

**PROPOSED UMKHOMAZI WATER PROJECT PHASE 1,  
RAW WATER COMPONENT**

**Phase 1 Heritage Impact Assessment**

**May 2015**

**Jean Beater & Frans Prins**

## EXECUTIVE SUMMARY

The current water resources of the Integrated Mgeni Water Supply System (WSS) are insufficient to meet the long-term water requirements of the system. Pre-feasibility investigations indicated that Phase 1 of the uMkhomazi Water Project (uMWP-1), which entails the transfer of water from the undeveloped uMkhomazi River to the existing Integrated Mgeni WSS, is the scheme most likely to fulfil this requirement.

The Mkomazi-Mgeni Transfer Pre-feasibility Study concluded that the first phase of the uMWP would comprise a new dam at Smithfield on the uMkhomazi River near Richmond, a multi-level intake tower and pump station, a water transfer pipeline/tunnel to a balancing dam at Baynesfield Dam or a similar in-stream dam, a water treatment works at Baynesfield and a gravity pipeline to the Mgeni bulk distribution reservoir system, below the reservoir at Umlaas Road. The table below indicates the components of the project:

uMWP-1 Component	Infrastructure	Proponent
Raw Water	<ol style="list-style-type: none"> <li>1. A new dam at Smithfield on the uMkhomazi River near Bulwer.</li> <li>2. Water conveyance infrastructure (including a ± 34 km long tunnel and a pipeline) to a balancing dam in the Baynesfield area. Alternatives under consideration for the tunnel alignment and location of the balancing dam.</li> </ol>	Department of Water and Sanitation
Potable Water	<ol style="list-style-type: none"> <li>3. A water treatment works in the uMlaza River valley.</li> <li>4. A gravity pipeline to the Umgeni Water bulk distribution reservoir system, below the reservoir at Umlaas Road.</li> </ol>	Umgeni Water

This Heritage Impact Assessment report deals with the Raw Water component of the project.

### Legislative requirements

Due to the size of the proposed Smithfield Dam and proposed balancing dam as well as the length of the water transfer tunnel and related raw water pipelines and alternatives (over 300 m), the proposed development triggers Section 38 of the National Heritage Resources Act, 1999 (Act No 25 of 1999) that states the following:

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

*(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length*

*(c) any development or other activity which will change the character of a site-*

*(i) exceeding 5 000 m<sup>2</sup> in extent; or*

*(ii) involving three or more existing erven or subdivisions thereof*

*(iii) involving three or more erven or divisions thereof which have been consolidated in the past five years:  
must notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.*

## **Location**

The Raw Water component is situated in the southern part of KwaZulu-Natal (KZN). The western part of the project area falls within the Harry Gwala District Municipality (Ingwe Local Municipality), whereas the eastern portion is located in the uMgungundlovu District Municipality (Richmond Local Municipality and Mkhambathini Local Municipality).

The western portion of the project area including Smithfield Dam and the first  $\pm$  21 km of the tunnel, falls under Traditional Authority and State land and is characterised by traditional homesteads, subsistence agriculture, communal areas and grassland areas.

The eastern part of the project area, which includes the remaining part of the tunnel ( $\pm$  13 km), balancing dam and raw water pipeline, is privately owned and predominantly used for commercial farming and forestry.

## **Alternatives**

Various options to meet the project's objectives have been considered during previous studies which lead to the identification of alternatives to be investigated including alternative sites and route alignments for the project infrastructure. There are numerous alternatives for the Raw Water component of the project that are listed in the main body of the report in Section 1.1.

## **Results**

Although rock art sites, occur in the greater Boston and Bulwer areas none were located during the site inspections. Small shelters that were noticed adjacent to the Umkhomazi River were investigated but these all are located within the river flood zone and no archaeological deposit would be found due to the flooding of these shelters.

A number of sensitive (and significant) cultural heritage and archaeological sites were identified in and around the proposed Dam that, together with a number of homesteads and associated graves, will be inundated by the Dam.

It is recommended that the Deepdale Bridge which is over 100 years old not be inundated as it is an example of the road infrastructure that was built in the late 19<sup>th</sup> century which is in

remarkably good condition. If inundation cannot be avoided, then a full recording of the bridge must take place and a permit must be obtained from Amafa for the destruction of the bridge.

The drystone wall found north of the R617 and uMhkomzi River is one of very few examples of a farming technique that was used extensively in the British Isles. It too is in good condition although overgrown by vegetation and it is therefore recommended that the R617 deviation that would impact on the wall be moved northwards to run along an existing gravel road.

Several homesteads will be inundated by the dam. An inspection of the homesteads revealed a number of graves that will have to be exhumed in consultation with family and the community. A Phase 2 assessment is required to identify all the graves that will have to be removed prior to inundation. Removal must be in accordance with Regulation 4 of the KZN Heritage Regulations of 2012 that require consultation with the family, community and, if necessary, with the local municipality.

The remains of several stone structures were found throughout the proposed Smithfield Dam basin. Most of the stone structures were identified as abandoned African homesteads from the later 19<sup>th</sup> – early 20<sup>th</sup> century with a significance rating of medium to high in terms of research as they belong to a period with lots of historical data but little archaeological evidence.

A Phase 2 archaeological impact assessment is therefore recommended must also include a search for unknown rock art sites that could possibly exist in the uMhkomazi River Valley. If sites are found, the necessary applications will have to be made to Amafa either for their removal or destruction depending on their significance and condition.

According to the palaeo-sensitivity map, the central and eastern sections of the Raw Water component fall in a green area which means that there is a moderate risk of fossils occurring there. The desktop study undertaken established that there were no records of fossils from the area therefore no further palaeontological assessment was required for these sections.

The western side however, where the dam is proposed, falls in both red and orange fossil sensitivity areas which means that the area is very sensitive to sensitive and a Phase 2 PIA site visit is required prior to inundation as there is a high probability of finding fossil plants in the area.

The construction of the dam, in particular, will have a high impact on the area where it is proposed. Every measure must be undertaken to avoid, where possible, the inundation of

homesteads as this will result in the inhabitants' way of life been substantially impacted upon together with the cultural landscape of the area.

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## **ABBREVIATIONS**

AIA	Archaeological Impact Assessment
ANC	African National Congress
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
FSL	Full Supply Level
HIA	Heritage Impact Assessment
IFP	Inkatha Freedom Party
KZN	KwaZulu-Natal
KZNHA	KwaZulu-Natal Heritage Act
LIA	Late Iron Age
MSA	Middle Stone Age
NHRA	National Heritage Resources Act
PIA	Palaeontological Impact Assessment
SAHRIS	South African Heritage Resources Information System
uMWP-1	Phase 1 uMkhomazi Water Project
WSS	Water Supply System
WTW	Water Treatment Works



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**AUTHOR DETAILS**

<b>Verification</b>	<b>Name and Study Undertaken</b>	<b>Qualifications</b>	<b>Professional Registration</b>
Authors	Jean Beater (Cultural Heritage)	MA (Heritage Studies)	Member of Association of South African Professional Archaeologists  Member of IAIAAsa
	Frans Prins (Archaeology)	MA (Archaeology)	Member of Association of South African Professional Archaeologists
	Prof. Marion Bamford (Palaeontology)	PhD Palaeobotany	Palaeontological Society of Southern Africa  Royal Society of Southern Africa

## 1. INTRODUCTION

The current water resources of the Integrated Mgeni Water Supply System (WSS) are insufficient to meet the long-term water requirements of the system. Pre-feasibility investigations indicated that Phase 1 of the uMkhomazi Water Project (uMWP-1), which entails the transfer of water from the undeveloped uMkhomazi River to the existing Integrated Mgeni WSS, is the scheme most likely to fulfil this requirement.

The Mkomazi-Mgeni Transfer Pre-feasibility Study concluded that the first phase of the uMWP would comprise a new dam at Smithfield on the uMkhomazi River near Bulwer, a multi-level intake tower and pump station, a water transfer pipeline/tunnel to a balancing dam on the Baynesfield Estate, a water treatment works at Baynesfield in the uMlaza River valley and a gravity pipeline to the Mgeni bulk distribution reservoir system, below the reservoir at Umlaas Road. From here, water will be distributed under gravity to eThekweni and possibly low-lying areas of Pietermaritzburg.

The overall uMWP-1 Feasibility Study has been divided into the following three modules:

- Module 1: Technical Feasibility Raw Water
- Module 2: Environmental Impact Assessment (EIA) - Nema Consulting was appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EIAs for the proposed uMWP-1 Raw Water and Potable Water components; and
- Module 3: Technical Feasibility Potable Water.

**Table 1: Simplified overview of uMWP-1 Components**

uMWP-1 Component	Infrastructure	Proponent
<b>Raw Water</b>	3. A new dam at Smithfield on the uMkhomazi River near Bulwer. 4. Water conveyance infrastructure (including a ± 34 km long tunnel and a pipeline) to a balancing dam in the Baynesfield area. Alternatives under consideration for the tunnel alignment and location of the balancing dam.	Department of Water and Sanitation
<b>Potable Water</b>	5. A water treatment works in the uMlaza River valley. 6. A gravity pipeline to the Umgeni Water bulk distribution reservoir system, below the reservoir at Umlaas Road.	Umgeni Water

This document serves as the Phase 1 Heritage Impact Assessment (HIA) for the proposed uMWP-1 Raw Water component.

## **1.1 Alternatives**

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The Raw Water section of the project consists of the components as described in Table 1 above and the infrastructure that has alternatives is listed in Table 2 below.

Various options to meet the project's objectives have been considered during previous studies (including the Pre-Feasibility Study), which lead to the identification of alternatives to be investigated as part of the Feasibility Study. This includes the assessment of these options in terms of the alternative sites and route alignments for the project infrastructure.

**Table 2: uMWP-1 Raw Water: components and alternatives**

No.	Components		Alternatives	
1.	Smithfield Dam Area	<b>Major storage dam - Smithfield Dam</b> (Full Supply Level & Purchase Line)	-	
2.		<b>Relocation of Eskom Transmission Line</b>	1. Option 1 (across the dam) 2. Option 2 (around the SE side of the dam)	
3.		<b>Gauging weir</b> (downstream and close to Smithfield Dam - U10F)	1. Option 1 2. Option 2	
4.		<b>Roads – Smithfield Dam</b>	<ul style="list-style-type: none"> <li>• Deviation of the R617</li> <li>• Road to Nonguqa</li> <li>• Access road to intake tower</li> <li>• Access road to tunnel inlet portal</li> <li>• Access road to dam wall</li> <li>• Construction roads</li> </ul>	-
5.		<b>Quarries &amp; Borrow Areas – Smithfield Dam</b>	<ul style="list-style-type: none"> <li>• Quarries I to IV-</li> <li>• Borrow areas A to C</li> </ul>	<ul style="list-style-type: none"> <li>• Aggregates: Midmar crushers (51.5km from SD; 66.8km from LBD)</li> <li>• Aggregates: Natal crushers (83.5km from SD; 44.2km from LBD)</li> <li>• Natural sand: NPC (153km from SD; 87.2km from LBD)</li> </ul>
6.		<b>Construction camp – Smithfield Dam</b>	-	
7.		<b>Hydropower plant – Smithfield Dam</b>	-	
8.	Conveyance Infrastructure	<b>Tunnel</b>	-	
9.		<b>Raw water pipeline</b>	1. Route to WTW Option 1 2. Route to WTW Option 2 3. Route to WTW Option 3	
10.		<b>Ventilation shafts</b>	-	
11.		<b>Adits</b>	-	
12.		<b>Access roads - shafts</b>	-	
13.		<b>Access roads - adits</b>	-	
14.		<b>Tunnel outlet</b>	-	
15.		<b>Hydropower plant – conveyance infrastructure</b>	-	

16.		<b>Waste disposal sites</b> (i.e. spoil areas)	Inlet portal (upstream)	-
			Outlet portal (downstream)	1. Option 1: Position 1 2. Option 2: Spoil to be used in the balancing dam wall
			Central portal	-
17.	Balancing Dam Area	<b>Balancing dam</b> (Full Supply Level & Purchase Line)		1. Dam upstream of Mbangweni Dam 2. Langa Balancing Dam
18.		<b>Approach Area (Langa BD)</b>		-
19.		<b>Spillway chute (Langa BD)</b>		-
20.		<b>Road – Balancing Dam</b>		1. Option 1 2. Option 2
		<b>Construction camp – Balancing Dam</b>		-
21.		<b>Quarries &amp; Borrow Areas – Balancing Dam</b>		-
22.			Quarry & borrow area 1	<ul style="list-style-type: none"> <li>• Aggregates</li> <li>• Natural sand</li> </ul>

## 2. LEGISLATIVE BACKGROUND

Due to the size of the proposed project as well as the length of the raw water pipelines and tunnel, the proposed development triggers Section 38 of the National Heritage Resources Act, 1999 (Act No 25 of 1999) that states the following:

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

*(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length*

*(c) any development or other activity which will change the character of a site-*

*(i) exceeding 5 000 m<sup>2</sup> in extent; or*

*(ii) involving three or more existing erven or subdivisions thereof*

*must notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.*

The project may impact on graves, structures, archaeological and palaeontological resources that are protected in terms of sections 33, 34, 35, and 36 of the KwaZulu-Natal Heritage Act (No. 4 of 2008) as well as sections 34, 35, and 36 of the National Heritage Resources Act (NHRA). These protections in terms of the KwaZulu-Natal Heritage Act (KZNHA) are summarised below:

**Table 3: Potential heritage impacts**

Section	Description	Relevance
Section 33(a) - Structures	No structure which is, or which may reasonably be expected to be older than 60 years, may be demolished, altered or added to without the prior written approval of the Council having been obtained on written application to the Council	Structures found within the proposed Smithfield Dam basin will be inundated hence if such structures are older than 60 years, then permission for the destruction of the structures will be necessary
Section 35 – Graves	(1) No grave – (a) not otherwise protected by this Act; (b) not located in a formal cemetery managed or administered by a local authority may be damaged, altered, exhumed, removed from its original position, or otherwise disturbed without the prior written approval of the Council having been obtained on written application to the Council (2) The Council may only issue written approval once the Council is satisfied that – (a) the applicant has	The possibility of graves been impacted especially by the proposed Smithfield Dam is high due to the extent of inundation as well as the rural nature of the area where burial of the dead often takes place close to traditional residences

	made a concerted effort to consult with communities and individuals who by tradition may have an interest in the grave; and (b) the applicant & relevant communities or individuals have reached agreement regarding the grave.	
Section 36 – Archaeological & palaeontological sites	<p>(1) No person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without prior written approval of the Council having been obtained on written application to the Council.</p> <p>(2) Upon discovery of archaeological or palaeontological material or a meteorite by any person, all activity or operations in the general vicinity of such material or meteorite must cease forthwith and a person who made the discovery must submit a written report to the Council without delay</p> <p>(4) No person may exhume, remove from its original position or otherwise disturb, damage, destroy, own or collect any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without prior written approval of the Council having been obtained on written application to the Council.</p>	Archaeological sites and remains as well as fossils may be found in the Smithfield Dam basin and along the raw water pipeline routes as well as the tunnel.

Additionally, the requirements of the KwaZulu-Natal Heritage Regulations of 2012 (Provincial Notice No. 40, dated 2 April 2012) that are associated with the KZNHA will be adhered to. The regulations prescribe the manner in which the application for permits to destroy, alter or remove, for instance, graves or structures must be undertaken.

In terms of Section 3 of the NHRA, heritage resources are described as follows:

- (a) places, buildings, structures and equipment of cultural significance;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features of cultural significance;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and paleontological sites;
- (g) graves and burial grounds, including—

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

The Phase I HIA will be undertaken to assess the project components and alternatives in order to ascertain whether any heritage resources will be impacted by the proposed development.



### 3. LOCATION

The Raw Water component is situated in the southern part of KwaZulu-Natal (KZN). The western part of the project area falls within the Harry Gwala District Municipality (Ingwe Local Municipality), whereas the eastern portion is located in the uMgungundlovu District Municipality (Richmond Local Municipality and Mkhambathini Local Municipality) (Fig. 1).

The western portion of the project area including Smithfield Dam and the first  $\pm 21$  km of the tunnel, falls under Traditional Authority and State land. The area is characterised by traditional homestead settlements, rural subsistence agriculture, communal areas and disturbed and more pristine grassland areas (Fig. 2).

The eastern part of the project area, which includes the remaining part of the tunnel ( $\pm 13$  km), balancing dam and raw water pipeline, is privately owned and predominantly used for commercial farming and forestry (Fig. 3).

### 4. TERMS OF REFERENCE (ToR)

- Undertake a Heritage Impact Assessment in accordance with the South African Heritage Resources Act (No. 25 of 1999).
- The identification and mapping of all heritage resources in the area affected, as defined in Section 2 of the National Heritage Resources Act, 1999, including archaeological and palaeontological sites on or close (within 100 m) of the proposed developments.
- Undertake a desktop palaeontological assessment.
- The assessment of the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- An assessment of the impact of development on such heritage resources.
- An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development.
- The identification of heritage resources that will be adversely affected by the development.
- Prepare a heritage sensitivity map (GIS-based), based on the findings of the study. Submit shapefiles (Hartebeetshoek 94) to Nema Consulting
- Identify heritage resources to be monitored.
- Comply with specific requirements and guidelines of Amafa aKwaZulu-Natali.
- Develop a Heritage Management Plan.

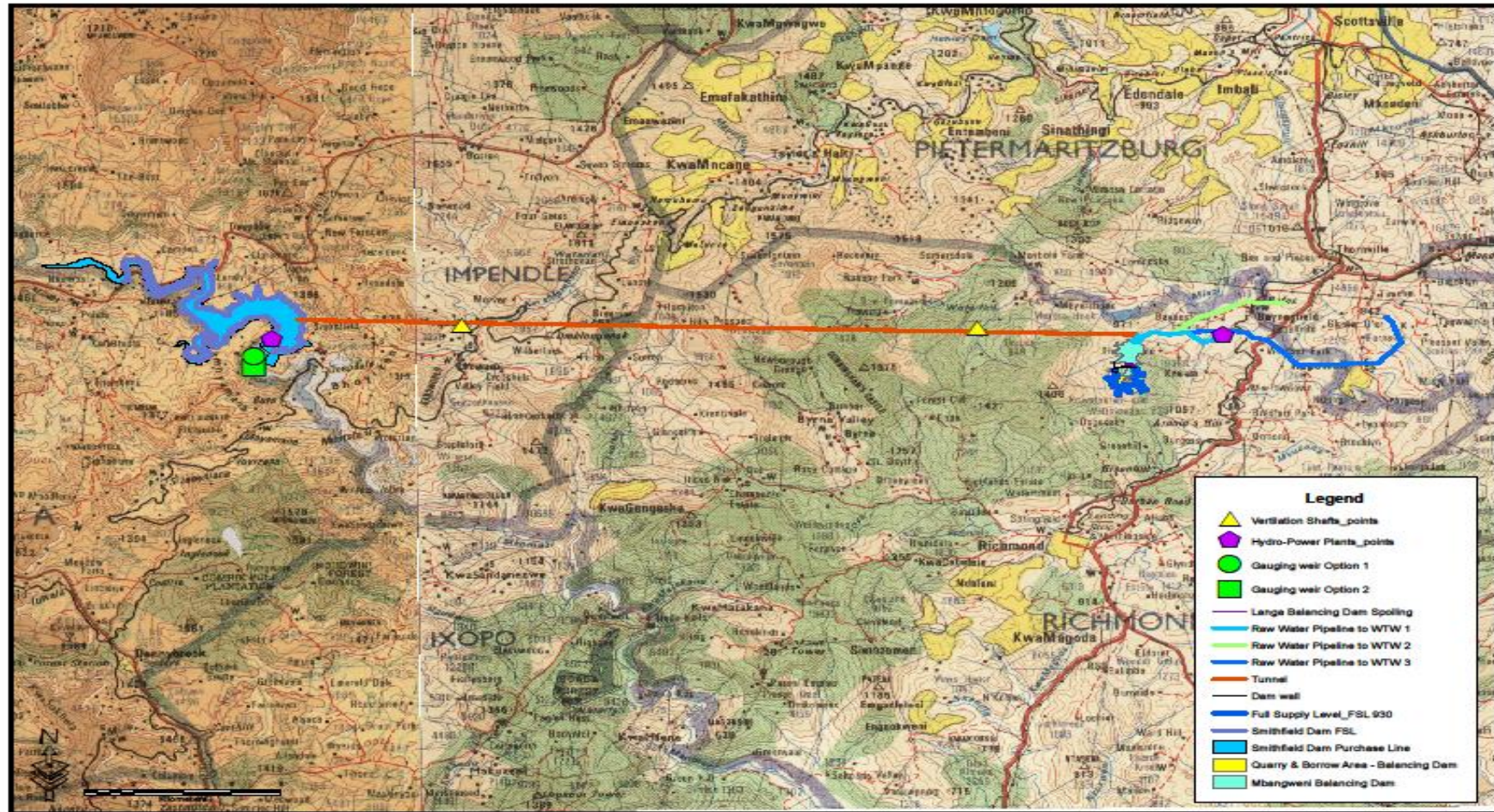


Figure 1: Location of raw water component

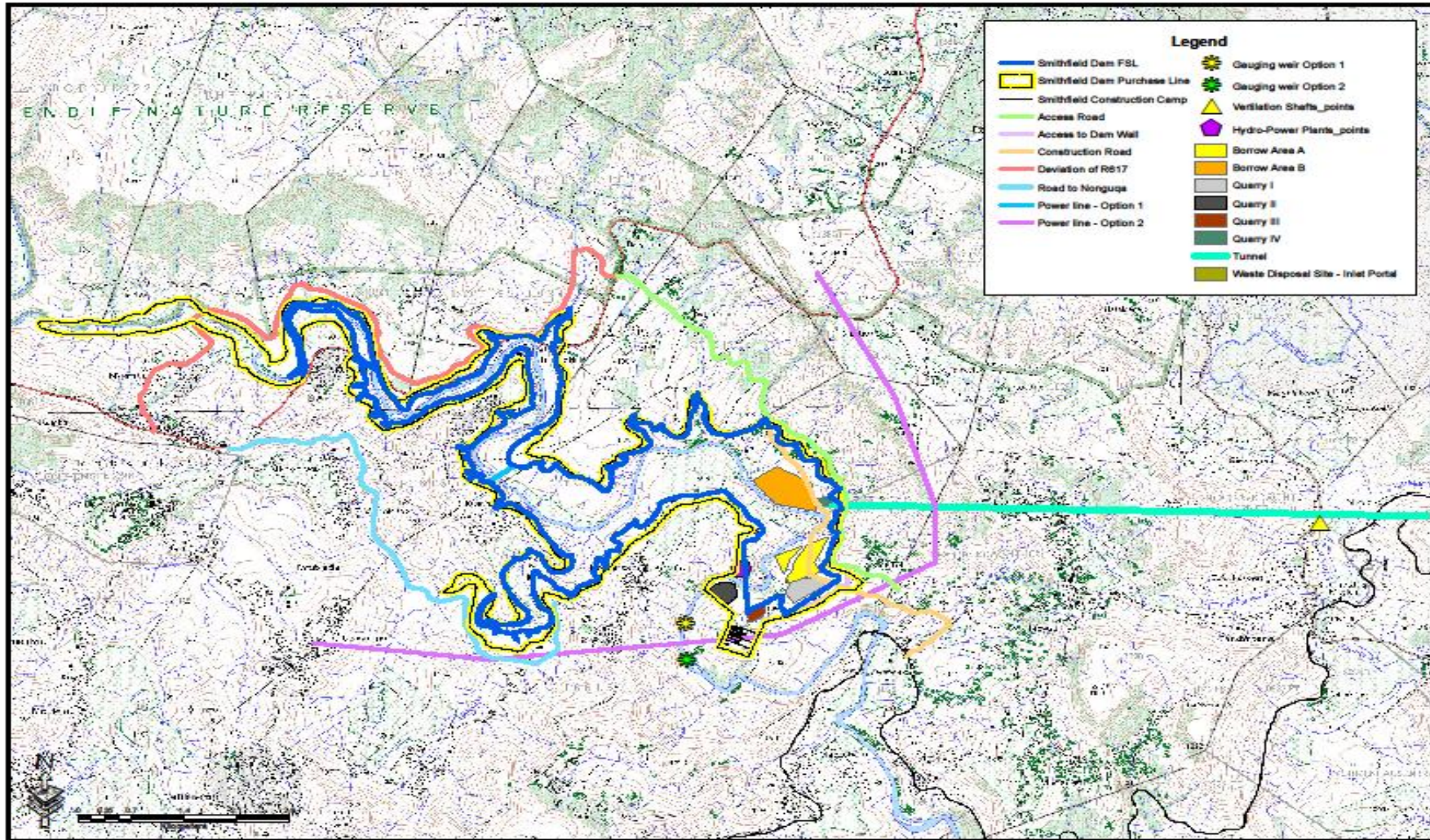


Figure 2: Western half and part of central section of raw water component

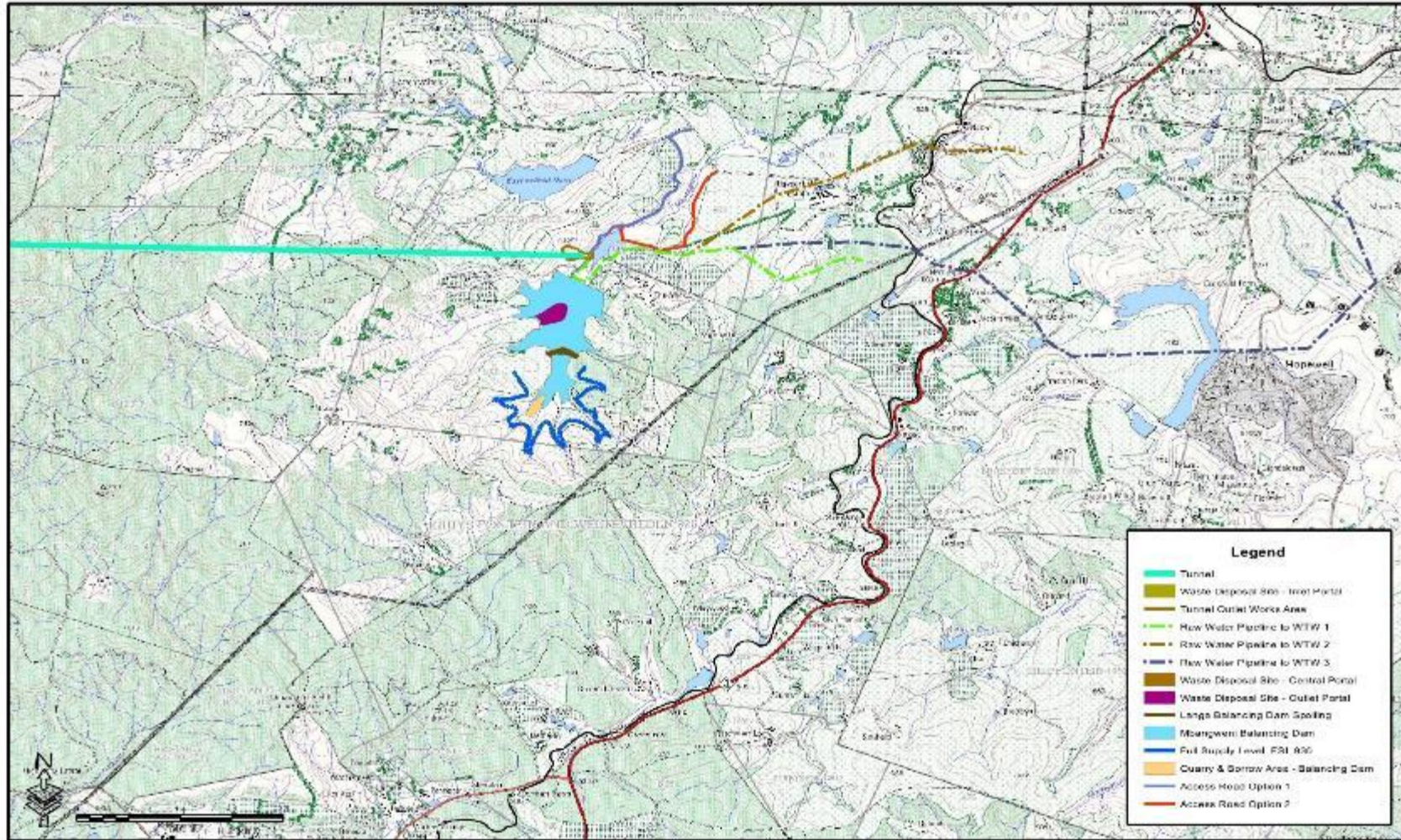


Figure 3: Central and eastern portion of raw water component

## 5. METHODOLOGY

A survey of literature, including Heritage/Archaeological Impact Assessments undertaken in the surrounding area, was undertaken in order to place the development area in an archaeological and historical context.

A desktop study was also conducted of the archaeological databases housed in the KwaZulu-Natal Museum. The SAHRIS website was consulted. In addition, the available heritage literature covering the greater Pietermaritzburg was also consulted.

The published geological and palaeontological literature, unpublished records and databases were consulted to determine if there are any records of fossils from the sites and the likelihood of any fossils occurring there.

A site inspection was undertaken on the eastern half of the project area on 4 May 2015 (exit point of tunnel, balancing dams, raw water pipeline). On 7 May 2015 and 27 May 2015, site visits were undertaken of the proposed location of the Smithfield Dam, borrow area sites, tunnel entrance, access roads, etc.

Mrs. Busi Dlamini, wife of the Executive Council Member of the KwaZashuke Tribal Council, Mr. Bheka Dlamini and Mr. Mbumvu of KwaZashuke directed the specialist to several grave sites and remains of structures in the KwaZashuke area. Mr. D. Gangani assisted in communicating with members of the community affected by the Smithfield Dam.

The staff of Baynesfield Estate assisted the specialist in providing directions to the locations of the proposed Balancing Dams (Mbangweni Dam and Langa Balancing Dam) and associated pipelines and access roads.

## 6. ASSUMPTIONS, GAPS IN KNOWLEDGE, UNCERTAINTIES

Although a considerable time was spent undertaking on site investigations not all areas that will be impacted by the proposed dam and associated infrastructure were closely inspected due to the large size of the area. Limited or no inspection of some areas such as the inlet portal of the dam were undertaken due to the areas been thickly vegetated.

It is also assumed that the residents with whom discussions were held do not know of all the heritage sites including grave locations hence the recommendation of a Phase 2 investigation.

## 7. HISTORICAL BACKGROUND OF THE STUDY AREA

### 7.1 Archaeological

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The greater Mkhomazi River Area has been relatively well covered by archaeological surveys although most of these have been conducted at the coast. The more inland areas in the environs of Boston and Bulwer is less well known. The available evidence, as captured in the Natal Museum heritage site inventories, indicates that the greater Boston and Bulwer areas contain mostly Early, Middle, and Later Stone Age material.

Most of these sites are situated close to the uMkhomazi River as well as in open air context or adjacent to exposed dongas or road cuttings. These tools were most probably made by early hominins such as *Homo erectus* or *Homo ergaster*. Based on typological criteria they most probably date back to between 300 000 and 1.7 million years ago. The presence of the first anatomically modern people (i.e. *Homo sapiens*) in the area is indicated by the presence of a few Middle Stone Age blades and flakes. These most probably dates back to between 40 000 and 200 000 years ago.

The later Stone Age flakes identified in the area are associated with the San (Bushmen) and their direct ancestors. These most probably dates back to between 200 and 20 000 years ago. Most of the Early and Middle Stone Age sites were identified by the late Dr Olivier Davies in the 1950's and 1960's. The majority of Later Stone Age sites were located by Dr Farden in the 1960s and 1970's although some has also been identified by Dr Aron Mazel in the 1980's. The greater Drakensberg to the immediate west of the project area contains a large percentage of Later Stone Age Sites as well as rock art.

The San were the owners of the land for almost 30 000 years but the local demography started to change soon after 2000 years ago when the first Bantu-speaking farmers crossed the Limpopo River and arrived in South Africa. By 1500 years ago these early Bantu-speaking farmers also settled adjacent to the Umkhomazi River closer to the coast.

Due to the fact that these first farmers introduced metal technology to southern Africa they are designated as the Early Iron Age in archaeological literature. Their distinct ceramic pottery is

classified to styles known as “Msuluzi” (AD 500-700), Ndongondwane (AD 700-800) and Ntshekane (AD 800-900). Most of the Early Iron Age sites in the greater Umkhomazi area belong to these traditions (Maggs 1989:31; Huffman 2007:325-462). However, none of these sites occur in the project area as Early Iron Age Sites typically occur on alluvial or colluvial soil adjacent to large rivers below the 1000m contour. The project area is for the most part situated above the 1000m contour.

The Early Iron Age sites typically occur on the alluvial and colluvial soils in the large river valleys below 700m above sea level. Later Iron Age sites occur in similar contexts as well as on ridges or plateaus in the existing grassland. Some impressive Later Iron Age sites occur in the Umngeni River Valley close to Howick as well as in the Ottos Bluff area near Albert Falls Dam.

These sites were occupied by Bantu-speaking agropastoralists who arrived in southern Africa after 1000 year ago via East Africa. Later Iron Age communities in KwaZulu-Natal were the direct ancestors of the Zulu people (Huffman 2007). The larger Umngeni Valley area was inhabited by various Nguni-speaking groups such as the Dlanyawo, Nyavu and Njilo, in the beginning of the 19th century (Bryant 1965; Wright 1988). Various groupings settled in the uMkhomazi River Valley after 1860. Many of these were refugees from the various civil wars that raged in Zululand since the assassination of King Shaka. After the Anglo-Zulu war of 1879 and the Bambatha Rebellion of 1911 almost all the African people in the study area adopted a Zulu ethnic identity.

## **7.2 Historical**

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The Port of Natal was established in 1824 under the leadership of Francis Farewell and Henry Francis Fynn. After 1832, other traders from the Eastern Cape joined the settlement and in 1837 Trekkers from the Cape Colony moved into the Colony. After the death of Piet Retief at Dingane’s hand, the Trekkers acted against the Zulu State leading to the establishment of the Republic of Natalia in 1839. However, this state of affairs was not acceptable to the British who then annexed Natal in 1844 (Ballard 1989: 117-122).

Little tangible evidence remains, except in Pietermaritzburg, of the Dutch homes that were erected by the Voortrekkers during their abortive attempt of establishing the Republic of Natalia (Dorning 1997: 1).

According to Ballard (1989: 126), the event that resulted in profound changes in the fledgling Colony was the immigration of white settlers mainly from the British Isles. Between May 1849 and February 1852, nearly 5 000 immigrants arrived in Natal.

After 1845, a different and sturdier type of building emerged with the arrival of the British settlers. Some of the earliest pioneer homes consisted only of a few rooms whereas by the 1870s elaborate houses were been built (Dorning 1997: 3) such as Calderwood Hall.

Close to the proposed Smithfield Dam is Calderwood Hall situated just off the R617. Calderwood Hall was the family home of the Jardine family, who emigrated to South Africa from Scotland to settle in the new colony. They initially built a modest stone farmhouse near a small river (now a dam with the original river running through it), but when the youngest son, Joseph Jardine, inherited the property, he decided to build a far larger country manor, designed by Stott. Construction started in 1895 and was completed in 1902 (Calderwood Hall 2015: 2 of 5).

Jardine bred race horses and supplied remounts to the British Army during the Anglo-Boer War of 1899 – 1902 (Dorning: 43). Calderwood Hall is currently used as a guest house.

A section of the tunnel that forms part of the uMWP Raw Water component crosses an area called Byrne Valley. The valley is situated approximately km from where the tunnel will be built. One of the immigration schemes for white settlers was Joseph Byrne's Emigration and Colonisation Company and most of the Byrne settlers were settled near Richmond in Byrne Valley.

Although the hopes of those who had been taken in by the promises of the various settlement companies were seldom realised (the offered land being too small and unsuitable to farm), many of the settlers flourished. Abandoning attempts to make ends meet on the land, they turned to trade and the whole of the Natal-Zululand region rapidly became covered by a commercial network. By 1855, the establishment of the towns of Richmond, York and Greytown to mention a few in the Midlands bore witness to the growing economic activity (Ballard: 128-129).

The end of the raw water tunnel, the proposed balancing dams and associated pipelines to the Water Treatment Works for the uMWP are located on Baynesfield Estate. According to the website of the Baynesfield Estate (Baynesfield Estate n.d: 1 of 2), Joseph Baynes with his father decided to join the Byrne settlers in 1850 to come to the Colony of Natal. As a result of



extensive travelling, Joseph Baynes found the Umlaas valley and he started to buy up land in the valley. Baynes House was built in 1882 as a typical example of a Victorian home.

The house still stands on the Baynesfield Estate together with associated buildings. Some are declared heritage sites.

Baynes farmed beef and dairy cattle, sheep, horses and pigs. According to the website (n.d: 1 of 2), Baynes started the bacon industry in the Colony of Natal with a bacon factory on the Estate. He was also the first man to dip cattle and became known as the 'Conqueror of the Tick'. The dip tank on the Estate is a declared heritage site. Baynes served as Minister of Lands and Works in the Colonial Government and died on 16 July 1925 (n.d: 2 of 2).

The Midlands of KwaZulu Natal including Bulwer and Impendle did not escape the political strife and tension of the apartheid years nor the intense conflict in the early 1990s between various political parties including the African National Congress (ANC) and the Inkatha Freedom Party (IFP). According to Carver (1996), evidence from commissions of inquiry, judicial proceedings, press investigations and human rights reports indicates that the outbreak of political violence in the mid-1980s was part of a calculated strategy by the National Party government and state security apparatus to disorganize opposition by means of a strategy of "informal repression". In Natal the Inkatha Freedom Front (IFF) led by Chief Mangosuthu Buthelezi benefited from its control of the KwaZulu homeland administration, particularly the police, whom it used in the struggle against the young "comrades" of the United Democratic Front.

Continuing violence in the post-election period (post-1994) was generally characterized by "political cleansing", mainly in rural areas aimed at eliminating pockets of support for the minority party in any given area. As the local government elections approached in June 1996, the non-governmental Human Rights Committee identified 30 areas of the province where the ANC could not campaign and 22 which were corresponding "no-go areas" for the IFP. The Lower South Coast and the Mandini area have both been particular focuses of violence, as have parts of the Midlands, including Impendle and Bulwer (Carver, 1996).

### **7.3 Living heritage**

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There are some beliefs and myths about the uMkhomazi River. Mr. Elliott Ndlovu was contacted who has some knowledge of such beliefs. He mentioned that he had heard that the uMkhomzi River was always full even when there were no rains and that the air kept the river full (pers. comm 15/05/2015).

Mr. Mbomvu of KwaZashuke also mentioned the above belief. He said that especially in winter the river would be full because of the wind. He said that this was because during winter when there was snow on the Drakensberg Mountains, the wind would blow causing the snow to melt that ultimately led to the uMkomazi River been full of water.

Mrs. Dlamini and Mr. Mbomvu of KwaZashuke mentioned that at night a light can be seen in the river. They said that the snake that lives in the river has a light on its head which is visible at night. It was also said that it is believed that tornados are created when the snake that lives in the river wants to move from one river to another river. The tornado would then cause damage to peoples' housing including roofs been torn off.

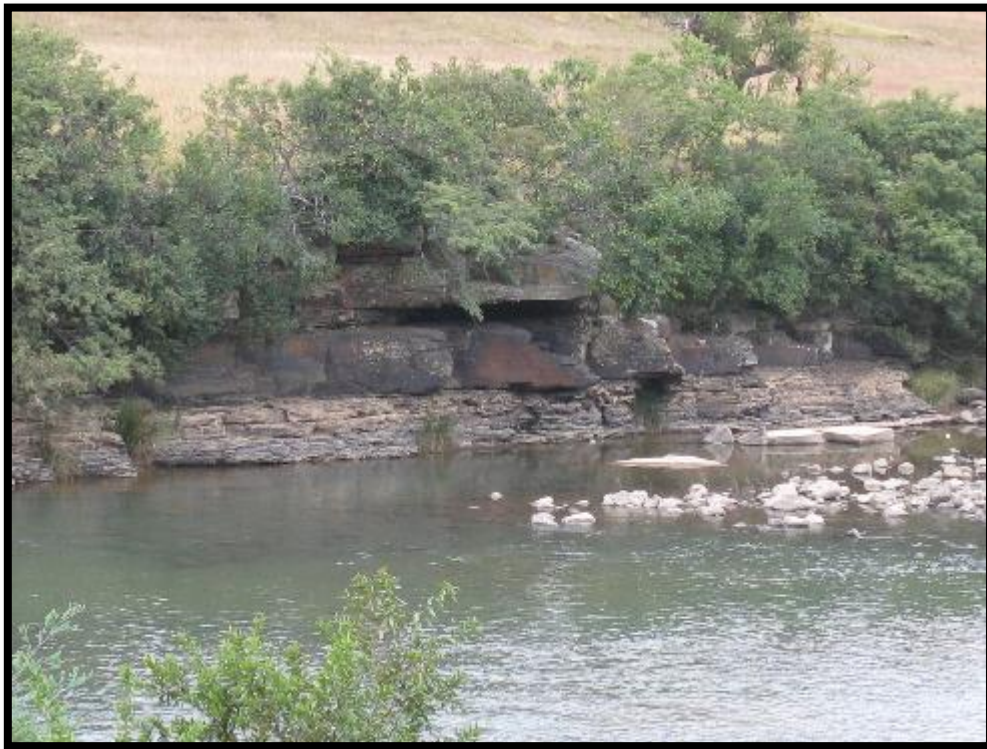
Mr. Mbomvu also stated that there was a belief that large dams created tornados as winds would be attracted to the dams.

## 8. RESULTS AND DISCUSSION

### 8.1 Archaeological

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Although various significant archaeological sites, such as rock art occurrences, occur in the greater Boston and Bulwer areas none were located the areas that were accessed during the site visit. Small shelters that were noticed adjacent to the Umkhomazi River were investigated but these all are located within the river flood zone and no archaeological deposit would remain (Fig 4).



**Figure 4: Small shelter adjacent to the Umkhomazi River**

A survey conducted by the Natal Museum in the 1960's located a few Middle Stone Age flakes and blades approximately 800m south of the proposed Smithfield Dam (Fig. 5). These tools occurred on the surface and were out of context. In addition, they have been removed and taken to the Museum for safekeeping. There is no evidence of the site today.

The remainders of several LIA / historic period structures will be impacted by the proposed dam and are listed in the following section.

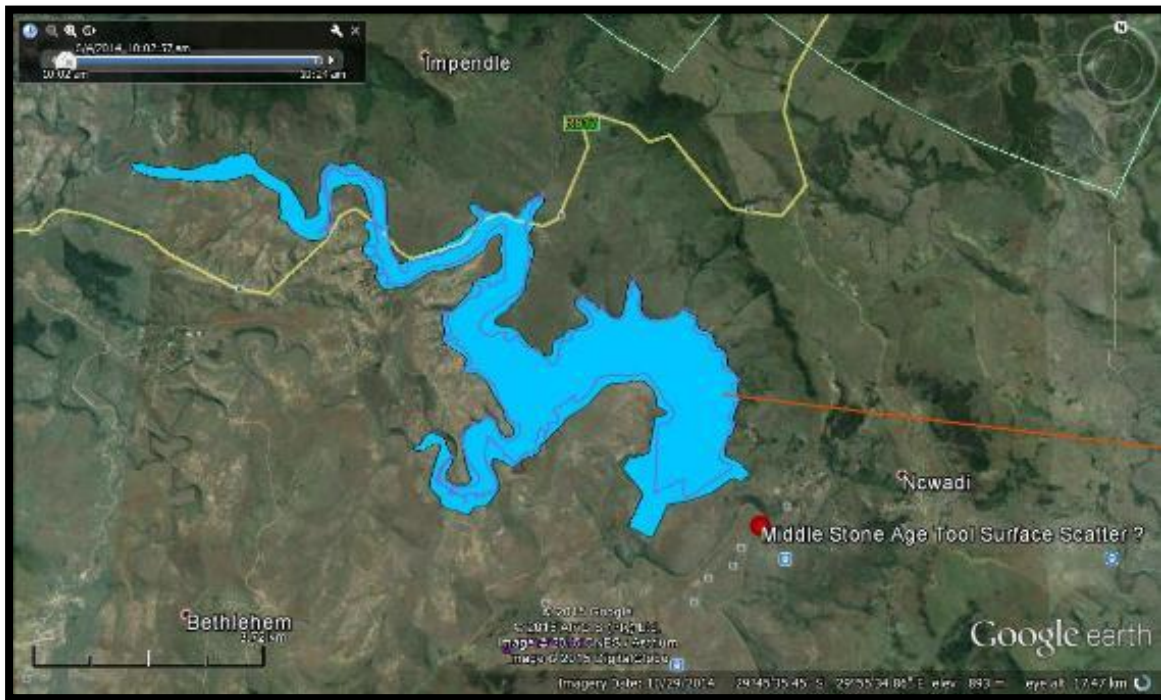


Figure 5: Google Earth image showing location of MSA tools recorded close to Smithfield Dam

## 8.2 Historical

The area where the Smithfield dam is proposed is characterized by steeply undulating topography with hills, steep slopes, flat plateaus and ridges, rivers and drainage lines. Traditional homesteads, are clustered on the mid slopes of the uMkhomazi Valley due to the availability of water from the river and arable riparian land. This arable land is used for subsistence farming in the form of food crop cultivation and livestock grazing. There are a number of churches and stores in the project area.

Close to where the R617 will be inundated by the proposed Dam, the Lundy's Hill Supply Store can be found. It forms part of a complex of buildings. The store is situated at 29°44'28.97"S / 29°54'53.75"E. Although in poor condition, the building is older than 60 years and is protected by section 33 of the KwaZulu-Natal Heritage Act. It is understood that the building will not be inundated by the proposed dam. It is however recommended that the store is protected by a 10 m fenced buffer to prevent any accidental damage in terms of passing construction vehicles, etc.



**Figure 6: Lundy's Hill Supply Store**

Immediately west of the store is the Deepdale Bridge which was built in 1896 and reconstructed in 1913. The single lane bridge on the D1212 is a reminder of the economic development of the Colony of Natal in the 19<sup>th</sup> Century with the spread of roads to the interior of the Colony. The bridge is a protected structure and it is recommended that inundation of the structure is avoided if possible due to its significance as one of the few remaining bridges from that era. The centre of the bridge is located at 29°44'28.75"S / 29°54'40.07"E.



**Figure 7: Plaque on Deepdale Bridge**



**Figure 8: Deepdale Bridge**

If inundation of the bridge cannot be avoided, a permit in terms of Regulation 2 of the KwaZulu-Natal Heritage Regulations of 2012 (Regulation No. 40 of 2 April 2012) will have to be obtained from Amafa prior to inundation and a complete recording of the structure must be undertaken to preserve its history. Two additional bridges on the R617 will be inundated by the proposed dam. These bridges were built more recently in the 1960s and have no heritage significance

Two causeways on the gravel road to KwaZashuke that cross the Luhane River, a tributary of the uMkhomazi River, will be inundated by the proposed dam. The causeways are located at 29°46'20.23"S / 29°54'36.17"E

The date of when the structures were built is unknown. The lower causeway could be older than 60 years (especially in light of the fact that construction of bridges was already taking place in 1896 in the area). It is therefore recommended that an application for the destruction of both causeways is made to Amafa.



**Figure 9: Causeways on the Luhane River**

A cluster of traditional homesteads are situated overlooking Deepdale Bridge that will be situated close to the full supply level (FSL) of the proposed Dam. It is understood that these dwellings will not be inundated.

If this is not the case, it should be noted that there is a good possibility that graves could be found close to the various homesteads. A Phase 2 HIA must be undertaken to determine the location of the graves in consultation with the affected homestead owners.

Some 50 m north of the R617 and on the other side of the valley to the above-mentioned terraced area, an old drystone wall was found. The wall was used to either keep animals in a secure area or to demarcate fields / pastures. These types of walls have their origins in the stone walling found in the British Isles.

Drystone walls are, with hedgerows, one of the most commonly used field boundaries in England. Drystone walls are not merely features of agricultural interest; they are in a sense, living history; a legacy of the movement towards enclosure of common farming and grazing land as English society moved away from feudalism (Britain Express 2015: 1 of 2).

The drystone wall will be impacted by the proposed deviation of the R617 at 29°44'40.57"S / 29°53'56.16"E. Although the wall appears to be no longer utilised, it is recommended that the R617 deviation avoid the wall as there are few reminders of this type of farming technique in KwaZulu-Natal let alone the country.

It is recommended that the proposed deviation follow the existing gravel road instead of looping southwards towards the river. This re-alignment would not only avoid the stone wall but would also keep the proposed realignment to an area that is already disturbed and where the possibility of finding intact heritage resources is low.

It is recommended that a 15 m buffer is placed around the wall during the construction of the R617 deviation to avoid any damage that may be caused to the wall from construction activities.



**Figure 10:** Google image of outline of drystone wall





**Figure 11: Section of drystone wall**



**Figure 12: View of raised area indicating drystone walling**

Several homestead along the R124 gravel road (the Deepdale road) will be inundated by the proposed Smithfield Dam.

At Kheswa's Kraal, six graves were found in a fenced off area (29°45'20.26"S / 29°56'36.33"E) which was overgrown with grass. There was no-one at the homestead so the people buried in the small informal cemetery are unknown but are most probably family members. The

neighbours' provided the name of the owner of the property. The remains of a small tombstone can be partially seen in Fig. 14 below.



**Figure 13: Graves at Kheswa's Kraal**



**Figure 14: Outline of grave at Kheswa's Kraal**

At Mbele's Kraal, the family at the homestead indicated that there was one grave of a family member which is located in the vegetable garden (29°45'26.49"S / 29°56'41.50"E) which was densely overgrown with vegetation. A small section of the grave can be seen in Fig. 16 below.



**Figure 15: Grave at Mbele's Kraal**

To the north-west of Mbele's Kraal, the remains of old dwellings could be seen (29°45'24.48"S / 29°56'40.07"E). No obvious graves were noted however, the undergrowth / grass cover was very thick making observation difficult. It is recommended that during the Phase 2 assessment, an investigation of this site be undertaken.

At Dlamini's Kraal, Mr. Dlamini informed the specialist that he had recently bought the homestead and that there were no graves to his knowledge in or close to the homestead. He telephonically contacted the previous owner who confirmed that there were no graves at the homestead.

At Mncwabe's Kraal, two graves of family members were pointed out by Mr. Mncwabe. The two graves are situated next to one another in a vegetable garden (29°45'24.67"S / 29°56'49.44"E).



**Figure 16: Graves at Mncwabe's Kraal**

Mr. Mncwabe then mentioned that there were many graves situated directly east of his homestead where he said the old people were buried. The grass cover was very thick but an inspection revealed between 10 and 20 graves stretching several metres eastwards together with the remains of structures. Some of the graves are outlined with stones and some are covered with stones. There are no identifying tombstones. The graves are located roughly between  $29^{\circ}45'25.72''\text{S} / 29^{\circ}56'50.41''\text{E}$  and  $29^{\circ}45'29.92''\text{S} / 29^{\circ}56'54.58''\text{E}$ . The Google Earth image below contains a rough outline of where the graves are located.



**Figure 17: Outline of grave adjacent to and east of Mncwabe's Kraal**

It is believed that the structures are from the historic period and application must be made to Amafa for their destruction as they will be inundated by the proposed dam.



**Figure 18: Remains of a grave**



**Figure 19: Google image showing rough outline of location of graves**

Mr. Mncwabe mentioned that the homestead south west of his homestead belonged to the Gamade family and to his knowledge there are no graves at the homestead. There was no-one at the homestead and a cursory look at the homestead did not reveal any obvious grave sites.

The inlet portal to the proposed tunnel is situated not far from the graves found east of the Mncwabe homestead mentioned above. Due to the proximity of the inlet portal to the large amount of graves found close to it, it is recommended that during the Phase 2 investigation, specific attention be given to the inlet site to ascertain the presence of heritage resources. Due to the thickness of the vegetation, a limited investigation of the area was undertaken during the site inspection and no sites were identified during this inspection. .

Excavation for the inlet portal of the tunnel will generate significant amounts of spoil material. The proposed waste disposal site is situated on the north eastern side of the P124 gravel road. The other option is to use the spoil material in the balancing dam walls. This is the preferred option from a heritage perspective.

It should be noted that the waste disposal site and proposed new P124 access road will impact on the remains of a circular structure at 29°45'26.33"S / 29°57'4.15"E which could possibly be a LIA / Sotho herder hut according to Prins. It is recommended that the proposed access road is re-aligned to avoid the structure and the proposed waste disposal site is moved slightly to the south east to avoid impacting on it. The structure must be fenced with a 10m buffer so that construction activities do not impact on it.

The alternative sites for the proposed borrow areas / quarries for Smithfield Dam were inspected. Sites A and B will impact on areas that are used for small scale subsistence farming. Some of the land is currently farmed and some of the land is lying fallow. It is recommended that instead of impacting on these areas, an existing quarry situated on the eastern side of the Deepdale road at 29°44'40.57"S / 29°53'56.16"E be used as it is already highly disturbed (see Fig. 22 below).



**Figure 20: View of part of Borrow Area B**



**Figure 21: Existing quarry with Deepdale gravel road in background**

Close to Borrow Area A, a number of sites were found including the remains of stone structures and graves (29°46'38.26"S / 29°56'41.89"E). The graves will have to be removed before inundation in accordance with Regulation 4 of the 2012 KwaZulu-Natal Heritage Regulations.

According to Prins, most of the stone structures are abandoned African homesteads from the later 19<sup>th</sup> – early 20<sup>th</sup> Century. The square outlines suggest European influence but absence of walling and trees suggest African inhabitants. All the stone structures identified in this report were rated as having a medium to high significance in terms of research as they belong to a period with lots of historical data but little archaeological evidence. The structures lend themselves to an archaeological study of spatial settlement layout with limited excavation of archaeological deposits.

It is therefore recommended that a second phase Archaeological Impact Assessment be undertaken and permits are obtained from Amafa for rescue excavations prior to inundation.

An inspection of the uMkhomazi River valley north east and below KwaZashuke revealed the remains of a structure and at least two graves at approx. 29°46'06.39"S / 29°55'21.41"E. This site falls outside the full supply level (FSL) of the proposed dam. However, the site must be clearly fenced off with a 10 m buffer to avoid any possible impacts due to their proximity to the dam and associated activities.





**Figure 22: Remains of a structure**

There are at least two graves ( $29^{\circ}46'05.19''\text{S} / 29^{\circ}55'14.35''\text{E}$ ) located at what was known as Hlope's Kraal. There is only the outline of a structure. The graves will be inundated by the dam therefore an application for the removal of the graves will have to be made to Amafa.



**Figure 23: Possible grave site at Hlope's Kraal**

Alongside the above site, the remains of a stone structure were found and at least one grave site. The site is known locally as Ngcobo's kraal ( $29^{\circ}46'7.09''\text{S} / 29^{\circ}55'11.21''\text{E}$ ).



**Figure 24: Ngcobo's Kraal**

The square structure suggest European influence and possibly dating from the late 1890s / early 20<sup>th</sup> Century. The structure is regarded to be of medium to high significance as explained above. It is recommended that a second phase Archaeological Impact Assessment be undertaken and a permit is obtained from Amafa for rescue excavation of the site prior to inundation.

The remains of a small stone structure can be found a short distance from the above site at (29°46'9.08"S / 29°55'11.2"E). The structure could date from the Late Iron Age / early historic period and, according to Prins, was possibly used by Sotho herders whilst looking after animals. The structure is regarded to be of medium to high significance as explained above. It is recommended that a second phase Archaeological Impact Assessment is undertaken and a permit is obtained from Amafa for rescue excavation of the site prior to inundation.



**Figure 25: Small stone structure**

During the Phase 2 assessment of the area, it is recommended that a more detailed inspection of the Luhane River valley be undertaken as there may be more structures and graves in the area that will be inundated by the dam.

The central portal to the tunnel is situated in a valley with a stream approximately half way between the proposed Smithfield Dam and proposed balancing dam. Although there are residences above the area, the project area itself is untouched by development and there is a possibility of the central portal excavations and waste disposal site affecting heritage resources especially archaeological material due to the water course. Access to the area was difficult during the Phase 1 site inspection therefore it is recommended that the site is assessed during the Phase 2 assessment.

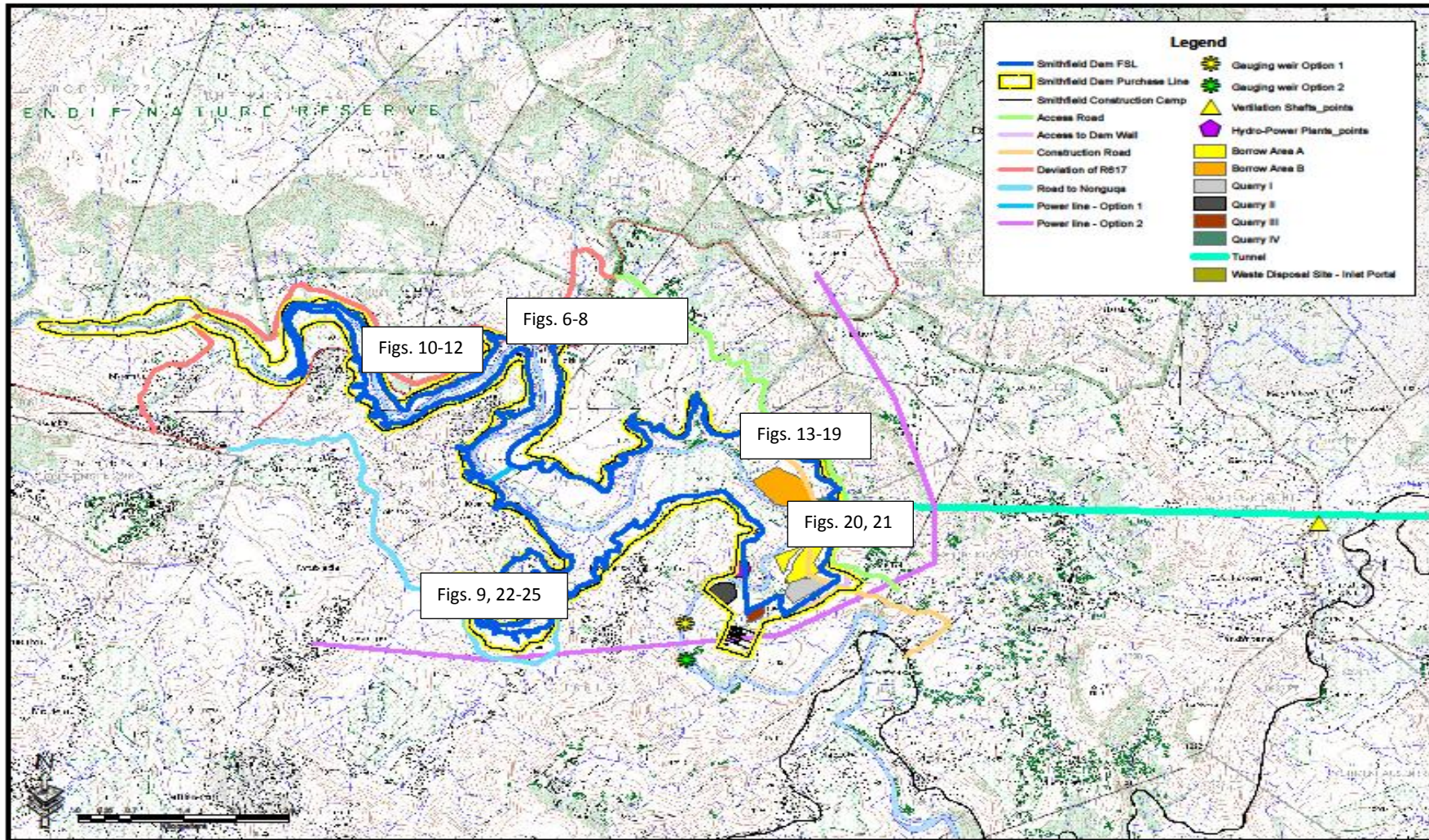


Figure 26: Western and central section of component

The outlet portal of the tunnel emerges above the southern-western end of the existing Mbangweni Dam. The outlet is situated on a steep slope hence it is not expected that heritage sites will be impacted by the tunnel. However, the area where the tunnel outlet works is proposed is one of the few areas in the surrounding area that is undisturbed by agricultural activities. It is therefore suggested that the area is assessed during the Phase 2 assessment to ensure that no unmarked graves or other heritage sites have been missed during the Phase 1 inspection.

There are two proposed sites for the proposed Balancing dam, namely:

- Construction of a new dam on the Mbangweni River approximately 250m upstream from the existing Mbangweni Dam;
- Construction of a new dam on the Mbangweni River, where the impoundment will be located on Portion 8 of the Farm Nooitgedacht 903. This is to be called the Langa balancing dam

Both dam sites are situated on Baynesfield Estate. The Baynesfield Lodges is found on the western bank of the existing Mbangweni Dam. The outlet portal and tunnel outlet works are situated approximately 300 m from the nearest lodge.



**Figure 27: Baynesfield Lodge on western bank of the existing Mbangweni Dam**

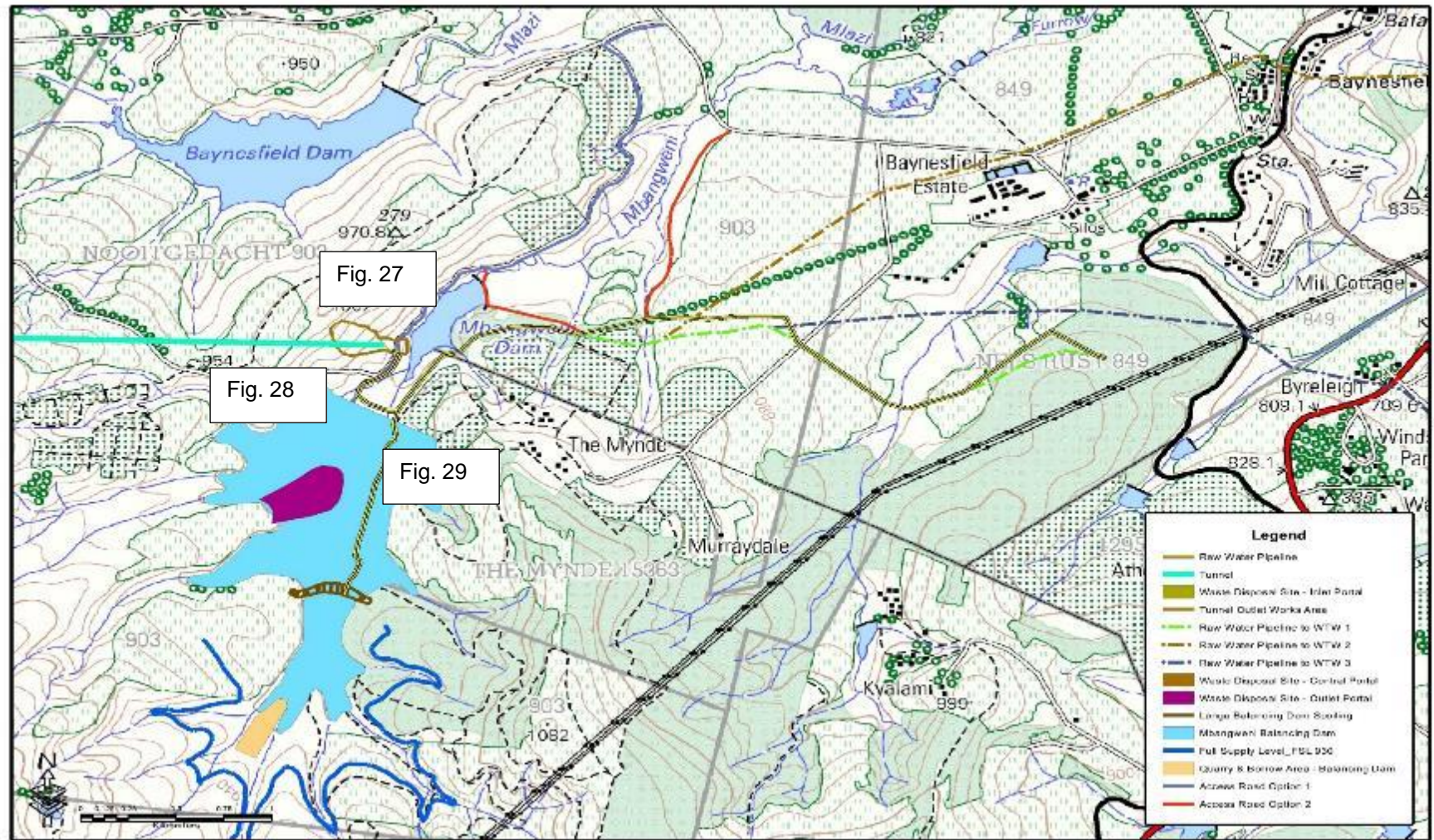


Figure 28: Eastern portion of Raw Water component



**Figure 29: Upstream area of Mbangweni River showing plantations and cultivated fields**



**Figure 30: Upstream of the Mbangweni River**

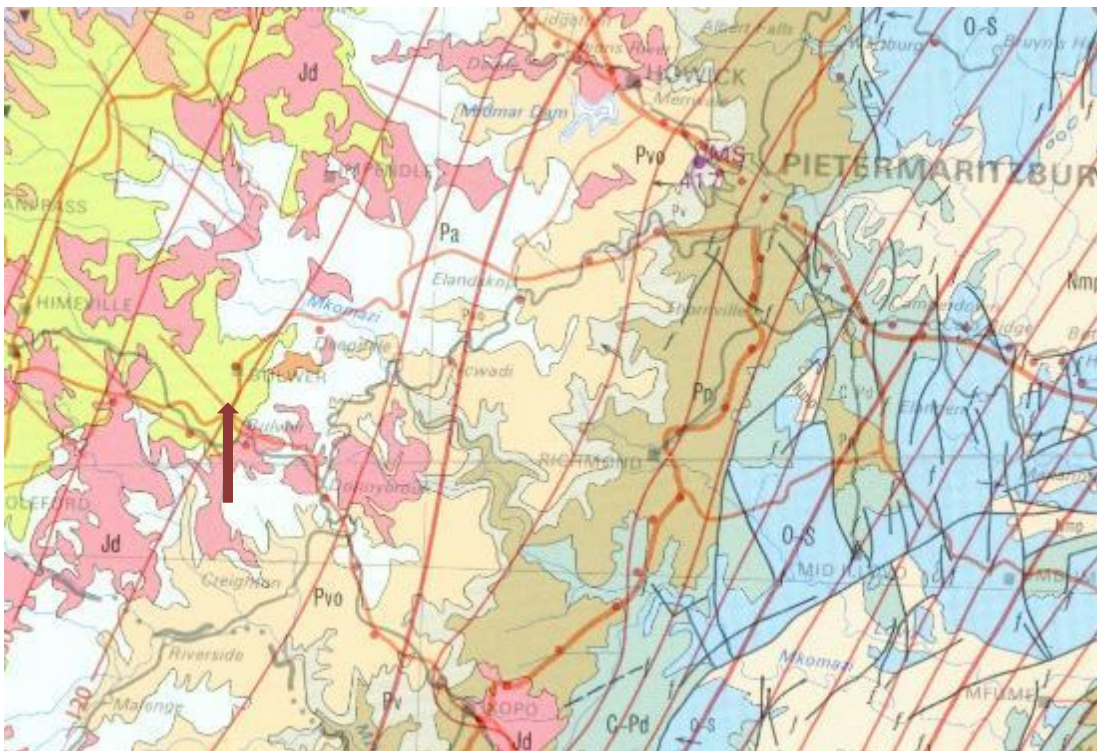
The area upstream from Mbangweni Dam, apart from the Mbangweni River and associated wetland, is transformed by maize cultivation on one side and sugar cane and tree plantations on the other side. No heritage sites were identified during the site visit.

All the raw water pipelines cross heavily impacted areas where intensive agricultural activities take place including the growing of avocados, sugar cane and maize as seen in Figures 29 and 30 above.

### 8.3 Palaeontology

The sites lie in eastern margin of the Karoo Basin, in the Volksrust Formation and Adelaide Subgroup in particular, which are of early Permian Ecca age and known to include fossil plants associated with the coal flora (see Fig.21 below). The distribution, however, is patchy. Plants of this age include Glossopteris leaves, cordaitalean leaves, ginkgophytes, ferns, sphenophytes, lycopods. According to the palaeo-sensitivity map produced by SAHRIS, the central and eastern sections of the Raw Water component fall in the green area which means that there is a moderate risk of fossils occurring there and a desktop study is required. Accordingly: there are no records of fossils from this region on the ESI database or published records (Anderson and Anderson, 1985; Plumstead, 1969).

No further palaeontological impact assessment is required for the central and eastern section of the project because there are no records of fossils from there. If, however, fossil plants are discovered during any excavations, a professional palaeontologist must be called to rescue them (after obtaining the appropriate Amafa permit).



**Figure 31: Geological map of the area along the uMkomazi River where the development will take place**



**Table 4: Abbreviations of the rock types**

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Last ca 20 Ma
O-S	Natal	Quartzitic sandstone, arkose, shale	Ordovician, Silurian
Jd	Jurassic dykes	Intrusive dolerite	Jurassic ca. 180 Ma
Pvo	Volksrust	Shale	Permian 300-250 Ma
Pa	Adelaide & Estcourt	Mudstone, sandstone	Permian 300-250 Ma
C-Pd	Dwyka	Tillite, sandstone, mudstone, shale	Carboniferous-Permian

However, according to the palaeo-sensitivity map produced by SAHRIS, the western side where the Smithfield Dam is proposed, falls in both red and orange areas which means that the area is very sensitive to sensitive and a Phase 2 paleontological impact assessment (PIA) is required for all aspects of the Western side as there is a high probability of finding some fossil plants in the area.

## 8.4 Recommendations

Due to the extent of inundation by Smithfield Dam, it is recommended that a Phase 2 assessment is undertaken that systematically surveys the footprint of the proposed dam identifying all affected graves and homesteads.

It is recommended that all sites (graves, structures, etc.) situated close to the FSL of the dam are fenced with a 15 m buffer in which no development may take place. Family member must be allowed unimpeded access to graves left *in situ* in the purchase line of the proposed dam.

Specific attention be given to the inlet site during the Phase 2 assessment to ascertain the presence of heritage resources especially graves.

It is recommended that the Phase 2 assessment include the tunnel outlet works as it is one of the few areas currently undisturbed by agricultural activities.

It is recommended that the Phase 2 assessment include the central portal area as the area was only assessed from afar due to access issues.

The Phase 2 Archaeological Impact Assessment is recommended to establish spatial patterns of previous development in the project area as well as assessing the significance of archaeological remains found. In addition, the uMkhomazi River valley will thoroughly investigated for the presence of rock art sites.

Due to the high fossil sensitivity of the Smithfield Dam / western section of the Raw Water component, a Phase 2 PIA is recommended. This is not required for the eastern section of the component.

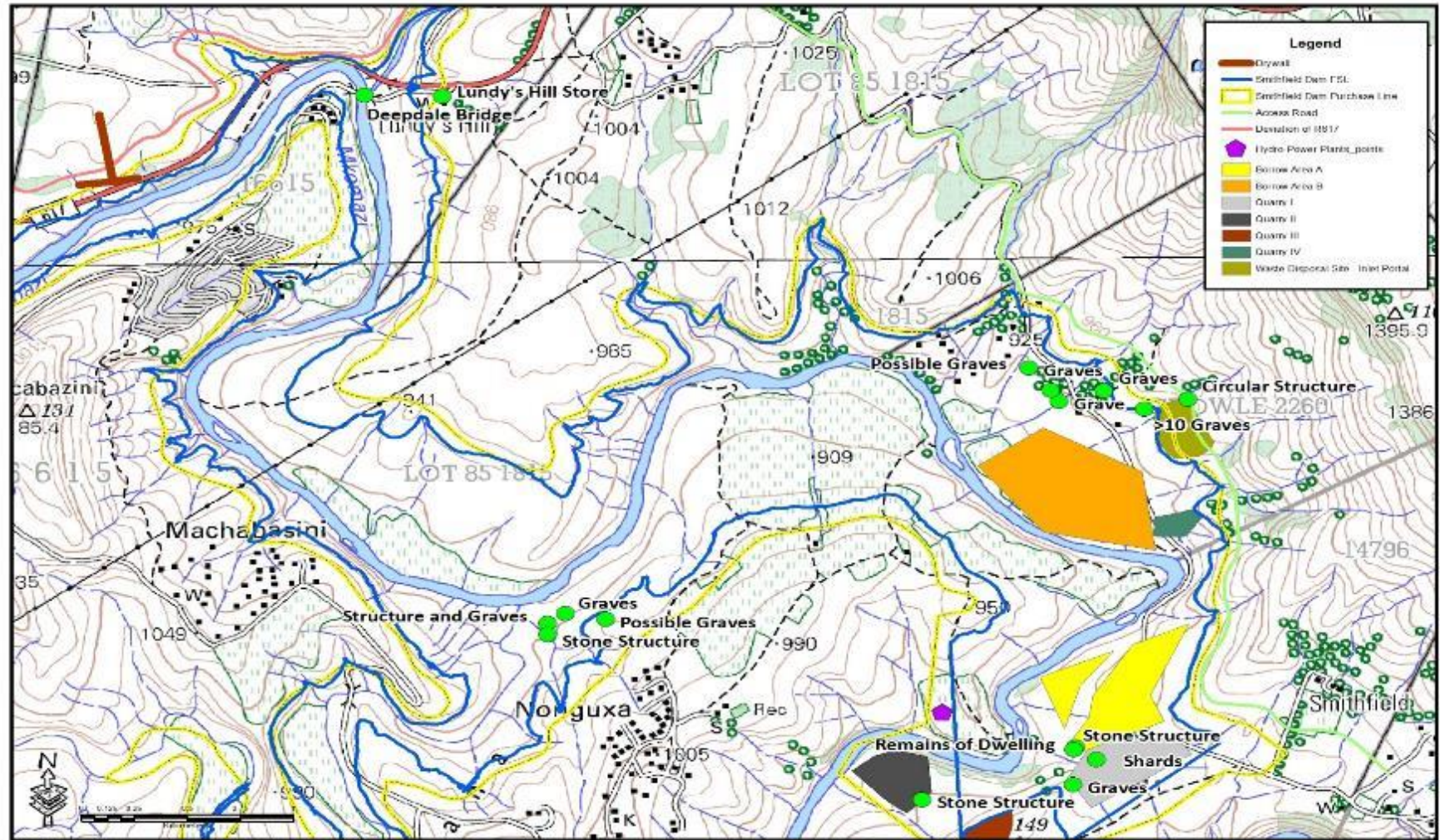


Figure 32: Heritage Sensitivity map

## 9. IMPACT ASSESSMENT METHODOLOGY

The EIA quantitative impact assessment will focus on the direct and indirect impacts to heritage resources associated with the project. All impacts have been analysed with regard to their nature, extent, magnitude, duration, probability and significance as described below:

### Nature (/Status)

The project could have a positive, negative or neutral impact on the environment.

### Extent

- Local - extend to the site and its immediate surroundings.
- Regional - impact on the region but within the province.
- National - impact on an interprovincial scale.
- International - impact outside of South Africa.

### Magnitude

Degree to which impact may cause irreplaceable loss of resources.

- Low - natural and social functions and processes are not affected or minimally affected.
- Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.
- High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

### Duration

- Short term - 0-5 years.
- Medium term - 5-11 years.
- Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.
- Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

### Probability

- Almost certain - the event is expected to occur in most circumstances.
- Likely - the event will probably occur in most circumstances.
- Moderate - the event should occur at some time.
- Unlikely - the event could occur at some time.
- Rare/Remote - the event may occur only in exceptional circumstances.

### Significance

Provides an overall impression of an impact's importance and degree to which it can be mitigated.

- 0 – Impact will not affect the environment. No mitigation necessary.
- 1 – No impact after mitigation.
- 2 – Residual impact after mitigation.
- 3 – Impact cannot be mitigated.

**Table 5: Impact Assessment: Western section: Smithfield Dam**

Environmental Feature	Cultural heritage
Relevant Alternatives & Activities	<b>Smithfield Dam</b>
Project life-cycle	<b>Pre-Construction phase</b>
Potential Impact	Proposed Management Objectives / Mitigation Measures
<ul style="list-style-type: none"> <li>• Destruction or damage to cultural heritage sites including structures older than 60 years, traditional graves, LIA sites, etc.</li> <li>• Inundation of Deepdale Bridge</li> <li>• Inundation of graves in traditional burial places and those not located in formal cemeteries</li> <li>• Inundation of LIA structures and historic / other structures</li> </ul>	<ol style="list-style-type: none"> <li>1. During construction, if any heritage resources are found (chance finds) the following protocol must be followed:               <ol style="list-style-type: none"> <li>a All work must stop in the vicinity of the find</li> <li>b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage</li> <li>c Amafa must be informed and a registered heritage specialist must be appointed to undertake an assessment of the find.</li> <li>d Depending of what is found and the significance thereof, the specialist will advise on the way forward.</li> <li>e If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from Amafa</li> <li>f Only once the specialist gives the go-ahead can work commence in the area</li> <li>g Under no circumstance can heritage material be destroyed or removed from the site</li> <li>h Should any remains be found that could potentially be human remains then the SAPS must be contacted</li> </ol> </li> <li>2. The bridge is one of the few examples of the early transportation network within KZN. It is recommended that the bridge is not inundated</li> <li>3. If this this not possible, then a complete photographic and historic record of the bridge must take place prior to inundation. A permit must be obtained from Amafa in accordance with Regulation 2 of the 2012 Heritage Regulations (as attached) prior to inundation</li> <li>4. A Phase 2 assessment is recommended where the exact location of all graves to be removed is determined as well as the identification of unidentified archaeological sites including rock art sites</li> <li>5. Permits must be obtained from Amafa prior to the relocation of the graves and the process required by Regulation 4 of the Heritage Regulations must be adhered to including consultation with family members, the affected community and relevant municipality (if required)</li> <li>6. Several stone structures / outline of structures from the LIA and historic period will be inundated. The sites have been attributed a medium to high significance. A second phase AIA is recommended and permit for rescue excavations must be obtained from Amafa in terms of Regulation 2 and 5 of the Heritage Regulations prior to inundation</li> </ol>

<b>Deepdale Bridge</b>	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	-	Regional	Medium	Permanent	Almost certain	3
<b>After mitigation</b>	-	Regional	Medium	Permanent	Likely	3

<b>Graves</b>	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	-	Regional	High	Medium	Almost certain	3
<b>After mitigation</b>	-	Regional	Medium	Medium	Likely	2

<b>LIA / historic stone structures</b>	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	-	Local	High	Permanent	Almost certain	3
<b>After mitigation</b>	-	Local	High	Permanent	Likely	2

**Table 6: Impact assessment: Western section: associated infrastructure**

<b>Environmental Feature</b>	<b>Cultural heritage</b>
<b>Relevant Alternatives &amp; Activities</b>	<b>Access roads, tunnel portals, borrow areas, etc</b>
<b>Project life-cycle</b>	<b>Pre-Construction, construction and operational phases</b>
<b>Potential Impact</b>	<b>Proposed Management Objectives / Mitigation Measures</b>
<ul style="list-style-type: none"> <li>• Destruction or damage to cultural heritage sites including structures older than 60 years, LIA sites and graves, etc.</li> <li>• Destruction of drystone wall by realignment of R617</li> <li>• LIA / historic period structures</li> </ul>	<ol style="list-style-type: none"> <li>1. Phase 2 assessment of tunnel portals due to undisturbed condition of areas where portals will be located</li> <li>2. During construction, if any heritage resources are found (chance finds) the following protocol must be followed:             <ol style="list-style-type: none"> <li>a All work must stop in the vicinity of the find</li> <li>b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage</li> <li>c Amafa must be informed and a registered heritage specialist must be appointed to undertake an assessment of the find.</li> <li>d Depending of what is found and the significance thereof, the specialist will advise on the way forward.</li> <li>e If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from Amafa</li> <li>f Only once the specialist gives the go-ahead can work commence in the area</li> <li>g Under no circumstance can heritage material be destroyed or removed from the site</li> <li>h Should any remains be found that could potentially be human remains then the SAPS must be contacted</li> </ol> </li> <li>3. The drystone wall is one of few surviving examples of that specific farming technique. The deviation of the R617 should be moved more north to avoid impacting on the wall and to follow the existing gravel road</li> <li>4. If the above is not possible, the photographic and historical recording of the structure must be undertaken and a permit to destroy that section of the wall must be obtained from Amafa as the structure is well over 60 years.</li> <li>5. A buffer of 15m must be placed around the remainder of the drystone wall to prevent damage by the construction of the R617 deviation.</li> <li>6. The buffer must be highly visible to construction personnel</li> <li>7. It is recommended that the buffer becomes permanent in order to avoid damage to the wall during road maintenance or if the road is widened</li> <li>8. Structures must be avoided by access roads, quarries, waste disposal areas, etc. The structures must be protected by a 15 m buffer to avoid accidental damage through construction activities.</li> <li>9. If the structures cannot be avoided, application must be made in terms of Regulations 2 and 5</li> </ol>

	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	-	Local	High	Permanent	Likely	3
<b>After mitigation</b>	-	Local	Medium	Permanent	Moderate	2

**Table 7: Impact assessment: Central and eastern section**

<b>Environmental Feature</b>	<b>Cultural heritage</b>
<b>Relevant Alternatives &amp; Activities</b>	<b>Tunnel, outlet portal, Balancing Dams, pipelines, access roads, etc</b>
<b>Project life-cycle</b>	<b>Construction &amp; operational phases</b>
<b>Potential Impact</b>	<b>Proposed Management Objectives / Mitigation Measures</b>
<ul style="list-style-type: none"> <li>Destruction or damage to cultural heritage sites including structures older than 60 years, graves, etc.</li> </ul>	<ol style="list-style-type: none"> <li>Phase 2 assessment of tunnel portals due to undisturbed condition of areas where portals will be located</li> <li>During construction, if any heritage resources are found (chance finds) the following protocol must be followed:             <ol style="list-style-type: none"> <li>All work must stop in the vicinity of the find</li> <li>The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage</li> <li>Amafa must be informed and a registered heritage specialist must be appointed to undertake an assessment of the find.</li> <li>Depending of what is found and the significance thereof, the specialist will advise on the way forward.</li> <li>If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from Amafa</li> <li>Only once the specialist gives the go-ahead can work commence in the area</li> <li>Under no circumstance can heritage material be destroyed or removed from the site</li> <li>Should any remains be found that could potentially be human remains then the SAPS must be contacted</li> </ol> </li> </ol>

	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	- negative	Local	Medium	Short-term	Almost certain	3
<b>After mitigation</b>	-	Local	Low	Short-term	Unlikely	1



**Table 8: Impact assessment: Archaeology**

<b>Environmental Feature</b>	<b>Archaeological Sites and Features</b>
<b>Relevant Alternatives &amp; Activities</b>	<b>Smithfield Dam, tunnel, access roads, pipelines, Balancing Dams, etc.</b>
<b>Project life-cycle</b>	<b>Construction &amp; operational phases</b>
<b>Potential Impact</b>	<b>Proposed Management Objectives / Mitigation Measures</b>
<ul style="list-style-type: none"> <li>Destruction or damage to archaeological sites and remains</li> </ul>	<ol style="list-style-type: none"> <li>A Phase 2 AIA is recommended to assess spatial patterns of settlements &amp; significance of archaeological remains.</li> <li>Depending on the significance of sites identified, either the sites will need to be recorded and rescued if sites are of high significance or application for destruction will have to be made to Amafa in terms of Regulation 5</li> <li>During construction, if any archaeological resources are found (chance finds) the following protocol must be followed:             <ol style="list-style-type: none"> <li>All work must stop in the vicinity of the find</li> <li>The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage</li> <li>Amafa must be informed and a registered heritage specialist must be appointed to undertake an assessment of the find.</li> <li>Depending of what is found and the significance thereof, the specialist will advise on the way forward.</li> <li>If the resource needs to be removed/altered/destroyed then the necessary permit/s must be obtained from Amafa</li> <li>Only once the specialist gives the go-ahead can work commence in the area</li> <li>Under no circumstance can heritage material be destroyed or removed from the site</li> </ol> </li> </ol>

	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	-	Local	Medium	Short-term	Likely	3
<b>After mitigation</b>	-	Local	Low	Short-term	Moderate	2

**Table 9: Impact assessment: Palaeontology: Western Section**

<b>Environmental Feature</b>	<b>Palaeontology</b>
<b>Relevant Alternatives &amp; Activities</b>	<b>Raw Water component – Western section: Smithfield Dam, access roads; inlet portal of tunnel, etc</b>
<b>Project life-cycle</b>	<b>Pre-construction and Construction phases</b>
<b>Potential Impact</b>	<b>Proposed Management Objectives / Mitigation Measures</b>
<ul style="list-style-type: none"> <li>Inundation of fossils by Dam</li> <li>Destruction or damage to fossils unearthed during construction process</li> </ul>	<ol style="list-style-type: none"> <li>A Phase 2 PIA is required where specialists will go to site as there is a high possibility of finding fossil plants in the project area.</li> <li>During construction, if any fossil plants are found (chance finds) the following protocol must be followed:             <ol style="list-style-type: none"> <li>All work must stop in the vicinity of the find</li> <li>The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage</li> <li>Amafa must be informed and a registered palaeontologist must be appointed to undertake an assessment of the find.</li> <li>Depending of what is found and the significance thereof, the specialist will advise on the way forward.</li> <li>If the fossils are deemed to be significant and need to be removed, the necessary permit/s must be obtained from Amafa before removal takes place.</li> <li>Only once the specialist gives the go-ahead can work commence in the area</li> <li>Under no circumstance may fossils be destroyed or removed from the site</li> </ol> </li> </ol>

	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	- negative	Local	High	Short-term	Almost certain	3
<b>After mitigation</b>	-	Local	Low	Short-term	Unlikely	2

**Table 10: Impact assessment: Palaeontology Central & Eastern sections**

<b>Environmental Feature</b>	<b>Palaeontology</b>
<b>Relevant Alternatives &amp; Activities</b>	<b>Raw Water component – Central and Eastern sections: tunnel; outlet portal, pipelines, access roads, Balancing Dams, etc</b>
<b>Project life-cycle</b>	<b>Pre-construction and Construction phases</b>
<b>Potential Impact</b>	<b>Proposed Management Objectives / Mitigation Measures</b>
<ul style="list-style-type: none"> <li>• Destruction or damage to fossils unearthed during construction process</li> </ul>	1. During construction, if any fossil plants are found (chance finds) the following protocol must be followed:
	<ul style="list-style-type: none"> <li>a All work must stop in the vicinity of the find</li> <li>b The Contractor or ECO must be informed and the find barricaded off to prevent further interference or damage</li> <li>c Amafa must be informed and a registered palaeontologist must be appointed to undertake an assessment of the find.</li> <li>d Depending of what is found and the significance thereof, the specialist will advise on the way forward.</li> <li>e If the fossils are deemed to be significant and need to be removed, the necessary permit/s must be obtained from Amafa before removal takes place.</li> <li>f Only once the specialist gives the go-ahead can work commence in the area</li> <li>g Under no circumstance may fossils be destroyed or removed from the project area</li> </ul>

	<b>+/- Impact</b>	<b>Extent</b>	<b>Magnitude</b>	<b>Duration</b>	<b>Probability</b>	<b>Significance</b>
<b>Before mitigation</b>	- negative	Local	Low	Short-term	Unlikely	2
<b>After mitigation</b>	-	Local	Low	Short-term	Remote	1

## 10. COMPARISON OF ALTERNATIVES

### Comparison of Options - Smithfield Dam Components

Components		Alternatives	Preferred (✓)	Motivation
Smithfield Dam Area	Relocation of Eskom Transmission Line	1. Option 1 (across the dam)	✓	The area of impact is limited to a new crossing of the river close to the existing servitude; substantially shorter than Option 2
		2. Option 2 (around the SE side of the dam)	X	A much longer option with a concomitant increase in the risk of impacting on heritage resources
	Gauging weir (downstream and close to Smithfield Dam - U10F)	1. Option 1	Either site	Due to proximity to river, any heritage resources would have been destroyed or washed away during flooding
		2. Option 2	Either site	Due to proximity to river, any heritage resources would have been destroyed or washed away during flooding
	Quarries & borrow areas	1. Quarries & Borrow areas	X	Existing quarry area to be used for the borrow area instead of proposed sites as the existing quarry is highly disturbed

Components		Alternatives	Preferred (✓)	Motivation
		2. Alternatives <ul style="list-style-type: none"> <li>▪ Aggregates:</li> <li>▪ Natural sand</li> </ul>	✓	Material will come from existing quarries; no impact on undisturbed areas in project site

**Comparison of Options – Conveyance Infrastructure Components**

Components		Alternatives	Preferred (✓)	Motivation
<b>Conveyance Infrastructure</b>	<b>Raw Water Pipeline</b>	1. Route to WTW Option 1	✓	WTW Option 1 is preferred option
		2. Route to WTW Option 2	✗	Pipeline is runs close to Baynesfield Estate buildings; WTW Option 2 is not preferred
		3. Route to WTW Option 3	✓	Follows much of Potable Water Pipeline Option 1 which crosses mainly disturbed areas; position of pipeline next to Stead family cemetery is however a cause for concern
	<b>Waste disposal site – Tunnel Outlet</b>	1. Option 1: Position 1	✗	Impacts on area where heritage sites could be found
		2. Option 2: Spoil to be used in the balancing dam wall	✓	No impact on heritage sites

**Comparison of Options - Balancing Dam Components**

Components		Alternatives	Preferred (✓)	Motivation
<b>Balancing Dam Area</b>	<b>Balancing dam</b>	1. Mbangweni Balancing Dam	✓	Situated closer to existing Mbangweni Dam hence there are existing access roads thus limiting need for new access roads
		2. Langa Balancing Dam	X	Outer reaches of dam impact on undisturbed land which increases potential for impacting heritage resources
	<b>Road – Balancing Dam</b>	1. Option 1	✓ (2)	Situated on existing road so area is already disturbed; slightly less preferred as longer in length than Option 2
		2. Option 2	✓ (1)	Situated on existing road so area is already disturbed
	<b>Quarries &amp; borrow areas</b>	1. Quarries & Borrow areas	X	Potential impacts on heritage sites
		2. Alternatives <ul style="list-style-type: none"> <li>▪ Aggregates:</li> <li>▪ Natural sand</li> </ul>	✓	Material coming from existing quarries; no impact on heritage resources

## 11. CONCLUSION

The construction of the proposed Smithfield Dam will have a high impact on heritage resources as a large area will be inundated permanently.

A number of sensitive cultural heritage and archaeological sites were identified in and around the FSL of the dam. Some of these sites, together with a number of homesteads will be inundated by the dam.

It is recommended that the inundation of the Deepdale Bridge which is over 100 years old not take place as the bridge is an example of the road infrastructure that was built in the late 19<sup>th</sup> century and which has remained in remarkably good condition. If inundation cannot be avoided, then a full recording of the bridge must take place and a permit must be obtained from Amafa for the destruction of the bridge.

The drystone wall found north of the R617 and uMhkomzi River is one of very few examples of a farming technique that was used extensively in the British Isles. The wall is also in good condition although overgrown by vegetation. It is therefore recommended that the proposed R617 deviation that would impact on the wall be moved northwards to run along an existing gravel road thereby avoiding the wall and keeping the impact of the new road to an area disturbed by an existing road.

The site inspections revealed that a large number of graves will be impacted by the proposed Smithfield Dam. A Phase 2 assessment is recommended in order to determine the locality of all the graves that will have to be removed prior to inundation.

During the Phase 2 assessment, in-depth consultation with affected families, including attempts to find family who no longer live in the area, must take place in order to ensure that the exhumation of the grave/s has the families support as well as determining where the remains must be re-buried and customary practices to be followed.

Due to difficulties during the Phase 1 assessment, it is recommended that an assessment of the inlet, central and outlet portals are undertaken during the Phase 2 assessment

The remains of several stone structures were found throughout the proposed Smithfield Dam basin. Most of the stone structures were identified as abandoned African homesteads from the

later 19<sup>th</sup> – early 20<sup>th</sup> century with a significance rating of medium to high in terms of research as they belong to a period with lots of historical data but little archaeological evidence.

A Phase 2 AIA is therefore recommended and the necessary permits must be obtained from Amafa for rescue excavations.

During the site inspections no rock art occurrences were located in the footprint of the project area. Small shelters that were noticed adjacent to the Umkhomazi River were investigated but these were all found to be located within the river flood zone and no archaeological deposit would have remained after the flooding of the river.

During the Phase 2 AIA, a search must also be undertaken for rock art sites that could possibly exist in the uMhkomazi River Valley. If sites are found, the necessary applications will have to be made to either for their removal or destruction depending on their significance and condition.

According to the palaeo-sensitivity map, the central and eastern sections fall in the green area which means that there is a moderate risk of fossils occurring there. The desktop study undertaken established that there were no records of fossils from the area therefore no further palaeontological assessment was required for the central and eastern section of the project.

The western side where the Smithfield Dam is proposed, falls in both red and orange fossil sensitivity areas as indicated on the SAHRIS palaeo-sensitivity map which means that the area is very sensitive to sensitive and a Phase 2 PIA site visit is required prior to inundation as there is a high probability of finding fossil plants in the area.

The construction of the dam in particular will have a very high impact on the area where it is proposed. Every measure must be undertaken to avoid, where possible, the inundation of homesteads as this will result in the inhabitants' way of life been substantially impacted upon together with the cultural landscape of the area. The relocation of households and associated cultural artefacts and family graves that may be found within or close to homesteads must be handled with great sensitivity.



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