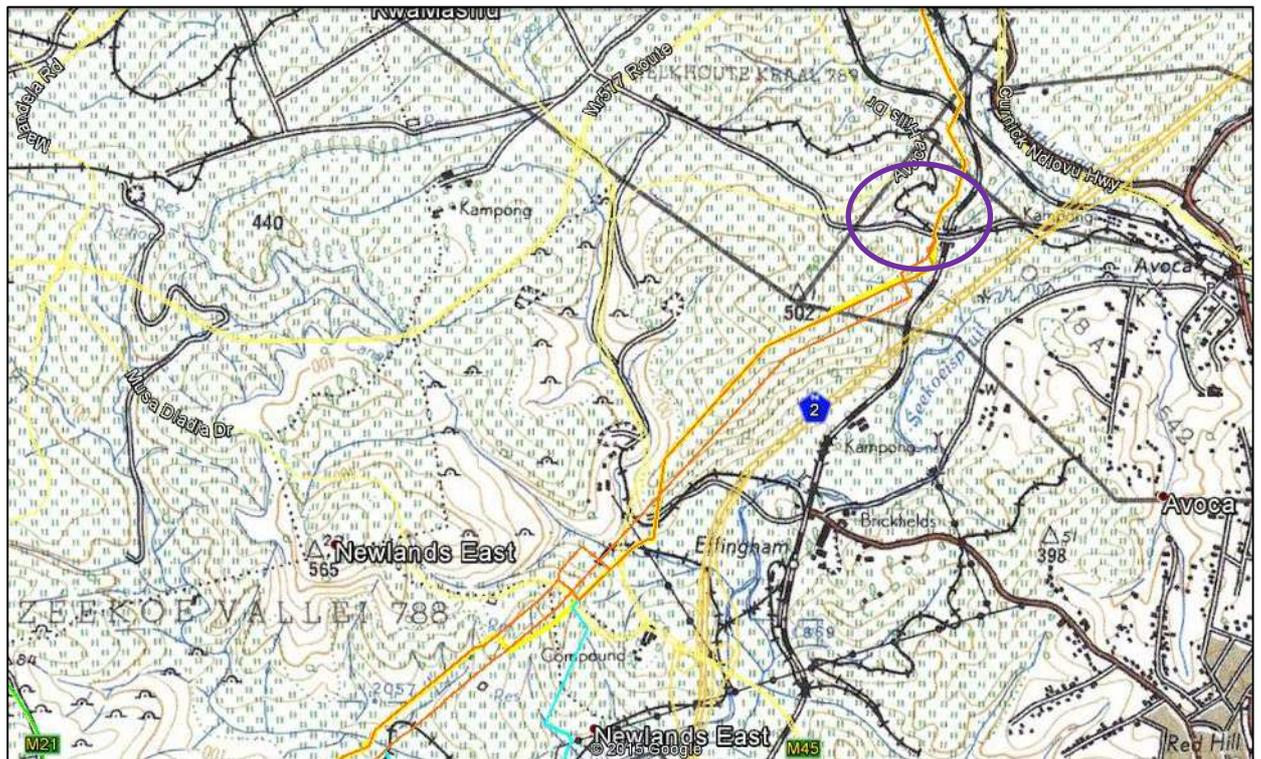


Figure 29 – Section of the Fifth Edition of the 2930DD and 2931CC topographical map that was surveyed in 1956. Showing the location where the proposed pipeline crosses over a railway line and road (see purple circle). The agricultural nature of the surrounding landscape is clearly evident with sugar cane farming prevalent at the time.

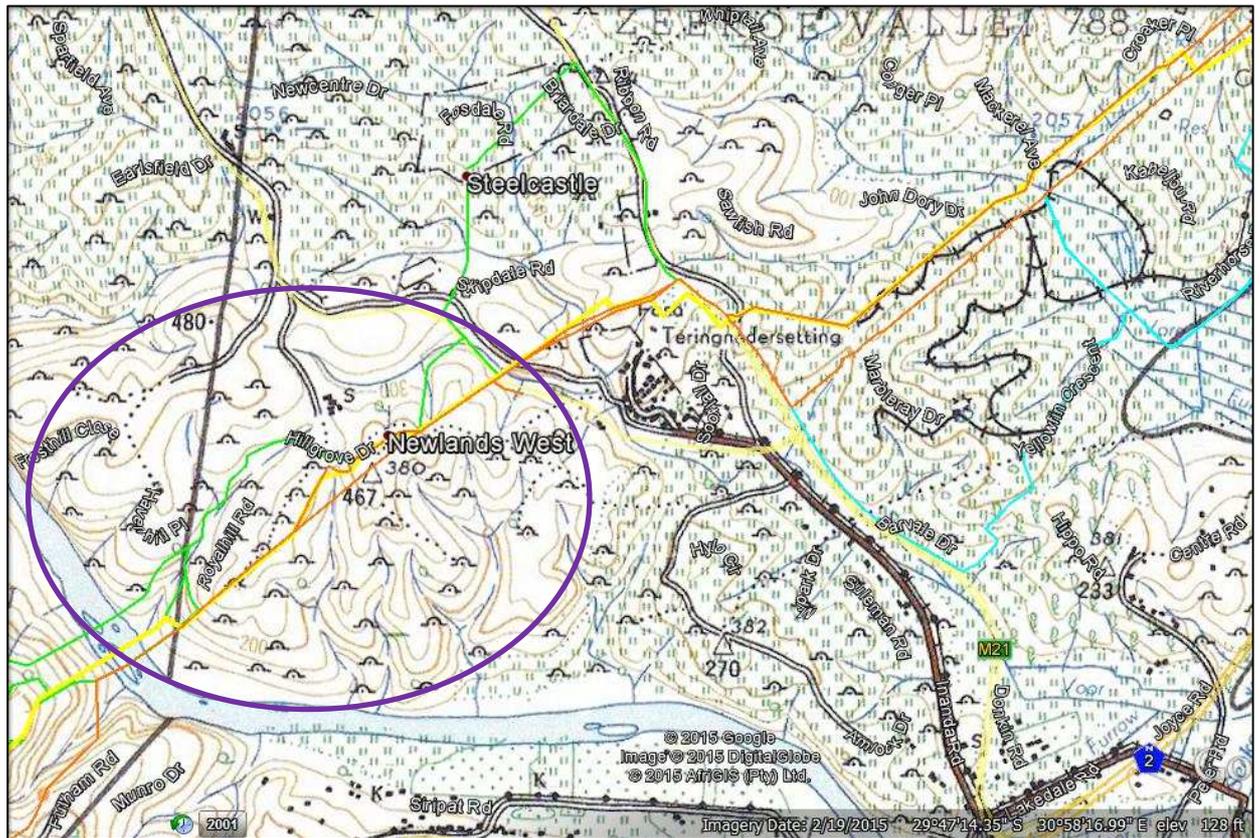


Figure 30 - Section of the Fifth Edition of the 2930DD and 2931CC topographical map that was surveyed in 1956. The concentration of huts on the eastern bank of the uMngeni River in the present day Newlands West is shown (see purple circle).

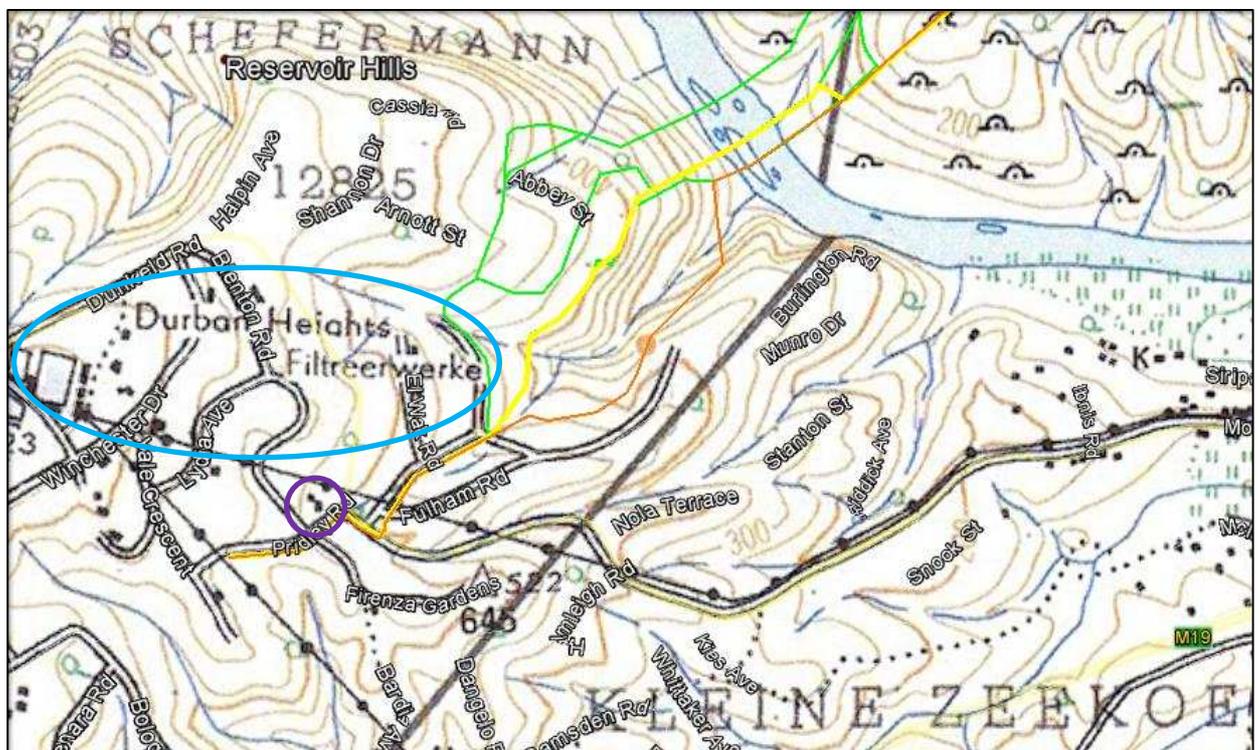


Figure 31 - Section of the Fifth Edition of the 2930DD and 2931CC topographical map that was surveyed in 1956. The Durban Heights Filtration Works (blue circle) and the small single structure (purple circle) on present-day Pridley road are depicted.

5.1.3 Findings in terms of the Archival and Historical Maps

The following observations can be made as a result of the study of the available archival and historical maps depicting the study area:

- None of the current residential areas such as KwaMashu, Avoca Hills, Newlands East, Newlands West, or Reservoir Hills are depicted on the 1940 or 1956 maps. This indicates that these suburbs were established after 1956.
- The northern end of the study area is not depicted on either the 1940 map or the 1956 map that is available. However, it is likely that the area was under sugar cane or other vegetation, like the surrounding areas.
- Since the present day, suburbs of Avoca Hills and Newlands were both depicted as undeveloped and being under vegetation or sugar cane, in the 1940 and 1956 maps, therefore it is highly likely that the existing built structures are all younger than 60 years.
- Since a number of huts are depicted close to the different proposed routes in especially the Newlands West area on both the 1940 and 1956 maps, the risk exists for stillborn and adult graves to have been buried in close proximity to these huts. Both the main preferred alternative route and the Alternative Route 3 would run through or very close to both these areas.
- The Hindu temple depicted in the Steelcastle area, which would be affected by Alternative Route 3 is likely to be the existing Narainsamy Temple located on Inanda Road in Newlands. This is a Provincial Heritage Site and is included in this report as Site 3.
- The area of Reservoir Hills was depicted in both the 1940 and 1956 maps as being mainly undeveloped with the only major structures found in this area those associated with the Durban Heights Filtration Works that was established in the Reservoir Hills area between 1940 and 1956. Furthermore, a single building located on present-day Pridley Road was depicted on the 1940 and 1956 sheets. If this building still exists, it would represent one of the few buildings from the study area and direct surroundings older than 60 years. However, no sign for such an old building was found during the fieldwork.

5.2 The Archaeology of the Study Area and Surroundings

5.2.1 Overview of the Archaeology of the Study Area and Surroundings

A limited number of archaeological surveys and research projects have been undertaken in the vicinity of Durban and the study area.

Two main types of archaeological reports and publications were used to compile this overview. The first source of information on the archaeology of the area was the use of published literature. The second of these are reports that were all accessed from the SAHRA electronic database known as SAHRIS, and which for the most part came about due to the requirement for archaeological and heritage impact assessments to be undertaken for various development activities. However, it is important to note that the information listed here does not necessarily represent all the previous archaeological work undertaken in the vicinity of the study area.

5.2.1.1 Archaeological Sites as Revealed Through a Study of Published Literature

The following sites were identified by studying archaeological journals and books.

5.2.1.1.1 Shongweni Cave

Shongweni is a large cave overlooking the Mlazi River at Shongweni Waterworks, some 25 km upstream from where it flows into the coastal plain near the head of Natal Bay. Davies excavated the cave in 1971. This was the first detailed excavation of a cave in the lower valleys of Natal. Two main periods of occupation were identified, a later period discontinuously from the thirteenth century A.D. to the end of the third millennium BC, and an earlier much more discontinuous period from near 10000 to about 21000 BC. The upper occupation was marked by floors of dung and leaves and by small hearths separated by lenses of dust and rockspalls; in the lower large beds of ash interfingering with pink sterile dust (Davies, 1975).

The dryness of the cave had ensured the good preservation in the upper occupation of vegetable material, wood, plants, leaves and artefacts such as twine, but not of animal-remains except bone. There was evidence as far back as 2000 B.C. for pottery and for

apparently cultivated plants. A wide variety of wild vegetable foods and marine shells were found whereas workable stone was fetched from far. The stonework itself however was found to be poor. Some examples of tools and weapons made of bone and of hard wood were also recovered from the site. Beads made from shells of freshwater-bivalves were also found (Davies, 1975).

The lower occupation yielded a much less complete picture. It is doubtful if vegetable-remains, apart from a few seeds, survive from this period. The stone industry is even poorer than in the upper occupation. A great many bone chips were found from the lower occupation, of which a few may have been shaped as tools (Davies, 1975).

The Shongweni Cave is located roughly 21.4 km south-west of the present study area.

5.2.1.1.2 Sibudu Cave

Sibudu Cave, approximately 40km north of Durban and about 15 km inland of the ocean, is located on a cliff overlooking the Tongati River, northern KwaZulu-Natal. The site is significant because it has a deep, well-dated Middle Stone Age (MSA) sequence and good organic preservation. Excavations at Sibudu Cave have yielded an Iron Age occupation directly overlying a long sequence of final Middle Stone Age (MSA) layers dating c. 61 000–26 000 years ago. Older, undated layers contain a Howiesons Poort Industry. The deposits themselves have clear stratigraphy and preserved hearth structures. Excavations have also uncovered a long Howiesons Poort occupation in the deeper, older deposits of the site (Wadley and Jacobs, 2004).

Early excavations were undertaken in 1983 by Aron Mazel of the Natal Museum. His excavation revealed that the uppermost layers of the cave contain Iron Age (IA) occupations and layers immediately below this contain MSA occupations. No Later Stone Age (LSA) remains are present in Sibudu and it seems that a long hiatus occurred between the final MSA occupations and the first IA occupations (Wadley and Jacobs, 2004).

The Iron Age layers BSV and BSS contain potsherds, upper and lower grindstones, rare pieces of metal, many glass beads, pits filled with ash, bones, seed, wood, wooden stakes, potsherds and even some basket-work. The remains of daga (burnt clay) hut floors were present together with grass matting and a digging stick. A cache of bead necklaces

comprising many coiled strands was found in a small pit in square B4 of layer BSS. Most of the beads were Indian red glass beads, but there were a few turquoise glass beads and an entire necklace of ostrich eggshell beads into which were strung a marine shell and a few blue glass beads (Wadley and Jacobs, 2004).

Directly below the Iron Age occupation, layers are traditional MSA material culture items because no LSA occupations are present in the cave. Here there are some rare examples of small bifaces and hollow-based points. The bifaces are elliptical tools with sharp cutting edges and they have been worked entirely across both faces by removing small flakes from their perimeters. Hollow-based points are triangular projectile heads that have their bases thinned and shaped to a concave form to facilitate hafting. Hollow-based points were also found at Umhlatuzana Cave, approximately 90 km from Sibudu, and the tool type may be a regional variant of the final MSA. Other retouched tools found in these layers include unifacial and bifacial points, straight and convex scrapers, scaled pieces and notches (Wadley and Jacobs, 2004).

Excavations in late 2002 yielded a Howiesons Poort Industry in a section of the trial trench. Although yet undated, this industry is clearly older than 61 000 years ago. The backed artefacts are accompanied by a higher proportion of blades and more large sandstone flakes than the more recent Sibudu assemblages. The density of worked stone appears to be far greater in the Howiesons Poort layer than in any of the more recent layers (Wadley and Jacobs, 2004).

Deliberately engraved bone was not recovered from the excavation before the late 2001 season, when a piece of caudal rib with ten parallel notches was recovered. Other pieces of MSA worked bone include a ground, polished 'pin'. This 'pin' is much thinner than ground and polished bone points that are found in southern African LSA sites (Wadley and Jacobs, 2004).

The Sibudu Cave is located roughly 27 km north-east of the present study area.

5.2.1.1.3 Umhlatuzana Rock Shelter

Umhlatuzana rock shelter is located between Pietermaritzburg and Durban and was excavated in 1985 by Jonathan Kaplan with the principle objective to rescue material at the

site that could be endangered by the building of a new toll road. The Umhlatuzana excavations exposed an unexpectedly rich archaeological deposit which reached a depth of 2.5 m. Material from both the MSA and LSA were recovered (Kaplan, 1989).

The Umhlatuzana excavation generated over one million pieces of artefactual stone of which more than 725 000 have been analyzed so far. This probably ranks Umhlatuzana as one of the richest stone artefact sites yet excavated in southern Africa. A fairly continuous series of deposits spans the MSA and the early microlithic LSA assemblages within the time range of 45 000-9000 BP. A preliminary analysis of the underlying MSA assemblages, which include stone artefacts characteristic of the Howiesons Poort and MSA 2, suggests that the occupation of the site may extend back to c. 90 000 BP and possibly even earlier. Other cultural remains such as pottery, worked bone, beads, and ground/modified ochre were recovered from the excavation. Animal bones and plant food remains (mainly seeds) were recovered from both Holocene and Late Pleistocene deposits (Kaplan, 1989).

The site contains a near continuous sequence of stone artefact assemblages which spans the late MSA and early LSA assemblages within the time range of c. 45 000-9000 BP. The Umhlatuzana assemblages thus span the transition between the MSA and early microlithic assemblages of the LSA. A preliminary analysis of the underlying Howiesons Poort and MSA assemblages suggests that this time range may extend as far back as 90 000 BP, and possibly even earlier (Kaplan, 1989).

The Umhlatuzana Rock Shelter is located roughly 17 km west of the present study area.

5.2.1.1.4 Blackburn

The site of Blackburn (named after the former estate) lies on the crest of a red dune north of the head of the Umhlanga Lagoon, at an altitude of over 75 m. It was discovered by Drs. Beater and Maud, and was reserved from sugar cultivation by Dr. Campbell. Davies conducted a series of excavations at this site between 1968 and 1970 (Davies, 1971).

Blackburn seems to have been a hilltop village with large patches of midden down the steep slopes. The houses were probably concentrated on the fairly level crest of the dune. Although two dwellings were identified, the researcher found that the crest of the hill had enough space for at most 19 or 20 adjacent houses of the standard size (5.5 m in diameter)

and if a cattle enclosure were present, the crest of the dune would have had space for another five houses. No good evidence for terracing was found, although concentrated patches of midden were observed on the slopes, which suggest that dwellings may have been built on terraces. It is therefore possible that additional houses were built on the slopes, which are too steep for building without levelling. The houses whose foundations were excavated appear to have been beehive-huts that were roughly 5.49 m across, with one or more central posts which were estimated to be more than 3.05 m high (Davies, 1971).

The Blackburn site is located roughly 9.4 km north-east of the present study area.

5.2.1.1.5 KwaGandaganda

KwaGandaganda was first recorded in 1983 during an archaeological survey carried out by the Natal Museum Archaeology Department in the uMngeni Valley near Durban. The survey was the first phase of a cultural resource management project to rescue archaeological material from flooding by the now completed Inanda Dam. KwaGandaganda was excavated between 1986 and 1988 during the second phase of the rescue project.

The site of KwaGandaganda lay within a large bend of the uMngeni River. Its location and size was typical of Early Iron Age sites from KwaZulu-Natal. It was situated alongside a river on fertile soils, in savanna bushveld, and extended over an area of roughly ten hectares. Ceramic styles and five radiocarbon dates indicate that KwaGandaganda was occupied continuously for 300 years between the seventh and early eleventh centuries AD. This period is conventionally divided into three phases, namely, Msuluzi (seventh century), Ndondondwane (eighth century), and Ntshekane (ninth century) based on ceramic style and un-calibrated radiocarbon dates. The dates stretched between the beginning of the seventh century and the late ninth century AD.

The site is located 18.5 km north-west of the present study area.

5.2.1.1.6 Mzonjani

Mzonjani is located on a recently level hilltop that is 2.5 km inland from the coast at La Lucia and 15 km north of Durban. The site is located near Mt Edgecombe. During January 1977 a

strip of land 100 m wide was bulldozed clear of sugar-cane and top soil as the first stage in the construction of the National Road 2 freeway northward up the coast from Durban. The consulting engineers, the contractors and the National Roads Department agreed to halt the earthmoving programme for several days while excavations were carried out by a team from the Natal Museum together with other volunteers. Mzonjani is the traditional name for the umndeni or 'ward' in which the site occurs. It was named after a former headman who lived there. The site itself is part of the coastal dune complex of Natal, belonging to the Berea Red Sand Member of the Bluff Formation. It is near the inland margin and consists of red sand and clay to a considerable depth. Early Iron Age material was seen for 260 m along the freeway path. Mzonjani, dated to the third and fourth century AD represents the earliest expression of the Iron Age in Kwazulu-Natal. The excavations at Mzonjani produced large ceramic assemblage (Maggs, 1980).

The Mzonjani assemblage is by far the largest yet available from Kwazulu-Natal for the period around AD 300, which represents the earliest expression of the Early Iron Age in this region. The distribution of Early Iron Age material reflects a village of some size. Nothing is known of the above-ground structures but the occupation must have been over a considerable period, perhaps several decades, in view of the quantity of material. The concentration of pottery around certain features could reflect relatively shallow refuse pits into which small quantities of domestic debris were tipped as they silted up with the sandy soil. Or alternatively they could reflect mobility of material, chiefly sherds and charcoal, within the soil profile due to physical, biotic or some other unknown factors. The absence of EIA sherds from exposed areas, which had not actually been bulldozed, suggests that there was some tendency for material to sink beneath the soil surface. However, since there clearly was some pit digging, this factor may also be significant in explaining the occurrence. The poor preservation of organic material means that little can be said about the economy. However, a village of several hectares suggests food production, particularly agriculture, to sustain it. Hunting, trapping and the gathering of shellfish as well as wild plant foods can be surmised on the basis of the local environment. The tuyere fragments from unit 3 and the pieces of slag excavated from 13, both contexts uncontaminated by LIA material, imply small scale iron-smelting on site (Maggs, 1980). The site is located roughly 4.1 km north-east of the present study area.

5.2.1.1.7 Iron Age Metal Hoard

This site was uncovered at the Inanda Dam, near Durban. The hoard was found among the roots of a tree that was bulldozed during clearing operations of the dam site near the uMngeni River. Being level ground, the site could have been occupied, but no evidence of settlement was recorded. The hoard comprises two large foliate spearheads, one being a typical Zulu stabbing spear and the other an unfinished example of the same kind (Maggs, 1991). This is one of several hoards uncovered in the general area of Kwazulu-Natal between Durban and Ladysmith.

5.2.1.1.8 Iron Age sites on the Northern Bank of the uMngeni River

In an article published in the Natal Museum Journal of Humanities, Gavin Whitelaw (1991) presents a map depicting the Iron Age sites that were known for the Durban area at that stage. Five of the 17 Iron Age sites depicted on this map are shown to be located on the northern bank of the uMngeni River. An overlay of this map over a Google Earth depiction of the study area was made. It was established that four of these sites are located in the Earlsfield and Ntuzuma sections of KwaMashu, with the fifth site located in Newlands West. This latter site is the closest of these five sites to the present study area, and is situated roughly 578 m north-west of the Preferred Route.

5.2.1.2 Archaeological Sites as Revealed Through a Study of the SAHRIS Database

The reports discussed here were all accessed from the SAHRA electronic database known as SAHRIS. It is important to note that the reports listed here do not necessarily represent all the previous archaeological work undertaken in the vicinity of the study area. The search focussed specifically on reports that cover the region in the direct surroundings of the study area, and especially the affected suburbs of Avoca Hills, KwaMashu, Reservoir Hills and Newlands.

- ***Cultural Heritage Impact Assessment of KwaMashu East Crossroads - Portions 1, A and B of Erf 1134 (Prins, 2012)***

This report was undertaken for a proposed development located between the M21 and M25 in KwaMashu East. The area is situated in an urban township context

adjacent to a wetland. The report indicated that portions of the greater KwaMashu area have been surveyed by heritage consultants in the last 20 years or so and six Iron Age sites have also been located in the southern sections of KwaMashu near the uMngeni River, no archaeological or heritage sites were at the time of the report known for the project area. Furthermore, the result of the survey was that no archaeological and other heritage sites were observed on the footprint. The area of study for this previous report is located roughly 2.1 km north-west of the present study area.

It is worthwhile to note that it would appear that the six Iron Age sites referred to in this must include the five sites published in Whitelaw (1991) as discussed above.

- ***A Phase 1 Heritage Impact Assessment Study For The Proposed Duffs Road Station Upgrade Programme, Ethekewini Metropolitan Municipality, KwaZulu-Natal Province, South Africa (Mngomezulu, 2014)***

The report deals with a heritage impact assessment for the proposed modern maintenance depots upgrade at the PRASA Duffs Road Station, Durban. The Duffs Road Station is located in the suburb of KwaMashu. The survey did not yield any archaeological sites. The area of study for this previous report is located roughly 729 m west of the present study area.

- ***First Phase Cultural Heritage Impact Assessment of Corobrick, Avoca South, Ethekeweni Municipality (Prins, 2014).***

The study area is located at Avoca South near Durban North. It is situated between the N2 and R 102. The area consists of the Corobrick office and factory buildings in the northern section and an old clay mining area to the south. Particular attention was paid to the area of exposed sandy deposits situated to the immediate south of the buildings. This area consisted of disturbed soils as is evidenced by previous mining activities on the footprint. Environmental consultants had identified stone artefacts previously on this portion.

The field survey identified stone artefacts that were found lying scattered at the base of the eroded sand dunes. In fact, all the exposed sandy areas on the footprint

contained some stone artefacts. Six exposed areas were identified; however, all of these exposed areas were assessed as forming one archaeological site. One Early Stone Age cleaver was observed. However, the vast majority of stone artefacts belonged to the MSA and consisted of flakes and blades. One hammer stone was also identified. The stone artefacts were not in any stratigraphic or spatial context and appeared to be eroding from the ancient sand dunes that had been disturbed by past mining activities. The site was therefore rated as of low significance.

The area of study for this previous report is located roughly 1 km south-east of the present study area.

- ***Desktop Survey of the Proposed Northern Aqueduct Augmentation, Phase 4, KwaZulu Natal (Anderson, 2012).***

A report on the survey of the proposed Northern Aqueduct Augmentation Phase 4 for the additional provision of potable water to areas lying north of the uMngeni River, south of the Ohlanga River and east of Ntuzuma. The project involved a short 6 km link between Duffs Road, Phoenix 6 Reservoir and Phoenix 2 Reservoir just north of Phoenix Highway.

The desktop study revealed no known, or previously recorded heritage sites in the study area. The only piece of land that could have Stone Age, Late Iron Age, and/or Historical Period occupation was the hill on the Erf Moriah 16743FU. This is a small area of land, which has had some form of agriculture for at least 80 years, and any archaeological site would have been completely damaged. The desktop study suggests that a full HIA survey should not be necessary, as most of the route has been damaged due to housing and/or agriculture. Only one section of the line would have palaeontological material and this area should be monitored during construction.

The area of study for this previous report is located directly north and north-east of the present study area.

- ***Heritage Impact Assessment of Western Aqueduct, Greater Durban Metro, KwaZulu-Natal, South Africa (Ethembeni, 2006).***

Report on the survey of the area affected by the construction of a new bulk water pipeline from Cato Ridge to Inanda and Pinetown. The Western Aqueduct was to commence at the eThekweni Municipal boundary at Cato Ridge, known as “Point M”, and was to terminate in the Mount Moriah Reservoir complex in Pinetown. Two secondary bulk potable water pipelines were to be constructed off the Western Aqueduct to supply areas to the north and south. The Northern pipeline was to commence in the Wyebank area, following a route through the uMngeni River valley, before terminating in the NR5 Reservoir complex in Ntuzuma. The Southern pipeline was to commence in Kloof and follow Hagarth and Stockville Roads down to the N3 highway before terminating in the M1B Reservoir in Tshelmyama. The report identified no heritage resources of significance that will be affected by the proposed development.

The area of study for this previous report is located a few kilometres north-west of the present study area.

- ***First Phase Cultural Heritage Impact Assessment of the Proposed Rohill Business Estate on the Remainder of Erf 3481 Durban North, Ethekeweni Municipality (Prins, 2014).***

The study area was located at the corner of Chris Hani Drive and the Old North Coast Road, Durban North. The land was zoned as ‘extractive industrial’ and was used by Corobrik to mine clay. Parcels of land that were not being mined were used to cultivate sugarcane. No heritage sites were identified.

The area of study for this previous report is located 1.3 km east of the present study area.

- ***Phase 1 Heritage Impact Assessment of Dodoma Avenue (Kennedy Road) Housing Project, eThekweni Metropolitan Municipality, KwaZulu-Natal (eThembeni, 2014)***

The proposed development site was located north of the Durban Central Business District, immediately south of the uMngeni River and the Springfield industrial area and east of the N2 highway.

A Hindu prayer site is located on the Dodoma Avenue boundary of the proposed development site. The Clare Estate Development Forum (CEDF) notified Amafa of the presence of human remains on the proposed development site on 19 November 2014. According to the CEDF and residents who attended the site meeting on 1 March 2014, the proposed development site includes at least six graves of people ancestral to the local Indian community, at least one of which is located on the proposed show house site. In addition, the proposed development site has been associated with local Hindu spiritual beliefs and practices for generations and is a place of active and ongoing living heritage. The site was assessed a medium significance regarding the living heritage aspects (Hindu prayer site) and a high significance due to the presence of human remains.

The area of study for this previous report is located 2.7 km south-east of the present study area.

5.2.1.3 Findings in terms of Archaeology of the Study Area and Surroundings

This section has shown that several significant sites are located in the general surroundings of the study area. These date to both the Stone Age and the Iron Age. There have also been several impact assessment studies undertaken in the direct surroundings of the present study area. Most of these reports did not identify any sites of heritage significance. However, two reports did note some resources of heritage significance. The report by Prins (2014) identified a Stone Age site consisting of an ESA cleaver and MSA flakes and blades in a locality roughly 1 km south-east of the present study area. The report by eThembeni (2014) identified a Hindu prayer site and place of burial. Also, the report by Prins (2012) mentions that six Iron Age sites are known from the southern end of KwaMashu near the northern bank of the uMngeni River.

5.3 Historical Overview

5.3.1 Historical Overview of the Study Area and Surrounding Landscape

DATE	DESCRIPTION
2.5 million to 250 000 years ago	<p>The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with more robust flaked tools. It dates to approximately <2 million years ago. The second technological phase is the Acheulian and comprises more refined stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago.</p> <p>The Heritage Impact Assessment conducted at Corobrick by Prins (2014) identified a number of out of context stone artefacts including an Earlier Stone Age cleaver. This locality is roughly 1 km south-east of the present study area.</p>
>250 000 to 40 000 years ago	<p>The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley 2013).</p> <p>Several well-known MSA sites are located in the general region of the study area. Sibudu Cave for example is located roughly 27 km north-east of the present study area and has a deep, well-dated Middle Stone Age (MSA) sequence and good organic preservation (Wadley, 2004). The cave was first excavated in 1983 by Aron Mazel of the Natal Museum. Sibudu Cave excavations have yielded an Iron Age occupation directly overlying a long sequence of final Middle Stone Age (MSA) layers dating c. 61 000–26 000 years ago. Older, undated layers contain a Howiesons Poort Industry (Wadley & Jacobs, 2004). Another MSA site from the surrounding landscape is the Umhlatuzana Rock Shelter which is located 17 km west of the present study area (Kaplan, 1989). Furthermore, the Heritage Impact Assessment conducted at Corobrick by Prins (2014) identified a number of out of context stone artefacts that could primarily be identified as Middle Stone Age blades and flakes. This locality is some 1 km south-east of the present study area.</p>
40 000 years ago to the historic past	<p>The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small stone tools known as microliths.</p> <p>One example of a Late Iron Age site in the general vicinity of the present study area is Umhlatuzana Rock Shelter, located roughly 17 km to the west. Rescue excavations during 1985 exposed an unexpectedly rich archaeological deposit which reached a depth of 2.5 m. Cultural assemblages from the MSA and LSA were recovered (Kaplan, 1989).</p>
AD 450 – AD 750	<p>The Mzonjani facies of the Kwale Branch of the Urewe Tradition represents the earliest Iron Age phase, which can be associated with the study area and its surroundings. The pottery of this facies is characterised by the occurrence of punctates on rim and spaced motifs on the shoulders of the clay vessels. This facies represents the oldest known Iron Age facies from KwaZulu-Natal (Huffman, 2007). The type site was identified during the commencement of</p>

	road construction some 4.2 km north-east of the study area. (Maggs, 1980).
AD 650 – AD 750	The Msuluzi facies of the Happy Rest Sub-Branch of the Kalundu Tradition represents another Iron Age phase, which can be associated with the study area and surrounding landscape. The pottery of this facies is characterised by broad cross-hatching, blocks of lines on rims as well as complex decoration on the neck and shoulder (Huffman, 2007).
AD 750 – AD 950	The Ndongondwane facies of the Kalundu Tradition is the next Iron Age facies to be identified within the general surroundings of the study area. The key features on the decoration of the ceramics comprise multiple bands of herringbone and cross-hatching in the neck (Huffman, 2007).
AD 950 – AD 1050	The Ntshekane facies of the Kalundu Tradition is the next Iron Age facies to be identified within the general surroundings of the study area. The key features on the decoration of the ceramics from this facies comprise multiple bands of herringbone on sloping necks (Huffman, 2007).
AD 1050 – AD 1500	The Blackburn facies of the Blackburn Branch of the Urewe Tradition represents the next Iron Age phase associated with the study area and surrounding landscape. The pottery of this facies is characterised by rim notching, spaced motifs, chevrons, punctates and appliqué (Huffman, 2007). The type site was excavated between 1968 and 1970 by Davies (1971) and is located 9.6 km north-east of the present study area.
AD 1350 – AD 1750	Ongoing research in KwaZulu-Natal has focused on the second phase of the Blackburn sequence, known as Moor Park. During the fourteenth century, the Moor Park farmers were the first to colonize the higher altitude grasslands of South Africa's interior. In doing so, they opened up possibilities for greater economic specialization and interdependence, not least because of the impossibility of smelting iron where suitable fuel was lacking. The same lack of timber also encouraged the adoption of stone as a building material (Mitchell and Whitelaw, 2005). The Moor Park facies of the Blackburn Branch of the Urewe Tradition is associated with pottery characterised by punctates, rim notching and appliqué (Huffman, 2007).
c. 1500	During this period the area today known as KwaZulu-Natal became increasingly populated by black people, and documents dating to as early as 1550 indicate that these residents had generally uniform customs and language (Van Jaarsveld, 1998). While they were not known as Zulu yet, these residents were certainly Nguni. In the words of John Laband: <i>“After about AD 1500 the evidence indicates that the Iron Age people of the Natal-Zululand region were culturally, linguistically and physically the direct ancestors of today’s black population, and that their distinctive Nguni-speaking culture had developed within their own region”</i> (Laband, 1995:13).
Early 1700s	Oral history relates that approximately at the beginning of the eighteenth century a number of other Black groups were living in the Durban area, including the Khanyawo, Nqondo, Thembu and Mpofana. While the Mpofana settled in the present-day Bluff area, the Thembu lived in most of the area where present-day Durban is located today, but south of the

	uMngeni River. Both these groups were fishermen. However, the Khanyawo living on the northern side of the uMngeni River were metal workers and used to trade spears for fish with the neighbouring Thembu (Whitelaw, 1991).
1770s – 1780s	The Thuli moved into the Natal Bay area during this time and established the Thuli Chiefdom in these areas (Whitelaw, 1991).
1787 - 1828	Shaka kaSenzangakhona, born in 1787, became leader of the small subordinate clan named Zulu, and by the time of his assassination on 24 September 1828 (Laband, 1995) King Shaka had made the Zulu the most powerful kingdom in Africa, a kingdom and people synonymous with a vast piece of South Africa still known today as Zululand and KwaZulu-Natal. As will be shown below, by 1824 the Zulu controlled the Durban area as well.

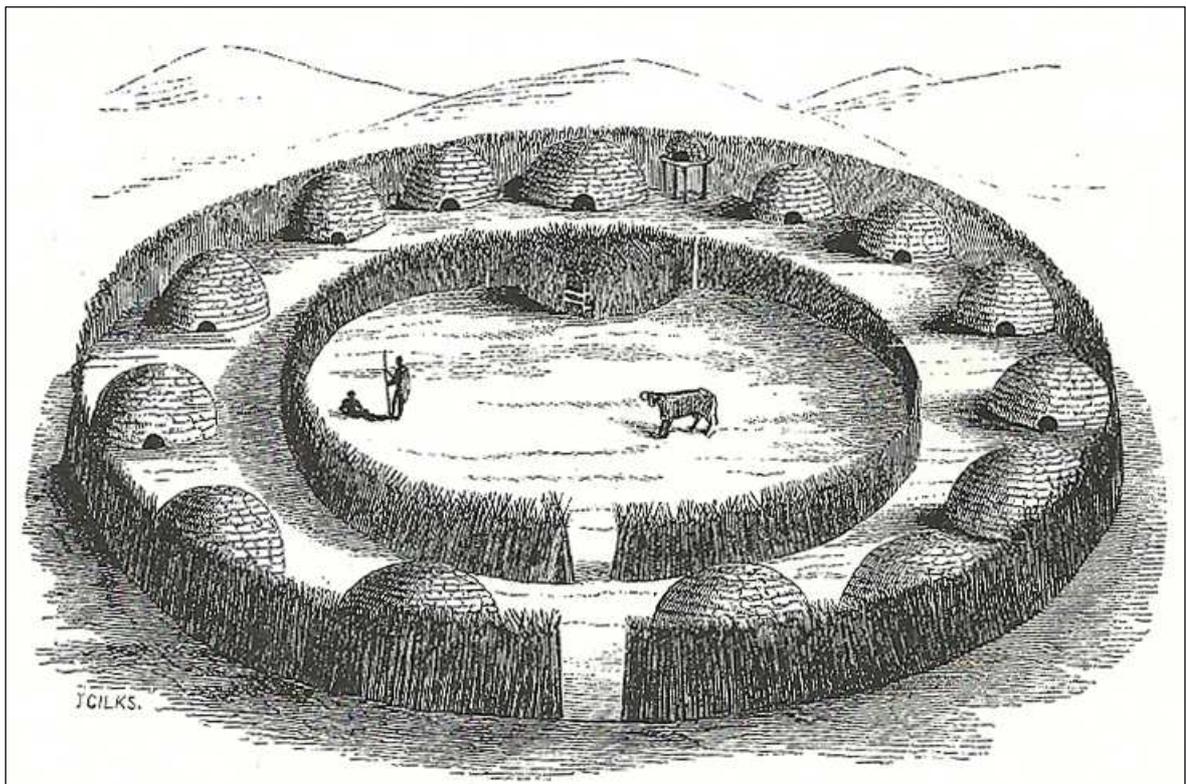


Figure 32 – A 19th century depiction of a typical Zulu umuzi (homestead) (Reader's Digest, 1994:81).

1824	<p>Six Englishmen, under the leadership of Henry Francis Fynn and Francis Farewell, established a trading post named Port Natal at present-day Durban.</p> <p>By 1838 the white population of the settlement reached thirty individuals, whereas a number of black refugees settled on a permanent basis at the village as well (Van Jaarsveld, 1998).</p> <p>It is important to note that Laband (1995) indicates that Farewell had communicated with King Shaka of the Zulu for permission to establish the trading post. This indicates that the Zulu kingdom controlled the area known today as Durban at the time.</p>
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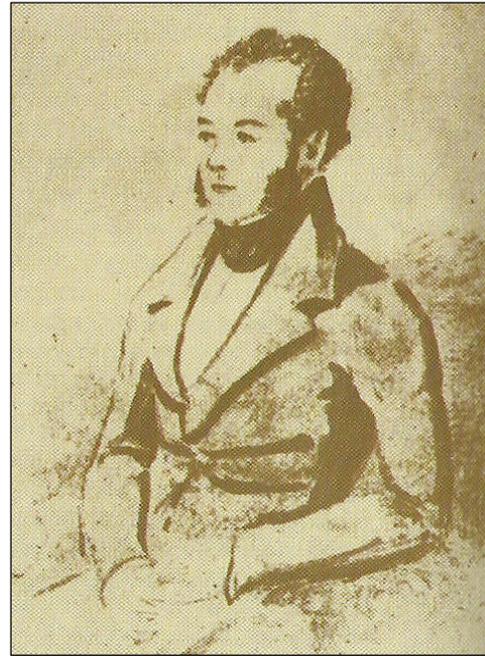


Figure 33 – Francis Farewell (left) and Henry Francis Fynn (right) (Reader’s Digest, 1994:86).

1828	In 1828, King Shaka ceded to Nathaniel Isaacs the district comprising the site of Durban (Henderson & Pay, 1939).
1835	<p>In 1835, the settlers decided to lay out the settlement in streets and named the town D’Urban, after Sir Benjamin Durban, the Governor of the Cape Colony (Henderson & Pay, 1939).</p> <p>In the same year the new king of the Zulu, Dingane, who succeeded after the assassination of Shaka, forbade any white person to cross over the Tugela River (Van Jaarsveld, 1998).</p>
16 December 1837	After the arrival of Dutch speaking trek farmers (<i>Voortrekkers</i>) from British controlled Eastern Cape borderlands into the territory of the Zulu as part of the Great Trek, King Dingane attacked their laager at Blood (Ncome) River and was defeated (Laband, 1995).
24 April 1838	Fearing the increasing influence of the white traders at Port Natal, Dingane ordered his army to attack it. By chance, the vessel <i>Comet</i> was at anchor of Port Natal, and most of the white families managed to flee to the safety of the ship from where they watched the settlement destroyed (Van Jaarsveld, 1998).
1839 – 1843	<p>With the settlement of Port Natal in ruins, and the threat of Dingane for the time being averted, the Voortrekkers established the Republic of Natalia. Two towns were established by them during this time as well, namely Pietermaritzburg (named after Piet Retief and Gert Maritz) and Congella (in the vicinity of the present-day Durban) (Laband, 1995).</p> <p>Alexander Biggar was appointed the first magistrate and Port Natal was properly surveyed for the first time by George Cato. The suburbs of Cato Manor and Cato Ridge were later named in his honour (Erasmus, 2014).</p>

1842	In 1842, after short hostilities that included the Battle of Congella and the Siege of Durban, Captain Smith with a force of 300 men occupied Port Natal (Henderson & Pay, 1939). On 31 May 1844 the territory was formally annexed to the Cape Colony (Erasmus, 2014). In 1845 the first Lieutenant-Governor, Martin West, was appointed (Erasmus, 2014) (Henderson & Pay, 1939).
1848	The first sugar cultivars were imported from Mauritius, and proved to be very successful (www.sahistory.org.za). This resulted in the rapid growth of sugar cane farming in the surroundings of present-day Durban.
1854	On 15 May 1854, the town of Durban was proclaimed a Borough and George Cato became the first mayor (Henderson & Pay, 1939) (Erasmus 2014).
1860	The system of indenture was approved by governments in India and Britain, endorsed by Natal's colonial legislature, and financed in part by the sugar cane planters. Beginning with the 342 Indians who came on board the Truro on 16 November 1860, a total of 152,641 indentured Indian workers arrived in Natal between 1860 and 1911 (Vahed, 2012).
1865	The Umgeni Sugar, Coffee and Produce Company Limited was established in 1865 "...to exploit the large sugar plantation of Sea Cow Lake, just north of Durban." (Beinart et.al, 1986). The factory of this company was in Newlands on the northern bank of the uMngeni River and could be seen from Reservoir Hills (South African Sugar Journal, 1981).It is evident that this company operated in close proximity to the present study area.
1860s – 1911	During this period, the government of the Natal Colony began to set aside several locations for Indians in areas around Natal. The main areas that Indians occupied in the Durban area were beyond the uMngeni River, in Riverside and Prospect Hall and further inland at Duikerfontein and Sea Cow Lake. Springfield and Sydenham were also predominantly Indian. Indians also settled in areas such as Mayville, Cato Manor, Clairwood, Magazine Barracks and the Bluff (www.sahistory.org.za). An Indian community is also known to have established themselves at present-day Newlands. Evidence for this includes the Narainsamy Temple that was built under instruction of Narainsamy Mudaliar in 1896.
11 February 1871	John Langalibele Dube was born at the Inanda Mission of the American Zulu Mission (AZM). He was the president of the South African Native National Congress (which later developed into the African National Congress) between 1912 and 1917 (www.sahistory.co.za). Although Dube travelled widely, a significant portion of his life was spent at Inanda, roughly 6 km north-west of the present study area.
1879	The Anglo-Zulu War took place during this year. The Durban area would have seen a marked increase in movements of troops and supplies from the harbour to areas further north as well as the establishment of defensive works to protect the settlement from potential Zulu attacks, including ones at Verulam and New Germany (see Laband and Thompson, 1983). However, no skirmishes or battles associated with the war took place anywhere close to the present study area.

1880s - 1890s	<p>After suffering financial bankruptcy in his early years, the early settler and sugar baron Marshall Campbell worked his way up in the Natal sugar industry during the 1880s and 1890s by consolidating central milling operations at Mount Edgecombe. He founded his company Natal Estates Ltd in London in 1895. This company eventually bought out most of the neighbouring sugar estates such as Blackburn, Saccharine Hill, Milkwood Kraal, Effingham and Umtata (Hughes, 2011). It is evident from these place names that the properties of Natal Estates Ltd may very well have included sections of the present study area at the time. Rankin and Tichmann (1986) for example indicate that sections of what is known today as Newlands East fell under the Effingham Estate of the Natal Estates Limited.</p>
1899 – 1902	<p>The South African War was fought between Great Britain and the Boer republics of the Zuid-Afrikaansche Republiek and Orange Free State. Durban was not directly affected by the war as some most of the battles that took place in KwaZulu-Natal occurred at towns such as Dundee, Ladysmith and Talana. The three attempted invasions of Natal by the Boer forces (at the beginning of 1900, in September 1901, and in March 1902) were all repulsed successfully by the British forces (Brookes & Webb, 1979).</p>
1904	<p>In this year Mohandas Karamchand Gandhi, who had lived in Durban since 1893, established the settlement of Phoenix (www.wikipedia.org). His reconstructed house is located roughly 5.2 km north-west of the study area.</p>
1910	<p>The Nazareth Baptist Church was established by Isaiah Shembe at Inanda. Shembe established this church on a freehold farm known as ekuPhakameni, which he had purchased a short while before (www.wikipedia.org). This Shembe church is located 6.2 km north-west of the present study area.</p>
<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><i>Figure 34 – Isaiah Mloyiswa Mdlwamafa Shembe (c. 1870 – 2 May 1935) who established the Nazareth Baptist Church in 1910 (www.ulwazi.org).</i></p> </div> </div>	
1921 - 1926	<p>By 1921 various suburbs had sprung up around Durban and Village Management Boards were formed to provide some form of management. In 1926 the Natal Provincial Administration Board established Local Administration and Health Boards for certain areas (Henderson & Pay, 1939).</p>

1931 - 1935	This was followed by the Durban Borough Extension and Loan Ordinance of 1931. The Municipal area was enlarged to some 67 square miles. In 1935 the status of Durban was raised to that of a city (Henderson & Pay, 1939).
1948-1950	The Ghetto Act, passed in 1948 and the Group Areas Act, passed in 1950, proclaimed certain areas for whites only. This meant that the non-White communities who found themselves in these areas would have to be moved to other areas designated as 'Indian', 'Coloured' or 'African'. The Group Areas Act displaced thousands of Indians and Africans from their homes and businesses. Indians were removed from areas such as Mayville, Cato Manor, Clairwood, Magazine Barracks and the Bluff (www.sahistory.org.za).
1950s	<p>As a result of the Group Areas Act that was proclaimed in 1950 a number of residential areas were established for Black, Indian and Coloured people who were removed from other areas. These newly established townships were KwaMashu, Newlands East, Newlands West and Reservoir Hills.</p> <p>KwaMashu for example was one of the first of Durban's dormitory townships that emerged with the implementation of the Apartheid Group Areas Act during the 1950s. KwaMashu resulted from the mass resettlement of the slum population of Cato Manor during the period of 1958 to 1965 (www.sahistory.org). Before the establishment of the township the area was a sugar cane plantation owned by Marshall Campbell (www.ulwazi.org). The name means "the place of Mashu", Mashu being the Zulu name for Sir Marshall Campbell (Erasmus, 2014).</p> <p>Newlands East for example was established as a township for Coloured people after the promulgation of the Group Areas Act (Khan, 2013). It would appear that Newlands West was also planned for Coloured people.</p> <p>Reservoir Hills is another of the areas that was zoned for Indian residence after the Group Areas Act was implemented in 1950 (Schensul, 2009). At the time it apparently advertised as "an Indian area available for the more well to do Indians" (http://www.sahistory.org.za/indian-community).</p>

5.3.2 Findings from Historical Overview

The historic overview of the study area and surroundings has revealed a long and significant history for the surroundings of the study area. However, apart from a few aspects very little of the historical overview can be directly associated with the study area itself. One of these is the early history of sugar cane farming in KwaZulu-Natal, and especially the work of the well-known companies Natal Estates Limited and Umgeni Sugar, Coffee and Produce Company Limited. Furthermore, the establishment of the four suburbs of KwaMashu, Avoca Hills, Newlands East, Newlands West and Reservoir Hills as segregated residential areas for the Black, Coloured and Indian communities in Durban after the promulgation of the Group Areas Act in 1950, also have significance for the study.

6 PALAEOLOGICAL OVERVIEW AND FINDINGS

Refer Annexure A for the complete Palaeontological Report

6.1 Geology of the Study Area

Most of the study area is underlain by Ordovician to Silurian-aged quartzites of the Natal Group, Carboniferous to Permian aged tillites of the Dwyka Group, Permian aged shales of the Pietermaritzburg Formation, Permian aged sandstone of the Vryheid Formation of the Karoo Supergroup, Jurassic aged Dolerite and Quaternary aged alluvium.

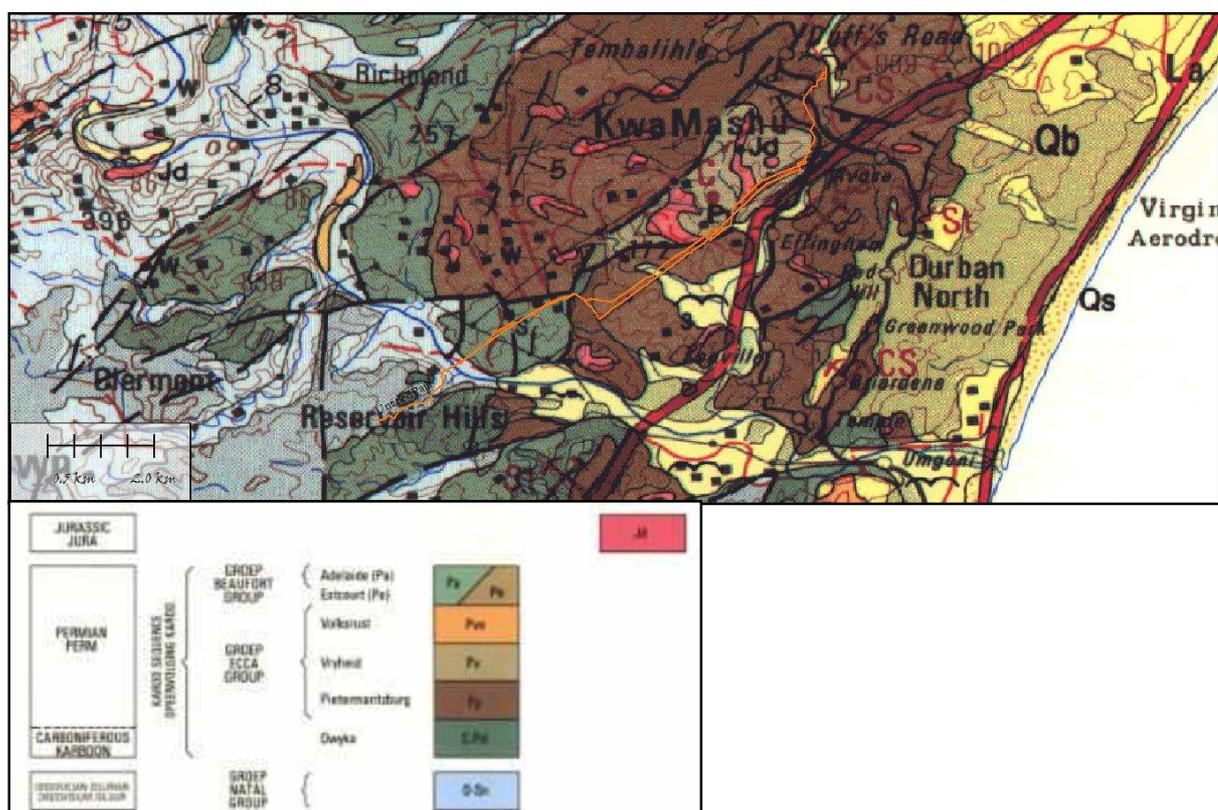


Figure 35 – Map showing the geology of the study area

6.1.1 Natal Group

The Ordovician to Silurian Aged Natal Group consists predominantly of relatively clean quartzite, with minor shale beds.

6.1.2 Dwyka Group

The Carboniferous to Permian aged Dwyka Formation is an assemblage of diamictites and glacial sediments, consisting of a mixture of fine-grained, poorly sorted sediments ranging

from fine-grained silts and shales to sandy shales, with larger dropstones and angular cobbles in places. The deposits represent glacial activity in this part of Gondwanaland during the Carboniferous and Early Permian (Johnson et al, 2006).

6.1.3 Ecca Group

6.1.3.1 Pietermaritzburg Formation

The Permian aged Pietermaritzburg Formation consists mainly of dark grey to black shale deposits.

6.1.3.2 Vryheid Formation

The Permian aged Vryheid Formation consists mainly of coarse-grained sandstone and carbonaceous shale, with some prominent coal beds in many parts of the basin.

6.1.3.3 Dolerite

The Jurassic aged dolerite forms part of the main suite of Karoo Dolerite that was intruded during the breakup of Gondwanaland.

6.1.3.4 Alluvium

The alluvium deposits are associated with the deposits of the recent rivers in the area.

6.2 Palaeontology of the Study Area

6.2.1 Natal Group

No significant fossils have been recorded to date from the quartzites of the Natal Group

6.2.2 Dwyka Group

Trace fossils have been recorded from the fine-grained shales of the Dwyka Group in KwaZulu-Natal (Linstrom, 1987; MacRae, 1999). All of the following could potentially be found in KwaZulu-Natal. Trackways, produced mostly by fish and arthropods (invertebrates), have been recovered in shales from the uppermost Dwyka Formation. Other trace fossils include coprolites (fossilized faeces) of chondrichthyans (sharks, skates and rays).

Body fossils include araneaceous foraminifera and radiolarians (single-celled organisms), bryozoans, sponge spicules (internal support elements of sponges), primitive starfish, orthoceroid nautiloids (marine invertebrates similar to the living *Nautilus*), goniatite cephalopods (*Eoasinites* sp.), gastropods (marine snails such as *Peruvispira viperdorfensis*), bivalves (*Nuculopsis* sp., *Phestia* sp., *Aphanaia haibensis*, *Eurydesma mytiloides*), brachiopods (*Attenuatella* sp.) and palaeoniscoid fish such as *Namaichthys schroederi* and *Watsonichthys lotzi*.

Fossil plants have also been found, including lycopods (*Leptophloem australe*), moss, leaves and stems (possibly belonging to a proto-glossopterid flora). Fossil spores and pollens (such as moss, fern and horsetail spores and primitive gymnosperm pollens) as well as fossilized wood probably belonging to primitive gymnosperms have also been recorded from Dwyka deposits (MacRae, 1999; McCarthy and Rubidge, 2005; Groenewald, 2012).

6.2.3 Ecca Group

6.2.3.1 Pietermaritzburg Formation

Fossils are generally absent from the Formation although trace fossils have been recorded from the upper layers of the Pietermaritzburg Formation by Linstrom (1987).

6.2.3.2 Vryheid Formation

The Vryheid Formation is well-known for the occurrence of coal beds that resulted from the accumulation of plant material over long periods of time. Plant fossils described by Bamford (2011) from the Vryheid Formation are; *Azaniodendron fertile*, *Cyclodendron leslii*, *Sphenophyllum hammanskraalensis*, *Annularia* sp., *Raniganjia* sp., *Asterotheca* spp., *Liknopetalon enigmata*, *Glossopteris* > 20 species, *Hirsutum* 4 spp., *Scutum* 4 spp., *Ottokaria* 3 spp., *Estcourtia* sp., *Arberia* 4 spp., *Lidgettonia* sp., *Noeggerathiopsis* sp. and *Podocarpidites* sp. According to Bamford (2011) "Little data have been published on these potentially fossiliferous deposits. Around the coalmines there is most likely to be good material and yet in other areas the exposures may be too poor to be of interest. When they do occur, fossil plants are usually abundant, and it would not be feasible to preserve and maintain all the sites, however in the interests of heritage and science such sites should be well recorded, sampled and the fossils kept in a suitable institution.

Although no vertebrate fossils have been recorded from the Vryheid Formation, invertebrate trace fossils have been described in some detail by Mason and Christie (1986). It should be noted, however, that the aquatic reptile, *Mesosaurus*, which is the earliest known reptile from the Karoo Basin, as well as fish (*Palaeoniscus capensis*), have been recorded in equivalent-aged strata in the Whitehill Formation in the southern part of the basin (MacRae, 1999; Modesto, 2006). Indications are that the Whitehill Formation in the main basin might be correlated with the mid-Vryheid Formation. If this assumption proves correct, there is a possibility that *Mesosaurus* could be found in the Vryheid Formation.

The late Carboniferous to early Jurassic Karoo Supergroup of South Africa includes economically important coal deposits within the Vryheid Formation of Natal. The Karoo sediments are almost entirely lacking in body fossils but ichnofossils (trace fossils) are locally abundant. Modern sedimentological and ichnofaunal studies suggest that the north-eastern part of the Karoo basin was marine. In KwaZulu-Natal, a shallow basin margin accommodated a prograding fluviodeltaic complex forming a broad sandy platform on which coal-bearing sediments were deposited. Ichnofossils include U-burrows (formerly *Corophioides*) which are assigned to ichnogenus *Diplocraterion* (Mason and Christie, 1986).

6.2.3.3 Dolerite

Due to its igneous character, dolerite will not contain fossils.

6.2.3.4 Alluvium

No significant fossils have been recorded from the alluvial deposits in this part of KwaZulu-Natal.

6.3 Palaeontological Sensitivity of the Study Area

The likely impact of the proposed development on local fossil heritage is determined based on the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of fresh bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1 above. The palaeontological sensitivity of the study area is shown in the image below. The Natal Group is allocated a Low palaeontological sensitivity due to the fact that no fossils have up to date been recorded from this unit.

The Pietermaritzburg Formation and alluvial deposits have been allocated a medium palaeontological sensitivity whereas the areas underlain by dolerite are allocated a very low to non-significant rating for palaeontological sensitivity. The Vryheid Formation however is allocated a very high palaeontological sensitivity.

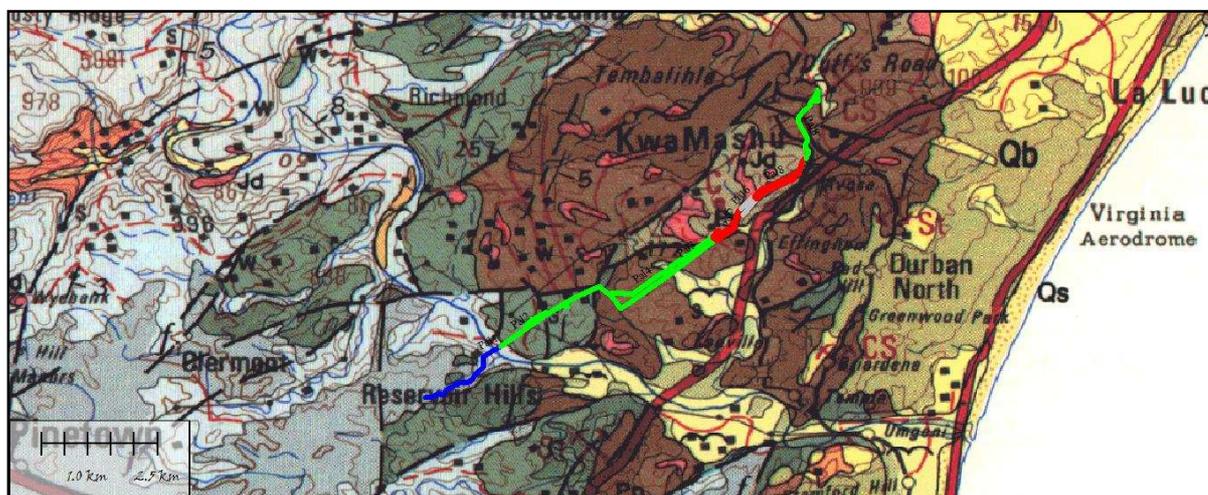


Figure 36 – The palaeontological sensitivity of the study area. Red represents the high palaeontological sensitivity areas, green the moderate sensitivity areas, blue the low sensitivity areas and grey the areas of no sensitivity.

6.4 Conclusions and Recommendations for Palaeontology

The study area is mostly underlain by Ordovician to Silurian aged quartzites of the Natal Group, Carboniferous to Permian Aged tillites of the Dwyka Group, Permian aged shales and sandstones of the Ecca Group, Jurassic aged dolerite and Quaternary aged alluvium. Trace fossils have been recorded from the Dwyka Group and Pietermaritzburg Formation of the Ecca Group, whereas fossils are abundantly known from rocks of the Vryheid Formation, also from the Ecca Group. No fossils are expected from the alluvial deposits and the dolerite will not contain fossils. The following recommendations can be made:

- The EAP and ECO of the project must be made aware of the possibility of finding trace fossils in areas underlain by the Dwyka Group and Pietermaritzburg Formation. There is a very high possibility of fossils being present in the areas underlain by the Vryheid Formation.
- Due to the fact that the presence/absence of fossils will only be recorded during the execution of the excavation activities, it is recommended that a qualified

palaeontologist be appointed to compile a Phase 1 PIA report if fossils are recorded during the construction phase of the project.

7 FIELDWORK FINDINGS

7.1 Introduction

The fieldwork was undertaken by a team comprising two archaeologists and one archaeological field assistant. The archaeologist was equipped with a hand-held GPS, and his recorded track logs are depicted in purple below. The three individuals conducting the fieldwork were Polke Birkholtz (Archaeologist and Project Manager), George Annandale (Archaeologist) and Derrick James (Field Assistant). The fieldwork was undertaken from Tuesday, 24 March 2015 to Thursday, 26 March 2015.

The overall study area consisted of the preferred pipeline route and three alternative routes situated on the north-western of the city of Durban. These three proposed line alternatives are labelled Alternative Routes 2, 3 and 6. Priority was placed during the fieldwork in the preferred pipeline route, and as a result a detailed walkthrough of almost the entire preferred line was undertaken. Less intensive fieldwork was conducted on the three route alternatives, with most of the fieldwork coverage on these three alternatives done from a vehicle. Written descriptions, photographs and GPS coordinates were taken of all heritage sites identified during the survey.

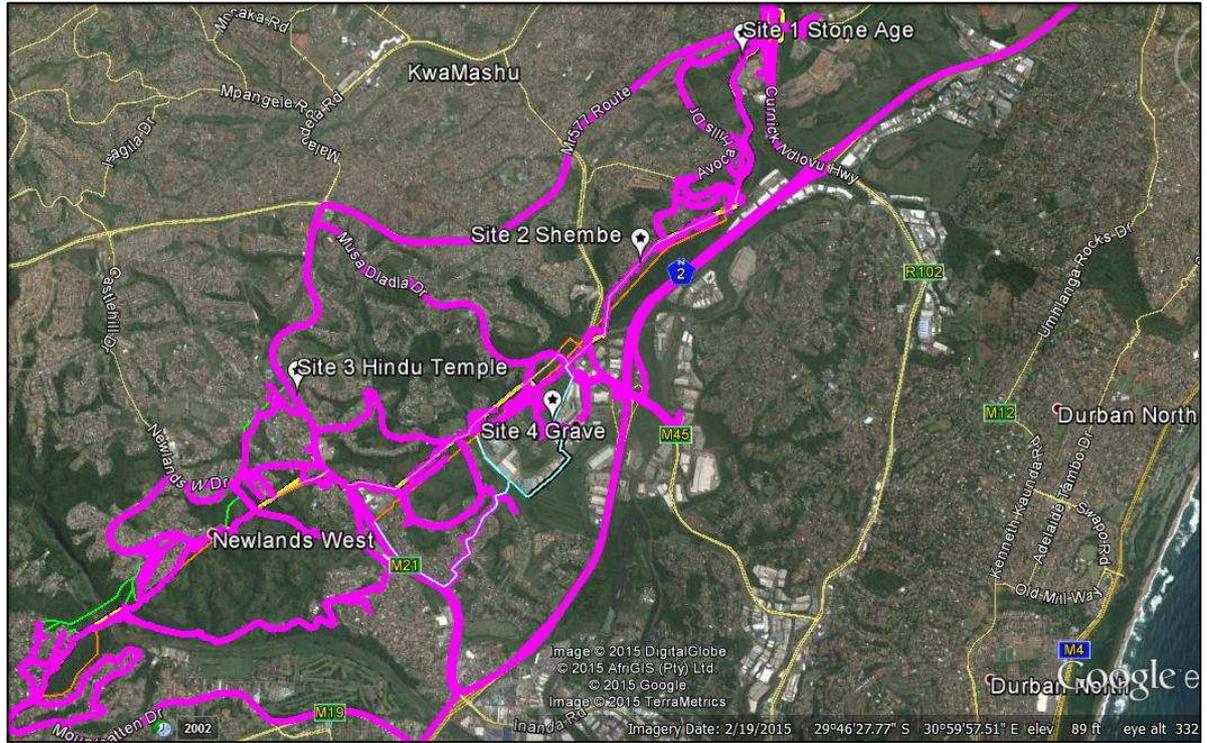


Figure 37 – Overall view of the proposed pipeline route, showing the recorded tracklogs as well as the four identified heritage sites.

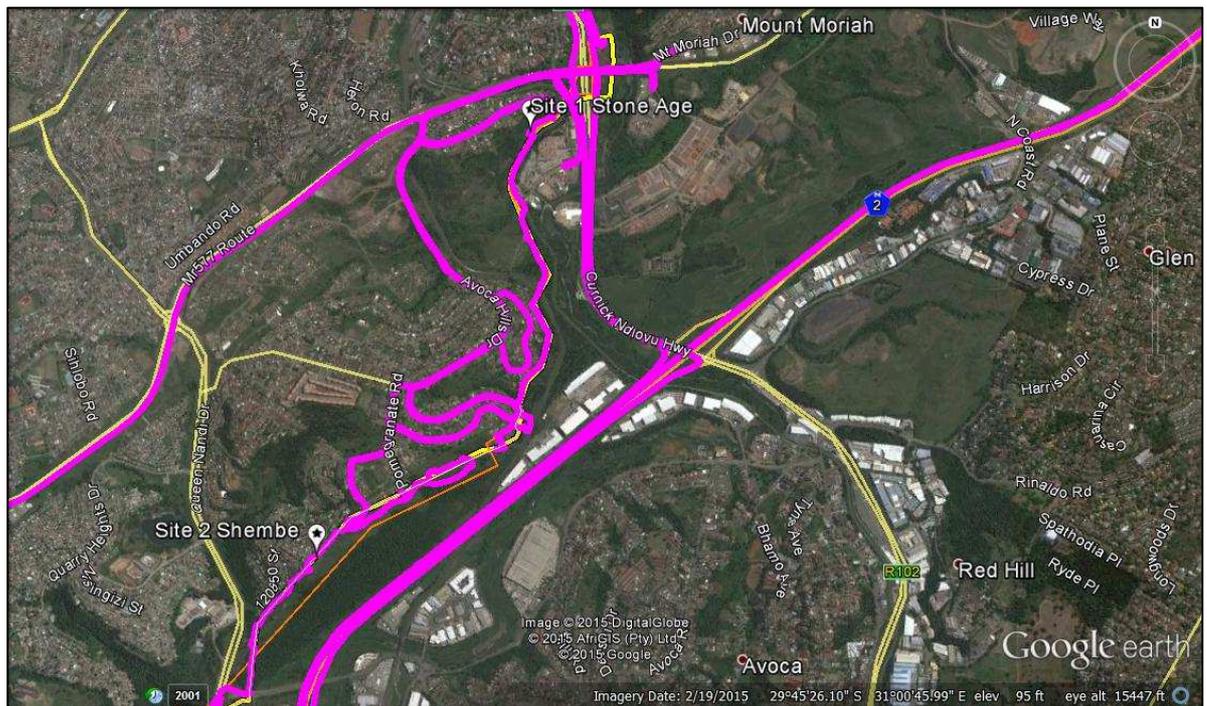


Figure 38 – Google Earth image depicting a closer view of the tracklogs recorded along the northern of the study area.

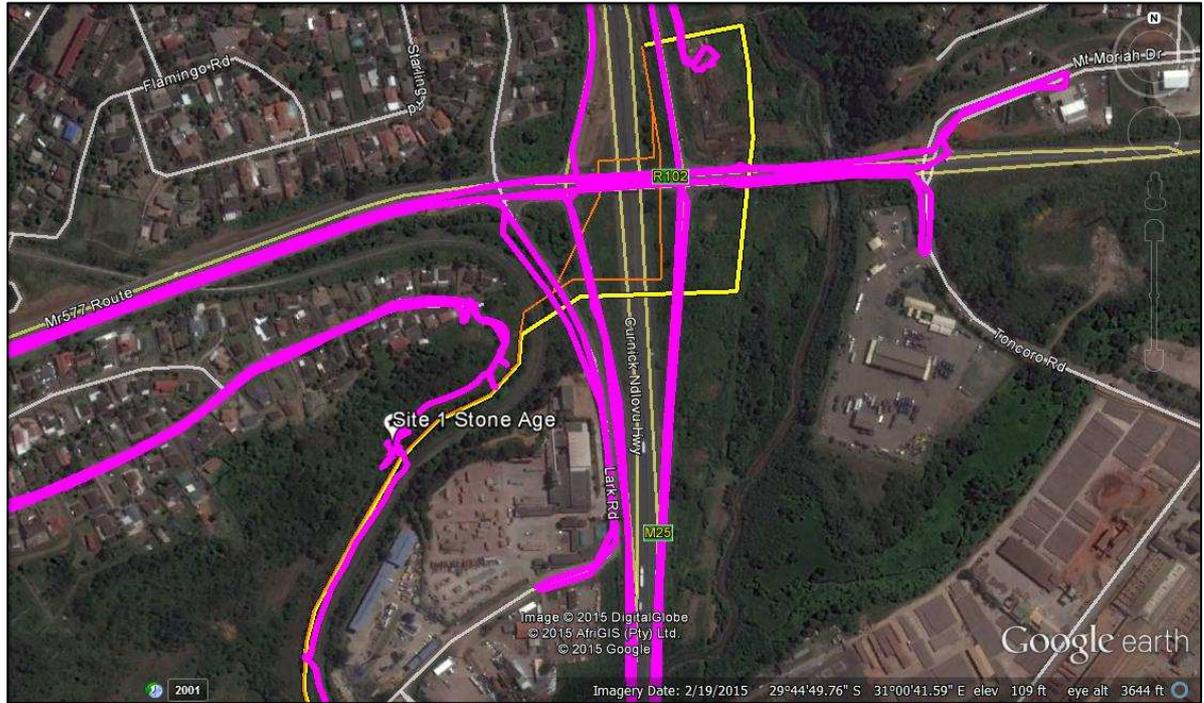


Figure 39 – View of the recorded tracklogs on the northern end of the study area, showing the location of Site 1

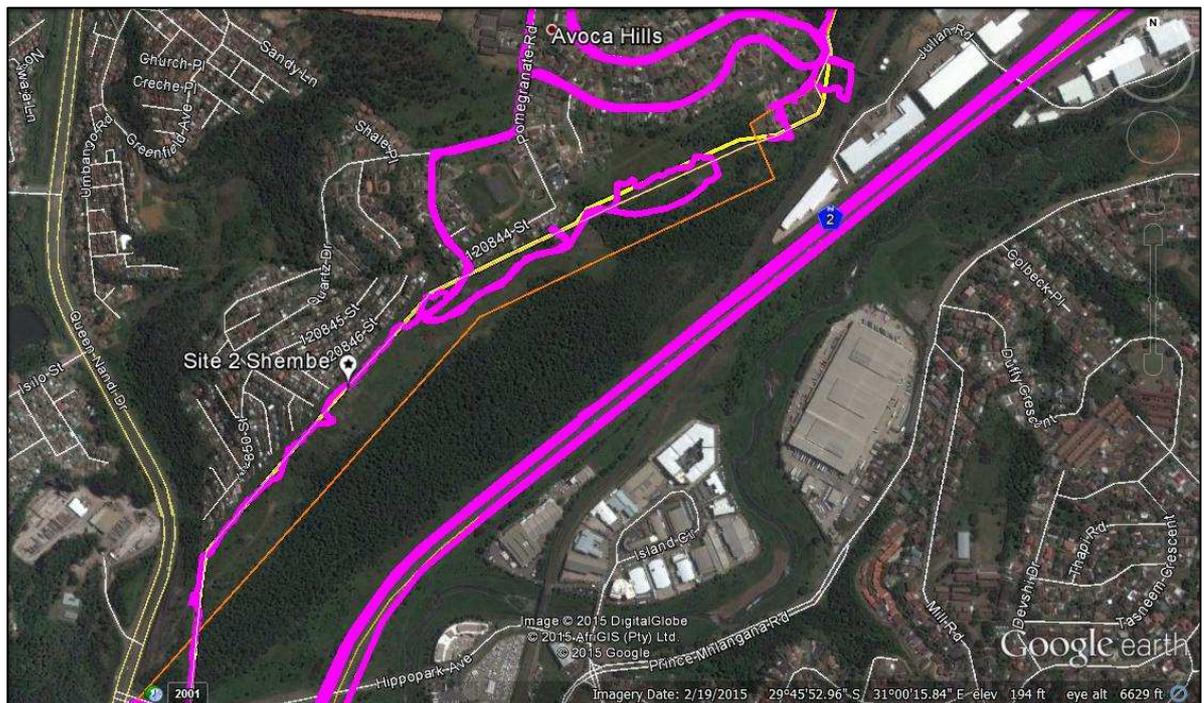


Figure 40 – View of recorded tracklogs along the mid-northern sections of the study area and showing the location of Site 2.

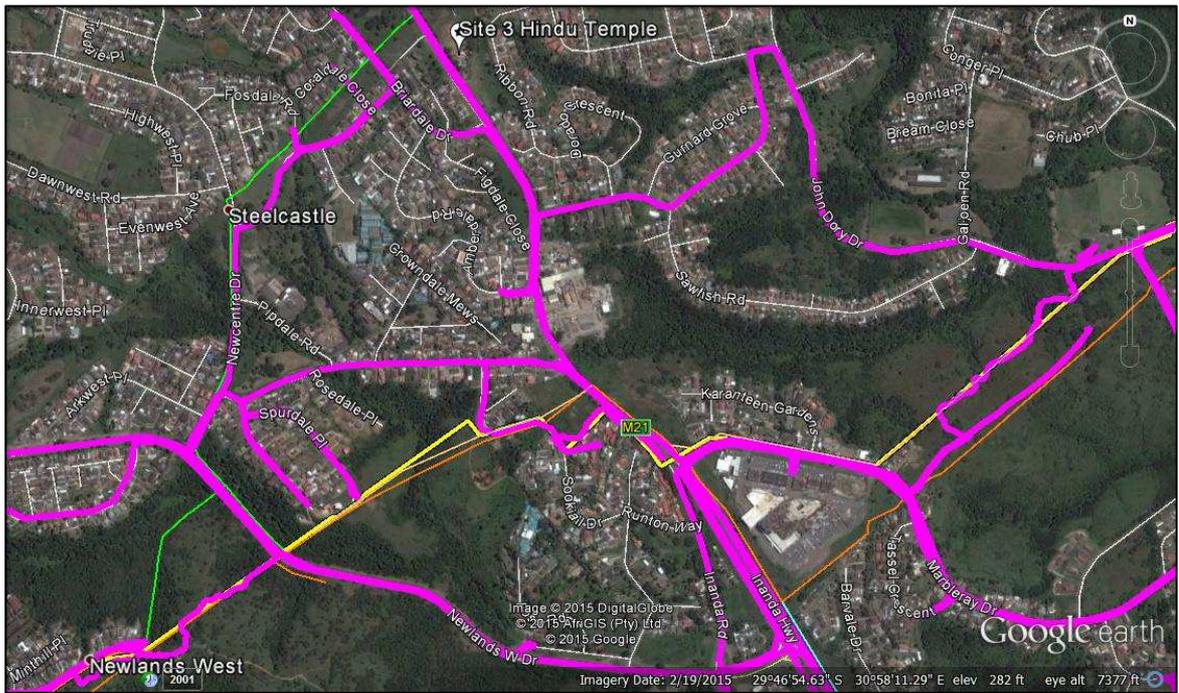


Figure 41 – View of the recorded tracklogs along the central parts of the study area and showing the location of Site 3.

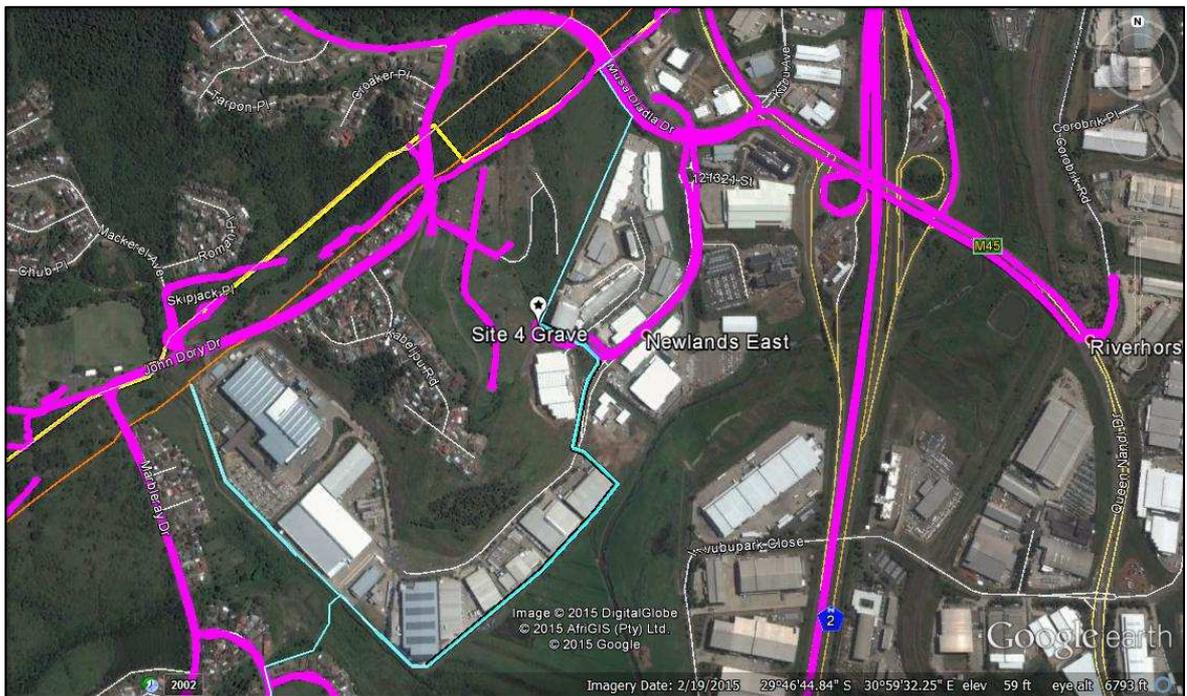


Figure 42 – Another view of the recorded tracklogs along the central sections of the study area with Route and location of Site 4 depicted.

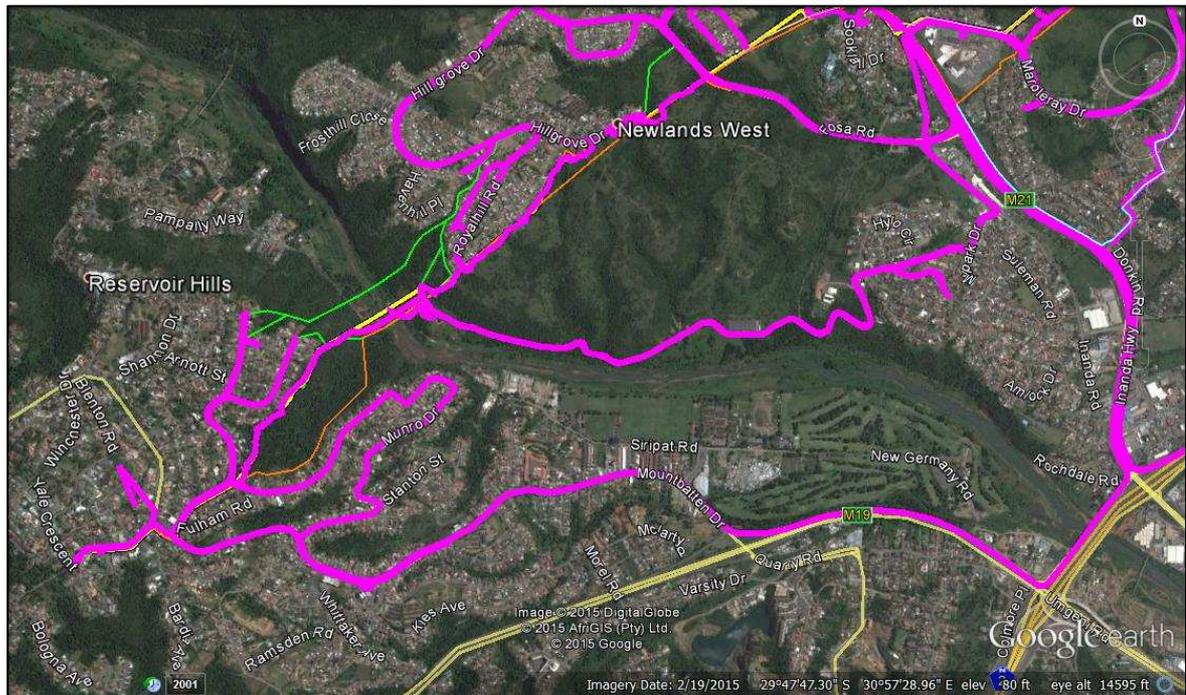


Figure 43 – View of the recorded tracklogs along the southern end of the study area.

7.2 Sites identified within or near the Preferred Route and Route 2 Alternatives

Two sites were identified in close proximity to the footprint area of the Preferred Route and Route 2 Alternatives. These sites will be individually discussed below.

7.2.1 Site 1

Site Coordinates:

S 29° 44' 52.9"

E 31° 00' 33.4"

Site Description:

A Stone Age occurrence was exposed by excavations undertaken during maintenance work on an existing pipeline. The occurrence was identified roughly 15 m from the Preferred Route and Route 2 footprints.

Two Early Stone Age stone tools as well as a smaller flake were observed in the discard heap of the maintenance excavations. A thorough investigation of the walls of the excavations

was subsequently made and no further lithics could be identified. It is therefore clear that the site comprises an occurrence of Stone Age lithics and does not constitute enough of a concentration of stone tools to classify it as a formal archaeological site.

As mentioned elsewhere, during a Heritage Impact Assessment study of the Corrobrock property by Prins (2014), a number of Stone Age artefacts were uncovered by excavations, including an ESA cleaver and MSA flakes and blades. This Stone Age occurrence is located roughly 1km south-east of the present site.

Site Significance:

Due to the lack of any concentration of artefacts, the site has very little scientific or historic significance. As a result, the site is deemed to be of Generally Protected C (Grade 4C), which represents a Low Significance. This indicates that the site may be destroyed without any further mitigation taking place.



Figure 44 - General view of the discard heap on which the three stone artefacts were identified.



Figure 45 - The three lithics identified at the site

7.2.2 Site 2

Site Coordinates:

S 29° 45' 54.8"

E 30° 59' 58.3"

Site Description:

A church was identified roughly 6 m from the Preferred Route and one of the Route 2 options. The church is located on the crest of a ridge with expansive views all around. It comprises a rectangular corrugated iron building with a pitched roof with a rectangular area demarcated with white painted stones located on the building's southern end. The demarcated rectangular area contains a number of small to medium sized trees.

The white painted stones used throughout the site as well as the association of the demarcated area with planted trees suggest that the church more than likely forms part of the Nazareth Baptist Church (also known as the "Shembe Church" or "iBandla

lamaNazaretha”). While the Nazareth Baptist Church as a whole was established in 1910 by Isaiah Shembe, an assessment of the available historical imagery of Google Earth indicates that the church site under discussion was only built after 2005.

Site Significance:

The significance of a Shembe church, such as the one located on Site 2, is usually found on three levels, namely a built heritage significance (if the structure and buildings of the church are older than 60 years), secondly a historical significance (if the church can be associated with a historic event or person in the church's history), and thirdly a social significance (if the site has high emotional and religious value for a particular community).

In this case, the available Google Earth imagery indicates that the church was erected after 2005. This means that its structural component can certainly not be viewed as significant within the realms of the heritage legislation. Furthermore, it can also not be seen as a historic site associated with any historic person. For the purposes of this report, the site is deemed to be of Generally Protected C (GP. 4C) which equals a Low Heritage Significance. However, the church still has high social significance.



Figure 46 - General view of the church with the rectangular building on the left and the area demarcated with white stones evident on the right. Photograph supplied by Robyn Phillips.



Figure 47 - Another view of the area that is demarcated with white stones.

7.3 Sites identified within or near the Route 3 Alternative

One site was identified in close proximity to the footprint area of the Route 3 Alternative. This site will be discussed below.

7.3.1 Site 3

Site Coordinates:

S 29° 46' 34.4"

E 30° 58' 00.9"

Site Description:

The site comprises the Narainsamy (Vishnu) Temple in Newlands West. The temple is situated on the north-eastern side of the Inanda Highway in Newlands West. The proposed Route Alternative 3 is located approximately 8 m from the temple property and 20 m from the temple building.

Originally built as a private temple in the countryside for the Narainsamy family, the position for the temple was well chosen and it is located on the summit of a hill. In 1896 one of the foremost South African Hindu temple designers and builders Kristappa Reddy was commissioned by Narainsamy Mudaliar and the temple was completed between 1906 and 1908. Reddy was a master builder indentured from North Arcot in Madras in South India and had been responsible for a number of temples in KwaZulu-Natal including the Empangeni and Ganesha Temples. However, the Narainsamy (Vishnu) Temple is seen as his masterpiece and his main contribution to temple architecture in KwaZulu-Natal. See for example Picton-Seymour (1989), Richardson (2001), Radford (2002) and websites such as www.artefacts.co.za.

The Narainsamy Temple is described as follows by Grossert (1965):

“As one approaches the Narainsamy temple, one is immediately aware that it is the edifice of a major deity for Narainsamy (Narayana Swami) is Vishnu, the second person of the Siva. The lovely pyramidal koroborum is flanked by two small domes, and rises high above the flat roof, which stretches out in front of it.

Looking at the temple itself one feels, that like so many of those in India, it has a sculptural, as well as architectural quality. The walls of the temple have been treated very simply. The stucco modeling and elaborate detail of the steeple and domes rise up from a classical and comparatively simple pedestal. Above the main entrance is a decorative feature made up of three arched panels, which form a short parapet to the flat roof of the hall, and it has two small stucco figures standing at either end. The flame motif of the arches is repeated as a dominating theme in the decorations of the spire, and is a form of the well-known mandala, Vishnu is Surya, the old Aryan Sun God, and these mandalas with a grotesque head for a keystone, are undoubtedly sun symbols. The fiery curve of the mandala is the path of the sun, and the flames forming the tongue hanging from the grotesque head signify the burning heat of midday. These mandalas repeat the silhouette form of the lotus dome and can also be associated with the sacred syllable Om. In a series of small bronzes of the Lord of the Dance, Siva-Hataraja, made in South India between the tenth and twelfth centuries, one also sees the figures surrounded by a ring of small tongues of flame, the prabhamandala. There is probably some common significance in the allegorical meanings ascribed to these flame symbols.

The most impressive feature of the temple is the koroborum, or steeple, about fifty-three feet high. It rises like a many tiered wedding cake, with its rich stucco: modelling glistening in the sunshine. The first tier above the base is a frieze, with a wide overhanging, dentilled cornice, supported by caryatid figures. In the centre of each section are niches in which small modelled figures of deities have been placed.

Above the frieze are two more storeys of diminishing size, dominated by mandala motifs on the four sides and corners. The dome springs delicately from a frieze of lotus petals and is terminated above by the bell-like inverted lotus, which supports the sikhanta, or finial. The fixing of the sikhanta takes place at a special ceremony of dedication, which is the climax of forty days of preparation by a Brahmin who has been specially instructed in Hindu ritual. If for any reason the temple should fall into disuse, the sikhantais removed. In contrast to similarly shaped finials of stucco on other parts of the building, this sikhanta, above the steeple, is of gilded metal. It is the emblem of the Three Spheres, rising one above the other and separated by amilakas, the flattened pericarps of a lotus, and it terminates in a small cone, pointing upwards. The two small domes like pieces of statuary on either side of the koroborum are masterpieces of the plasterer's art. Around the bases quaint cows with one head that shares two bodies lie at the corners. It is a device reminiscent of the lions at the entrances to Babylonian palaces, which were given five legs to convey the appearance of solidity from front and side views.

Within the mandabulum (hall), four heavy square columns with capitals and bases similar to those on the pilasters and columns outside, support beams that run the length of the hall. These, in turn, support the flat concrete ceiling decorated with variations of the lotus theme. As a repeating motif it is used again in the form of small rosettes along the narrow frieze at the end of the hall, and on the face of the transoms above the openings to the image cells. The interior architecture is also painted pure white, providing an atmosphere of austere simplicity, but a little colour is brought in in various ways.

The temple has many other interesting little architectural details. There is a refreshing freedom in the way decoration has been added and the building set out, giving a personality that is found in freehand but not in mechanical drawings. One senses the hand-made product and the personal expression of builder in every part of the structure and one realises that studying the architecture gives but one aspect of the religious life of the Hindus. The temple building is the body, and unless a heart is beating within it and blood coursing through the

veins, it is a lifeless thing. There is a spiritual as well as a physical metabolism, a regeneration, a building up of cells and a growing. The Hindu temple is an expression of a spiritual faith by the Indian people of this conviction, and a reflection of their tradition”.

It is important to note that the Narainsamy Temple is believed to be the oldest South African Hindu temple with the Ganessa Temple at Mount Edgecombe the second oldest. The original buildings of the three oldest known South African Hindu temples (Shree Subramaniam Alayam on the Umbilo River, Emperuman Alayam in Mount Edgecombe and the Magazine Barracks Temple at Somtseu Road) do not exist anymore (Meer, 1969).

The Narainsamy Temple was declared a National Monument on 17 August 1984 (www.sahistory.org.za). Today it is proclaimed as a Grade II Provincial Heritage Site in terms of the National Heritage Resources Act.

Site Significance:

The significance of the Narainsamy Temple can be found on many levels. It is described as the masterpiece of one of the foremost South African Hindu Temple builders Kristappa Reddy and is believed to be the oldest South African Hindu Temple still in existence today (see Meer, 1969). It is also protected by various aspects of the National Heritage Resources Act, including the fact that it represents a structure older than 60 years as well as the fact that the heritage legislation views it as an archaeological site in that it is older than 100 years. The temple also has high significance for a

Furthermore, in terms of the National Heritage Resources Act “...a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

- (a) its importance in the community, or pattern of South Africa’s history;*
- (b) its possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage;*
- (c) its potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage;*
- (d) its importance in demonstrating the principal characteristics of a particular class of South Africa’s natural or cultural places or objects;*
- (e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;*

- (f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;*
- (g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;*
- (h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and*
- (i) sites of significance relating to the history of slavery in South Africa. “*

From the list outlined in the legislation, it is evident that the Narainsamy Temple would rate highly in all nine these aspects, except for the last item. The site was considered of such heritage significance even during Apartheid that it was declared a National Monument on 17 August 1984. It is currently a declared Grade II Provincial Heritage Site in terms of the National Heritage Resources Act.

The site was therefore previously assessed to be of Provincial Heritage Significance (PS).

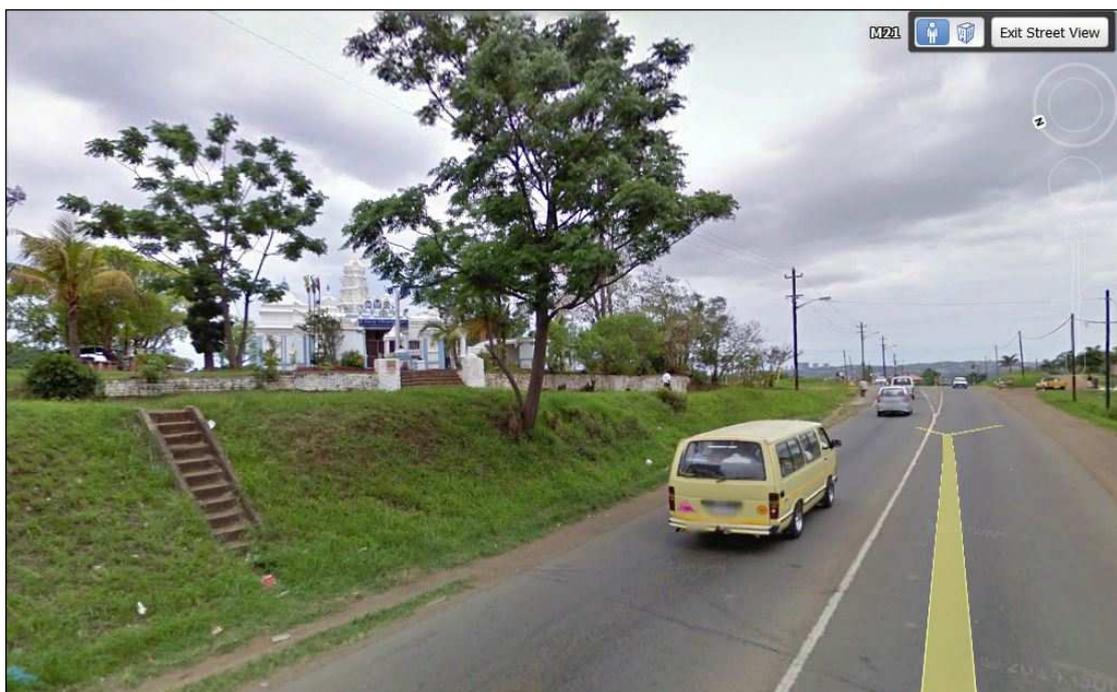


Figure 48 - Google Earth Street View showing the Narainsamy Temple in relation to Inanda Highway. The Route 3 alternative is proposed to be built on the temple side of the road



Figure 49 - This photograph of the temple was taken in 1988 by Janek Szymanowski (http://commons.wikimedia.org/wiki/File:9_2_412_0009-Narainsamy_Temple-Newlands-Durban-s.jpg)

7.4 Sites identified within or near the Route 6 Alternative

One site was identified in close proximity to the footprint area of the Route 6 Alternative. This site will be discussed below.

7.4.1 Site 4

Site Coordinates:

S 29° 46' 43.2"

E 30° 59' 28.0"

Site Description:

A grave with a brick lined dressing was identified approximately 3 m from the Route 6 footprint. The closest point on the Route 6 alternative to the identified grave is where the proposed Route 6 pipeline makes a right angle to the north-east.

The grave and its direct surroundings are covered in dense vegetation associated with a non-perennial stream. This dense vegetation reduces visibility. As a result, it is possible for more graves to be located in this area.

The grave forms part of the Newlands East Municipal Cemetery and is located directly adjacent to the cemetery's cement fence.

Site Significance:

All graves have high levels of emotional, religious and in some cases historical significance. As such the site is of Generally Protected A (GP. 4A) which equals a High/Medium Significance.

This indicates that the site may not be impacted upon without prior mitigation. The mitigation measures to be undertaken for the site can be found below.



Figure 50 - General view of the site. The identified grave is located in the dense vegetation to the right of the tree. More visible graves from the Newlands East Municipal Cemetery can be seen on the right.



Figure 51 - The upright scale marks the position of the grave that was identified here. A section of the grave's brick line dressing is just visible to the left of the scale.

8 IMPACT OF PROPOSED DEVELOPMENT ON HERITAGE RESOURCES

In this section, the relative impacts of the proposed developments on the four sites that were identified in proximity to the preferred route and three route alternatives will be calculated.

8.1 Development Impact of the Preferred and Route 2 Alternatives

8.1.1 Risk Calculation for the Development Impact on Site 1

In this section the impact of the proposed development of the Preferred and Route 2 Alternatives on Site 1 will be established. As shown elsewhere, Site 1 is a Stone Age occurrence located roughly 15 m from the Preferred Route and Route 2 footprints.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(2 + 2 + 3)}{3} \times \frac{4}{5}$$

Impact Risk = 1.8

Table 10: Risk Calculation for the Impact of the Preferred and Route 2 Alternatives on Site 1

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Low	Study Area	Medium-Term	Very Likely	Low
Impact on Site 1	2	2	3	4	1.8

This calculation has revealed that the impact risk of the proposed development of the Preferred and Route 2 Alternatives on Site 1 falls within Impact Class 2, which represents a **Low Impact Risk**. As a result, no mitigation would be required.

8.1.2 Risk Calculation for the Development Impact on Site 2

In this section the impact of the proposed development of the Preferred and Route 2 Alternatives on Site 2 will be established. As shown elsewhere, Site 2 is a church located roughly 6 m from the Preferred Route and one of the Alternative Route 2 options.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(2 + 3 + 3)}{3} \times \frac{3}{5}$$

Impact Risk = 1.6

Table 11: Risk Calculation for the Impact of the Preferred and Route 2 Alternatives on Site 2

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Low	Local/ Regional	Medium-Term	Could Happen	Low
Impact on Site 2	2	3	3	3	1.6

This calculation has revealed that the impact risk of the proposed development of the Preferred and Route 2 Alternatives on Site 2 falls within Impact Class 2, which represents a **Low Impact Risk**. As a result, no heritage mitigation would be required. However, as will be shown below, social mitigation measures will be required.

8.2 Development Impact of the Route 3 Alternative

Only one site was identified in close proximity to the footprint area of the Route 3 Alternative, namely the Narainsamy Temple. It must be stressed here that at this stage it would be difficult to accurately predict the impact of the development of the Route 3 Alternative on the temple as the exact nature of the construction activities in this area (should the Route 3 Alternative be decided upon) is unknown. For example, although this route alternative would not cross over the temple or its property, construction activities such as blasting may have a very negative impact on the site.

Furthermore, as the temple can be considered an archaeological site (it is older than 100 years), it is always possible for associated cultural material dating to the construction or early use of the temple to be located in areas outside of its direct property.

8.2.1 Risk Calculation for the Development Impact of the Route 3 Alternative on Site 3

In this section the impact of the proposed development of the Route 3 Alternative on Site 3 will be established. As shown elsewhere, Site 3 is a Hindu Temple located approximately 20 m from the proposed Route 3 Alternative, whereas its property is roughly 9 m from the proposed Route 3 Alternative.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(5 + 4 + 5)}{3} \times \frac{3}{5}$$

Impact Risk = 2.8

Table 12: Risk Calculation for the Impact of the Route 3 Alternative on Site 3

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Very High	Provincial	Permanent	Could Happen	Moderate
Impact on Site 3	5	4	5	3	2.8

This calculation has revealed that the impact risk of the proposed development of Alternative Route 3 on Site 3 falls within Impact Class 3, which represents a **Moderate Impact Risk**. As a result, mitigation would be required.

8.3 Development Impact of the Route 6 Alternative

Only one site was identified in close proximity to the footprint area of the Route 6 Alternative, namely a grave.

8.3.1 Risk Calculation for the Development Impact of the Route 6 Alternative on Site 4

In this section the impact of the proposed development of the Route 6 Alternative on Site 4 will be calculated. As shown elsewhere, Site 4 is a grave located approximately 3 m from the Route 6 Alternative footprint.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(4 + 3 + 5)}{3} \times \frac{4}{5}$$

Impact Risk = 3.2

Table 13: Risk Calculation for Development Impact of the Route 6 Alternative on Site 4

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Local	Permanent	Very Likely	High
Impact on Site 4	4	3	5	4	3.2

This calculation has revealed that the impact risk of the proposed development of Route 6 Alternative on Site 4 falls within Impact Class 4, which represents a **High Impact Risk**. As a result, avoidance or mitigation would be required.

8.4 Development Impact on Sites Identified in the Desktop Study

In the archaeological and historical desktop study two the risk for the presence of two possible heritage sites were identified. The first of these relates to the identification of a cluster of huts on the historic topographic maps on that section of the northern bank of the uMngeni River where the preferred route and alternatives will cross over. The second aspect deals with the mention of six known Iron Age sites near the banks of the uMngeni River in a previous heritage impact assessment report (Prins, 2012) coupled with the known five Iron Age sites on the northern banks of the uMngeni River as highlighted by Whitelaw (1991).

8.4.1 Risk Calculation for the Development Impact on Possible Graves

During the desktop study it was revealed that a cluster of huts are depicted on the 1956 topographical sheet on that section of the northern bank of the uMngeni River where the preferred route and route alternatives will cross over. If these huts were associated with black people, experience has shown that in the traditional custom of black groups such as the Xhosa, Ndebele, Venda and Zulu stillborn babies were often buried in direct proximity to the homes of the child’s parents whereas adult graves were often buried in close proximity to the homes of relatives. As the slopes of the uMngeni River were found to be densely vegetated, heritage features such as graves would be nearly impossible to identify in the field.

In this section, the impact of the proposed development of all Route Alternatives on the possible graves will be established.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(4 + 3 + 5)}{3} \times \frac{3}{5}$$

Impact Risk = 2.4

Table 14: Risk Calculation for Development Impact on the Possible Presence of Graves

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	High	Local	Permanent	Could Happen	Moderate
Impact on possible presence of graves	4	3	5	3	2.4

This calculation has revealed that the impact risk of the proposed development on the possible presence of graves associated with huts depicted on the 1956 map falls within Impact Class 3, which represents a **Moderate Impact Risk**. As a result, mitigation would be required.

8.4.2 Risk Calculation for the Development Impact on Possible Iron Age Sites

As indicated above, a number of Iron Age sites are known from the northern banks of the uMngeni River. While none of these known sites are located within the present study area, the possibility exists for undiscovered Iron Age sites to be still located in this area. The dense vegetation observed along this section of the study area would have been the identification of any Iron Age sites difficult, and especially so if such sites were not associated with stonewalling.

In this section, the impact of the proposed development of all Route Alternatives on the possible Iron Age sites will be established.

$$\text{Impact Risk} = \frac{(\text{Significance} + \text{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

$$\text{Impact Risk} = \frac{(3 + 3 + 5)}{3} \times \frac{3}{5}$$

Impact Risk = 2.2

Table 15: Risk Calculation for Development Impact on the Possible Presence of Iron Age Sites

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Medium	Local	Permanent	Could Happen	Moderate
Impact on possible presence of Iron Age sites	3	3	5	3	2.2

This calculation has revealed that the impact risk of the proposed development on the possible presence of Iron Age sites falls within Impact Class 3, which represents a **Moderate Impact Risk**. As a result, mitigation would be required.

8.5 Summary of Impact Risk Assessments

The impact risks calculated in this section have resulted in the following conclusions:

- The development of the Preferred and Route 2 Alternatives will have a Low Impact Risk on Site 1. As a result, no mitigation would be required.
- The development of the Preferred and Route 2 Alternatives will have a Low Impact Risk on Site 2. As a result, no heritage mitigation would be required. However, social mitigation would be required.
- The development of the Route 3 Alternative will have a Moderate Impact Risk on Site 3. As a result, mitigation would be required.
- The development of the Route 6 Alternative will have a High Impact Risk on Site 4. As a result, avoidance or mitigation would be required.
- The development will have a Moderate Impact Risk in terms of the potential for graves to be located along the northern bank of the uMngeni River in an area where the 1956 topographic map has shown a cluster of huts used to be located.
- The development will have a Moderate Impact Risk in terms of the potential for Iron Age sites to be located within an area on the northern bank of the uMngeni River where six Iron Age sites have already been discovered.

It is clear from this section that the Preferred and Route 2 Alternatives will represent the lowest impact on any of the identified heritage resources, provided the recommended mitigation is undertaken. The development of Alternative Route 3 and Alternative Route 6

will result in the highest impact risk, and are not recommended. Furthermore, as the fieldwork was focussed on the Preferred Alternative, it is strongly recommended that this route be implemented. This is stated as the impact of this route on heritage has been clearly defined in this report.

9 MITIGATION MEASURES AND GENERAL RECOMMENDATIONS

9.1 Mitigation Measures Required for the Identified Heritage Resources

In this section, the mitigation measures required for the development of the Preferred Alternative will be outlined. As indicated at the end of the previous chapter, the Preferred Route is the only one of the alternatives that had been walked in detail during the fieldwork, and only two sites of Low Heritage Significance were identified. The heritage risk for this route is therefore the best defined and established for any of the route alternatives. Significant heritage sites were identified at both Route Alternatives 3 and 6. Although Route 2 is expected to have a similar low impact than the Preferred Alternative, this route was not walked in detail.

The potential risks associated with the possible presence of graves and Iron Age sites on that section of the proposed development located on the northern end of the uMngeni River, means that mitigation would be required. It must be stressed that this impact risk will be present on all the alternatives, and as a result, these two impact risks of the possible presence of graves and Iron Age sites were not used to assess which route alternative would have the least possible impact.

9.1.1 Mitigation Measures required for Site 1

The impact risk calculation for the development impact of the proposed development on Site 1 has resulted in a Low Impact Risk. As a result, no mitigation would be required.

9.1.2 Mitigation Measures required for Site 2

The impact risk calculation for the development impact of the proposed development on Site 2 has resulted in a Low Impact Risk. As a result, no heritage mitigation would be required. However, the following social mitigation would be required:

- The project social consultant must undertake consultation with the church leader(s) and/or congregation in order to reach an agreement between the applicant and the church on either moving the church or alternatively to construct the pipeline in such a way that it will not affect the church and its activities.

9.1.3 Mitigation Measures required for the Possible Presence of Graves and Iron Age sites

The impact risk calculation for the development impact on the possible presence of graves and Iron Age sites on the northern bank of the uMngeni River has resulted in a Moderate Impact Risk. As a result, the following mitigation measures would be required:

- An archaeological watching brief (monitoring) will be required during the construction of the section of the pipeline where the desktop study has identified a risk for the possible presence of graves and Iron Age sites.
- The archaeological monitoring must be conducted during all vegetation clearing and earth-moving activities by an archaeologist for signs of the presence of informal graves and Iron Age sites.
- Archaeological monitoring must take place along the pipeline between the following coordinates: S 29° 46' 59.7" E 30° 58' 01.6" (near Sookall Drive) and S 29° 48' 05.3" E 30° 56' 32.1" (near Juba Place Road).
- Should the presence of graves or Iron Age sites be confirmed, all construction activities in that area will have to cease to allow the archaeologist to assess the discovery and provide recommendations.

9.1.4 Mitigation Measures required for Palaeontology

The following mitigation measures would be required for palaeontology:

- The Environmental Assessment Practitioner and Environmental Control Officer of the project must be made aware of the possibility of finding trace fossils in areas underlain by the Dwyka Group and Pietermaritzburg Formation. There is a very high possibility of fossils being present in the areas underlain by the Vryheid Formation.
- Due to the fact that the presence/absence of fossils will only be recorded during the execution of the excavation activities, it is recommended that a qualified palaeontologist be appointed to compile a Phase 1 PIA report if fossils are recorded during the construction phase of the project.

10 CONCLUSIONS

PGS Heritage was appointed by Strategic Environmental Focus to undertake a Heritage Impact Assessment (HIA), which forms part of the Environmental Impact Assessment (EIA) for the proposed development of the Northern Aqueduct Project by eThekweni Water and Sanitation.

Four development alternatives were proposed, namely the Preferred Alternative, Route 2 Alternative, Route 3 Alternative and Route 6 Alternative. All four alternatives were assessed as part of this heritage impact assessment study. It must be stressed however that priority in the fieldwork was placed on the Preferred Alternative. This allowed for a detailed walkthrough of almost the entire Preferred Alternative. The three Route Alternatives were primarily surveyed by vehicle.

An archival and historical desktop study was undertaken that was used to compile a historic layering of the study area within its regional context. This component indicated that the landscape within which the project area is located has a rich and diverse history. The desktop study also revealed that the banks of the uMngeni River possess the potential risk for graves and Iron Age sites. This potential risk was included in the impact risk calculations and recommended mitigation measures.

A palaeontological desktop study was also conducted which indicates that study area is mostly underlain by Ordovician to Silurian aged quartzites of the Natal Group, Carboniferous to Permian Aged tillites of the Dwyka Group, Permian aged shales and sandstones of the Ecca Group, Jurassic aged dolerite and Quaternary aged alluvium. Trace fossils have been recorded from the Dwyka Group and Pietermaritzburg Formation of the Ecca Group,

whereas fossils are abundantly known from rocks of the Vryheid Formation, also from the Ecca Group. The following recommendations were made in the palaeontological report:

- The EAP and ECO of the project must be made aware of the possibility of finding trace fossils in areas underlain by the Dwyka Group and Pietermaritzburg Formation. There is a very high possibility of fossils being present in the areas underlain by the Vryheid Formation.
- Due to the fact that the presence/absence of fossils will only be recorded during the execution of the excavation activities, it is recommended that a qualified palaeontologist be appointed to compile a Phase 1 PIA report if fossils are recorded during the construction phase of the project.

The desktop study work was followed by fieldwork, which comprised a walkthrough of the Preferred Route by a fieldwork team comprising two archaeologists and one archaeological field assistant. The other alternatives were mainly surveyed by vehicle. As a result, four heritage sites were identified. These comprised a Stone Age occurrence (Site 1) and modern Shembe church site (Site 2) on the Preferred Route and Route Alternative, a Hindu Temple (Site 3) on the Route 3 Alternative and at least one grave (Site 4) on the Route 6 Alternative.

Impact risk calculations were undertaken on the expected impact of the different alternative routes on the identified heritage sites as well as the possible presence of graves and Iron Age sites along a section of the study area as revealed by the desktop study. The impact risk calculations resulted in the following findings:

- The development of the Preferred and Route 2 Alternatives will have a Low Impact Risk on Site 1. As a result, no mitigation would be required.
- The development of the Preferred and Route 2 Alternatives will have a Low Impact Risk on Site 2. As a result, no heritage mitigation would be required. However, social mitigation would be required.
- The development of the Route 3 Alternative will have a Moderate Impact Risk on Site 3. As a result, mitigation would be required.
- The development of the Route 6 Alternative will have a High Impact Risk on Site 4. As a result, avoidance or mitigation would be required.

- The development will have a Moderate Impact Risk in terms of the potential for graves to be located along the northern bank of the uMngeni River in an area where the 1956 topographic map has shown a cluster of huts used to be located.
- The development will have a Moderate Impact Risk in terms of the potential for Iron Age sites to be located within an area on the northern bank of the uMngeni River where six Iron Age sites have already been discovered.

The following conclusions were drawn from the impact risk calculations in terms of the different alternatives:

- The Route 6 Alternative will have the highest development impact risk of any of the alternatives.
- The Route 3 Alternative will have the second highest development impact risk.
- Both the Preferred Route as well as the Route 2 Alternative will have the lowest impact risk.
- As the Preferred Route was surveyed in detail on foot coupled with the fact that it still has a very low impact risk, means that this route alternative is recommended for the proposed development.

As a result, mitigation measures were outlined for the proposed construction of the Preferred Alternative. The following mitigation measures were outlined for the proposed development impact on the possible presence of graves and Iron Age sites along a section of the proposed development:

- An archaeological watching brief (monitoring) will be required during the construction of the section of the pipeline where the desktop study has identified a risk for the possible presence of graves and Iron Age sites.
- The archaeological monitoring must be conducted during all vegetation clearing and earth-moving activities by an archaeologist for signs of the presence of informal graves and Iron Age sites.
- Archaeological monitoring must take place along the pipeline between the following coordinates: S 29° 46' 59.7" E 30° 58' 01.6" (near Sookall Drive) and S 29° 48' 05.3" E 30° 56' 32.1" (near Juba Place Road).

- Should the presence of graves or Iron Age sites be confirmed, all construction activities in that area will have to cease to allow the archaeologist to assess the discovery and provide recommendations.

Furthermore, the following social mitigation measures were outlined for the proposed development impact on the Shembe Church:

- The project social consultant must undertake consultation with the church leader(s) and/or congregation in order to reach an agreement between the applicant and the church on either moving the church or alternatively to construct the pipeline in such a way that it will not affect the church and its activities.

On the condition that the recommendations made in this report are adhered to, no heritage reasons can be given for the development not to continue.

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11.4 Historic Topographic Maps

All the historic topographic maps used in this report were obtained from the Directorate: National Geo-spatial Information of the Department of Rural Development and Land Reform in Cape Town.

11.5 Contemporary Cartographic Data

MapSource and Google Earth were used to depict contemporary cartographic data.

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

1. GENERAL PRINCIPLES

In areas where there has not yet been a systematic survey to identify conservation-worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been completed and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In terms of the heritage legislation, permits are required to damage, destroy, alter, or disturb such sites. People who already possess such material are required to register it. The management of heritage resources is integrated with environmental resources and this means that before development takes place heritage resources are assessed and, if necessary, rescued or mitigated.

In addition to the formal protection of culturally significant graves, all graves which are older than 60 years and are not in a cemetery (such as ancestral graves in rural areas) are protected. The legislation protects the interests of communities who have an interest in the graves: they must be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle should be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resource authority and if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the applicant's (i.e. mining company or development company) cost. Thus, the applicant will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;

- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video 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), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection to, all historic and prehistoric cultural remains, including graves and human remains.

2. GRAVES AND CEMETERIES

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and National Health Act (Act 61 Of 2003) and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinterment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and National Health Act (Act 61 Of 2003) and are the jurisdiction of the South African Heritage Resource Agency (SAHRA). The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

Appendix B

PALAEONTOLOGICAL DESKTOP STUDY