PHASE ONE HERITAGE IMPACT ASSESSMENT OF THE PROPOSED BUFFELS RIVER BRIDGE AT MLABA NEAR DUNDEE, KWAZULU-NATAL

ACTIVE HERITAGE cc.

For: GBS Environmental Consulting

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LIST OF ABBREVIATIONS AND ACRONYMS

EIA	Early Iron Age
ESA	Early Stone Age
HISTORIC PERIOD	Since the arrival of the white settlers - c. AD 1820 in this part of the country
IRON AGE	Early Iron Age AD 200 - AD 1000 Late Iron Age AD 1000 - AD 1830
LIA	Late Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998 and associated regulations (2006).
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations (2000)
SAHRA	South African Heritage Resources Agency
STONE AGE	Early Stone Age 2 000 000 - 250 000 BP Middle Stone Age 250 000 - 25 000 BP Late Stone Age 30 000 - until c. AD 200

EXECUTIVE SUMMARY

A first phase heritage survey of the proposed construction of the 130 metre Buffels River Bridge (Number 3717) over the Umzinyathi River on L2953 Local Road in the Mhlaba area east of Pomeroy in KwaZulu-Natal. Identified no heritage sites or features on the footprint. The area is also not part of any known cultural landscape. Modern graves do occur in the area but none of them are located less than 25m from the footprint. The palaeontologist report that the proposed Buffalo River Bridge development will not pose a significant threat to local fossil heritage resources. There is therefore no reason, from a heritage perspective, why the proposed development may not proceed as planned. However, attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose additional archaeological, historical or paleontological remains should cease immediately, pending evaluation by the provincial heritage agency.

1 BACKGROUND INFORMATION ON THE PROJECT

Table 1. Background information

Consultant:	Frans Prins (Active Heritage cc) for GBS Environmental Services
Type of development:	The proposed development that forms the subject of this application is the construction of a bridge and access road that will eventually connect the communities living either side of the Umzinyathi River and allow access to Nquthu and Pomeroy. The existing river crossing is through the Umzinyathi River when water levels permit. During winter it can be ankle deep, however this river is too dangerous to cross during the wet season when this river becomes a raging torrent, hindering access to community dwellings, schools and clinics in the area. The bridge will be constructed with funding from the KZN Department of Transport
Rezoning or subdivision:	Rezoning
Terms of reference	To carry out a Heritage Impact Assessment
Legislative requirements:	The Heritage Impact Assessment was carried out in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and following the requirements of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act, 1997 (Act No. 4 of 2008)

1.1. Details of the area surveyed:

The project area is located approximately 25km to the east of Pomeroy in the Mlaba area in the Tugela River Valley (Figs 1 & 2). The project entails the construction of the Buffels River Bridge (Number 3717) over the Umzinyathi River on L2953 Local Road, Erf-Klip River 4665 & Reserve 18 15838. It is situated within the Amajuba District Municipality. The proposed bridge will allow both vehicle and pedestrian movement across the river. The bridge will have an overall length of approximately 130m and will designed to clear a 1:20 flood return period. The bridge will have 10 spans of 12 metres with wing walls on either end of the approaches. The piers will have an approximate height of 3 - 4 metres and shall be supported on pad foundation founded on bedrock. The coordinates of the proposed bridge are as follows: 28°31´01.49˝ S 30°39´19.82˝ E

BACKGROUND TO ARCHAEOLOGICAL HISTORY OF AREA

The archaeological history of the Province of KwaZulu-Natal (KZN) dates back to about 2 million years and possibly older, which marks the beginning of the Stone Age. The Stone Age in KZN was extensively researched by Professor Oliver Davies formerly of the Natal Museum. The Stone Age period has been divided in to three periods namely: Early Stone Age (ESA) dating between 2 million years ago to about 200 000 years ago, Middle Stone Age (MSA) dating between 200 000 years ago to about 30 000 years ago, and the Later Stone Age (LSA) which dates from 30 000 to about 2 000 year ago. The Stone Age period ends around approximately 2 000 years ago when Bantu speaking Age farmers from the north arrived in southern Africa. The Iron Age is also divided into three periods, namely: Early Iron Age (EIA) dating between AD 200 and AD 900, Middle Iron Age (MIA) dating between AD 900 and AD 1300, Late Iron Age (LIA) dating between AD 1 300 and 1 820.

2.1 Stone Age

2.1.1 Early Stone Age (ESA)

The ESA is considered as the beginning of the stone tool technology. It dates back to over 2 million years ago until 200 000 years ago. This period is characterised by Oldowan and Acheulean industries. The Oldowan Industry, dating to approximately

between over 2 million years and 1.7 million years predates the later Acheulean. The Oldowan Industry consists of very simple, crudely made core tools from which flakes are struck a couple of times. To date, there is no consensus amongst archaeologists as to which hominid species manufactured these artefacts. The Acheulean Industry lasted from about 1.7 million years until 200 thousand years ago. Acheulean tools were more specialized tools than those of the earlier industry. They were shaped intentionally to carry out specific tasks such as hacking and bashing to remove limbs from animals and marrow from bone. These duties were performed using the large sharp pointed artefacts known as hand axes. Cleavers, with their sharp, flat cutting edges were used to carry out more heavy duty butchering activities (Esterhuysen, 2007). The ESA technology lasted for a very long time, from early to middle Pleistocene and thus seems to have been sufficient to meet the needs of early hominids and their ancestors. Although not identified on the footprint, ESA tools occurrence have been reported in other sites in KZN. Apart from stone artefacts, the ESA sites in this Province have produced very little as regards other archaeological remains. This has made it difficult to make inferences pointing to economical dynamics of the ESA people in this part of the world. The diet of ESA peoples has therefore had to be reconstructed on the basis of evidence from elsewhere that it comprised primarily of animal and plant foods (Mazel 1989).

2.1.2 Middle Stone Age (MSA)

The MSA dates to between 200 000 and 30 000 years ago, coinciding with the emergence of modern humans. The MSA technology is therefore believed to have been manufactured by fully modern humans known as *Homo sapiens* who emerged around 250 000 years ago. While some of the sites belonging to this time period occur in similar contexts as those of ESA, most of the MSA sites are located in rock shelters.

Palaeoenvironmental data suggest that the distribution of MSA sites in the high lying Drakensberg and surrounding areas was influenced by the climate conditions, specifically the amount and duration of snow (Carter, 1976). In general, the MSA stone tools are smaller than those of the ESA. Although some MSA tools are made from prepared cores, the majority of MSA flakes are rather irregular and are probably waste material from knapping exercises. A variety of MSA tools include blades, flakes, scrapers and pointed tools that may have been hafted onto shafts or handles and used as spearheads. Between 70 000 and 60 000 years ago new tool types appear known as segments and trapezoids. These tool types are referred to as backed tools from the method of preparation. Residue analyses on the backed tools from South African MSA

sites including those in KZN indicate that these tools were certainly used as spear heads and perhaps even arrow points (Wadley, 2007). A few sites with impressive MSA deposits have been excavated in KZN. Perhaps the best known ones are Sibudu Cave and Umhlatuzana Cave to the south of the study area, and Border Cave to the north of the study area. All these sites provided impressive evidence for fine resolution data and detailed stratigraphy (Wadley & Jacobs, 2006).

2.1.3 Late Stone Age (LSA)

Compared to the earlier MSA and ESA, more is known about the LSA which dates from around 30 000 to 2 000 (possibly later) years ago. This is because LSA sites are more recent than ESA and MSA sites and therefore achieve better preservation of a greater variety of organic archaeological material. The Later Stone Age is usually associated with the San (Bushmen) or their direct ancestors. The tools during this period were even smaller and more diverse than those of the preceding Middle Stone Age period. LSA tool technology is observed to display rapid stylistic change compared to the slower pace in the MSA. The rapidity is more evident during the last 10 000 years. The LSA tool sequence includes informal small blade tradition from about 22 000 – 12 000 years ago, a scraper and adze-rich industry between 12 000 – 8 000 years ago, a backed tool and small scraper industry between 8 000 – 4 000 years and ending with a variable set of other industries thereafter (Wadley, 2007). Adzes are thought to be wood working tools and may have also been used to make digging sticks and handles for tools. Scrapers are tools that are thought to have been used to prepare hides for clothing and manufacture of other leather items. Backed tools may have been used for cutting as well as tips for arrows It was also during Later Stone Age times that the bow and arrow was introduced into southern Africa – perhaps around 20 000 years ago. Because of the bow and arrow and the use of traps and snares, Later Stone Age people were far more efficient in exploiting their natural environment than Middle Stone Age people. Up until 2 000 years ago Later Stone Age people dominated the southern African landscape. However, shortly after 2 000 years ago the first Khoi herders and Bantu-speaking agro pastoralists immigrated into southern Africa from the north. This led to major demographic changes in the population distribution of the subcontinent. San hunter-gatherers were either assimilated or moved off to more marginal environments such as the Kalahari Desert or some mountain ranges unsuitable for small-scale subsistence farming and herding. The San in the coastal areas of KZN were the first to have been displaced by incoming African agro pastoralists. However, some independent groups continue to practice their hunter gatherer lifestyle in the foothills of the Drakensberg until

the period of white colonialisation around the 1840's (Wright & Mazel, 2007). According to the KwaZulu-Natal Museum archaeological database Later Stone Age sites have been located in the Tugela River in the past but these are mostly restricted to surface scatters. Also dating to the LSA period is the impressive Rock Art found on cave walls and rock faces. Rock Art can be in the form of rock paintings or rock engravings. The province of KZN is renowned for the prolific San rock painting sites concentrated in the Drakensberg. Rock art sites do occur outside the Drakensberg including Zululand, however, these sites have not been afforded similar research attention as those sites occurring in the Drakensberg. However, there are no rock art sides found within the immediate vicinity of study area, which may be due to the lack of the suitable geology.

2.2 Iron Age

2.2.1 Early Iron Age (EIA)

Unlike the Stone Age people whose life styles were arguably egalitarian, Iron Age people led quite complex life styles. Their way of life of greater dependence on agriculture necessitated more sedentary settlements. They cultivated crops and kept domestic animals such as cattle, sheep, goats and dogs. Pottery production is also an important feature of Iron Age communities. Iron smelting was practised quite significantly by Iron Age society as they had to produce iron implements for agricultural use. However no smelting sites were discovered in the study area as it is the northern KZN that is rich in abandoned iron smelting sites (Maggs, 1989). Although Iron Age people occasionally hunted and gathered wild plants and shellfish, the bulk of their diet consisted of the crops they cultivated as well as the meat of the animals they kept. EIA villages were relatively large settlements strategically located in valleys beside rivers to take advantage of the fertile alluvial soils for growing crops (Maggs, 1989). The EIA sites in KZN date to around AD 500 to AD 900. Extensive research in the province of this period led to it being divided in the following time lines according to ceramic styles (Maggs, 1989; Huffman 2007):

_ Msuluzi (AD 500);

_ Ndondondwane (AD 700 – 800);

_ Ntshekane (AD 800 – 900).

The archaeological data base of the KwaZulu-Natal Museum indicates that ten Early Iron Age sites occur in the immediate vicinity of the study area. The well-known and researched site of Ndondondwane (Van Schalkwyk et al 1997) occurs approximately 20km upstream from the project area. Other well-known Early Iron Age sites such as Mamba (Van Schalkwyk 1994a), and Woshi (Van Schalkwyk 1994b) occurs within 24km's from the project area on the banks of the Tugela River.

2.2.2 Late Iron Age (LIA)

The LIA is not only distinguished from the EIA by greater regional diversity of pottery styles but is also marked by extensive stone wall settlements. However, in this part of the world, stone walls were not common as the Nguni people used thatch and wood to build their houses. This explains the failure to obtain sites from the aerial photograph investigation of the study area. Trade played a major role in the economy of LIA societies. Goods were traded locally and over long distances. The main trade goods included metal, salt, grain, cattle and thatch. This led to the establishment of economically driven centres and the growth of trade wealth. Keeping of domestic animals, metal work and the cultivation of crops continued with a change in the organisation of economic activities. Evidence for this stems from the fact that iron smelting evidence was not found in almost every settlement (Maggs, 1989; Huffman 2007).

2.3 Historic Period

Oral tradition is the basis of the evidence of historical events that took place before history could be recorded. This kind of evidence becomes even more reliable in cases where archaeology could be utilised to back up the oral records. Sources of evidence for socio political organization during the mid-eighteenth to early nineteenth century in the study area and the larger former Natal Province suggest that the people here existed in numerous small-scale political units of different sizes, population numbers and political structures (Wright & Hamilton, 1989). This period was largely characterised by rage and instability as political skirmishes broke due to the thirst for power and resources between chiefdoms. During the 2nd half of the eighteenth century, stronger chiefdoms and paramouncies emerged. However, these were not fully grown states as there was no proper formal central political body established. This changed in the 1780's when a shift towards a more centralized political state occurred. This shift was mainly characterized by population growth and geographical expansion of states. The most important and largest and strongest states at the time were the Mabhudu, Ndwandwe and Mthethwa. However, other smaller states, also established themselves in the greater Tugela Region. These included in the south the Qwabe, Bhaca, Mbo, Hlubi, Bhele, Ngwane and many others (Wright & Hamilton, 1989). The Zulu kingdom, established by King Shaka however remained the most powerful in the region in the early years of the 19th century. Shaka fought ruthlessly and often defeated his rivals and conquered their cattle, wives and even burnt their villages.

These wars are often referred to as Difaqane and this period was characterised by rage and blood shedding. Shaka was assassinated in 1828 at which time he had transformed the nature of the society in the Natal and Zululand regions. He was succeeded by Dingane (Wright & Hamilton, 1989). Dutch farmers unhappy with the British rule in Cape Town decided to explore into the interior of the country, away from British rule. Some groups remained in the Eastern Cape, others kept going and a few settled in the Orange Free State and the Transvaal. A great number, led by Piet Retief and Gerrit Maritz, crossed the Drakensberg into Natal.

Here they encountered the Zulus who lured them into a trap and brutally massacred many of them. This was only one of the many failures of the white settler expeditions in the frontier areas and when the shocking news reached the Cape, more groups were sent to the interior to revenge. A series of battles were fought but the most notable was the Battle of Blood River in 1838 where the Boers defeated the Zulus. This ended the Zulu threat to the white settlers and a permanent and formal settlement in Natal was established. However the Zulu kingdom remained independent for a couple of decades. The Republic of Natalia was annexed by the British in 1845 and in 1879 the Zulu kingdom was also invaded (Wright & Hamilton, 1989). The Anglo-Zulu War has been well recorded and an important occurrence took place at Keates Drift and Jamesons Drift, near the project area, when a few British soldiers attempted to cross the Tugela River after their defeat at the battle of Isandlwana. Although no relicts or artefacts survive from this encounter the surrounding landscape is still imbued with the meaning of this important period in the colonial history of KwaZulu-Natal. The Bambata Rebellion of 1906 saw various incidents in the close vicinity of the project area. The most significant is perhaps the Bambata Rock Ambush that occurred approximately 20 km from the project area.

2 BACKGROUND INFORMATION OF THE SURVEY

2.1 Methodology

A desktop study was conducted of the archaeological databases housed in the KwaZulu-Natal Museum. The SAHRIS website was consulted for previous heritage surveys and heritage site data covering the project area. In addition, the available archaeological and heritage literature covering the greater Tugela Valley area was also consulted.

A ground survey, following standard and accepted archaeological procedures, was conducted on the 2nd August 2015.

2.2 Restrictions encountered during the survey

2.2.1 Visibility

Visibility was good.

2.2.2 Disturbance

No disturbance of any potential heritage features was noted.

2.3 Details of equipment used in the survey

GPS: Garmin Etrek
Digital cameras: Canon Powershot A460
All readings were taken using the GPS. Accuracy was to a level of 5 m.

3 DESCRIPTION OF SITES AND MATERIAL OBSERVED

3.1 Locational data

Province: KwaZulu-Natal
Municipality: Amajuba District Municipality
Towns: Dundee

3.2 Description of the general area surveyed

The proposed bridge spans the Umzinyathi (Buffels) River in an area characterised by Thornveld and degraded Valley Bushveld in the immediate vicinity of the River (Figs 3 & 4). The area can be classified as rural and Zulu homesteads occur adjacent to the access roads leading towards the proposed Buffels River Bridge. No formal archaeological or other heritage sites were located on the footprint. Although rural homesteads are situated adjacent to portions of the road leading to the proposed bridge none have associated graves that could be compromised by the development. Those

graves noticed were all situated more than 30m from the footprint. The area is not part of any known cultural landscape. The paleontological assessment of the area also reports no significant fossil material and suggests that development may proceed as planned (Appendix 1).

4 STATEMENT OF SIGNIFICANCE (HERITAGE VALUE)

4.1 Field Rating

Not applicable as no heritage sites occur on the footprint.

Table 2. Field rating and recommended grading of sites (SAHRA 2005)

Level	Details	Action
National (Grade I)	The site is considered to be of National Significance	Nominated to be declared by SAHRA
Provincial (Grade II)	This site is considered to be of Provincial significance	Nominated to be declared by Provincial Heritage Authority
Local Grade IIIA	This site is considered to be of HIGH significance locally	The site should be retained as a heritage site
Local Grade IIIB	This site is considered to be of HIGH significance locally	The site should be mitigated, and part retained as a heritage site
Generally Protected A	High to medium significance	Mitigation necessary before destruction
Generally Protected B	Medium significance	The site needs to be recorded before destruction
Generally Protected C	Low significance	No further recording is required before destruction

5 RECOMMENDATIONS

The heritage survey of the proposed Buffels River Bridge and associated access road at Mlaba near Dundee identified no heritage sites or features on the footprint. Although graves occur in the general area none of them occur closer than 30m to the proposed road upgrade. In addition, potential palaeontological impact resulting from this particular development is considered low (Appendix 1). The area is also not part of any known cultural landscape. There is therefore no reason, from a heritage perspective, why the proposed development may not proceed as planned. However, attention is drawn to the

South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose additional archaeological, historical or paleontological remains should cease immediately, pending evaluation by the provincial heritage agency. In addition, the palaeontologist report that should considerable fossil remains be exposed in unweathered Dwyka sediments as a result of bedrock excavations during development, the responsible ECO must immediately report the findings to the relevant heritage authority so that appropriate mitigation measures can be put in place (Appendix 1).

6 MAPS AND FIGURES

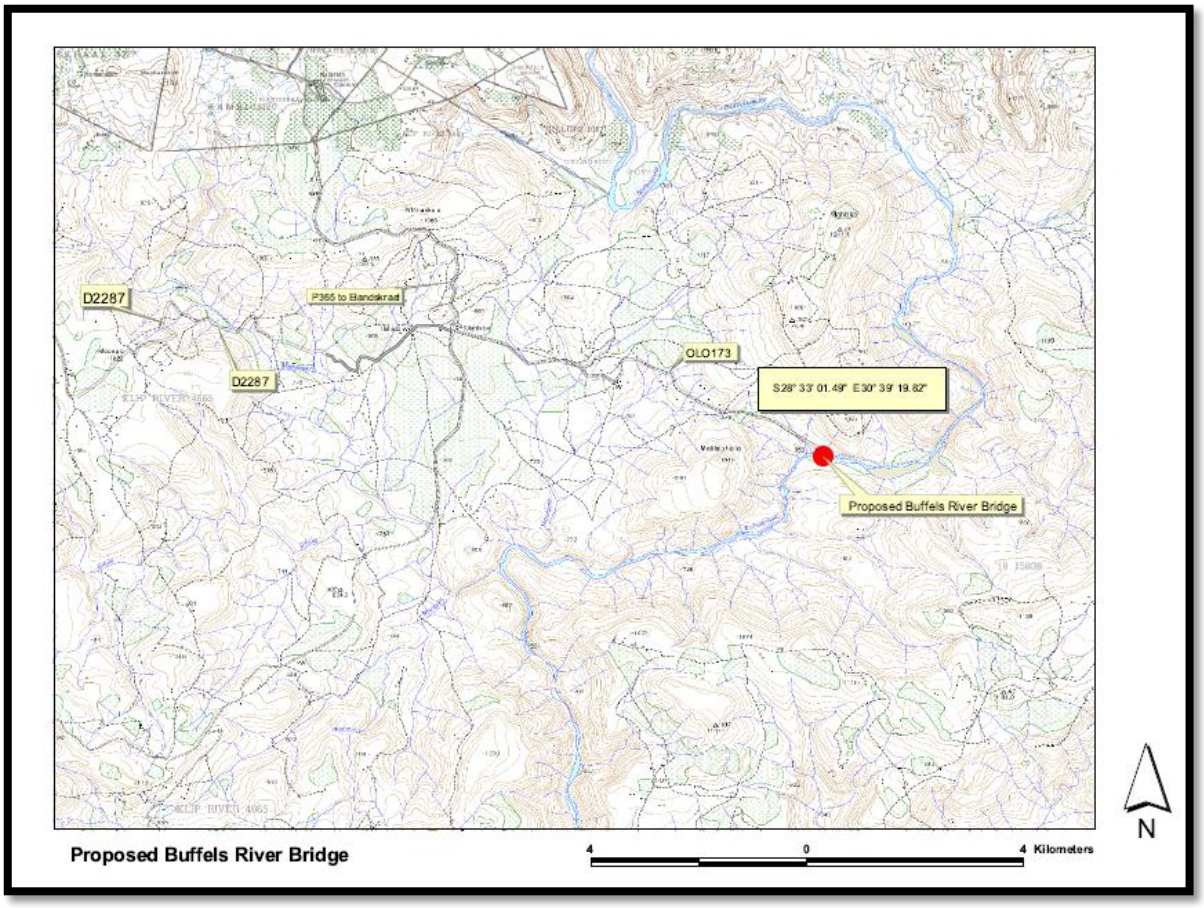

Figure 1. Topographical Map showing the location of the proposed Buffels River Bridge (Source: GBS).

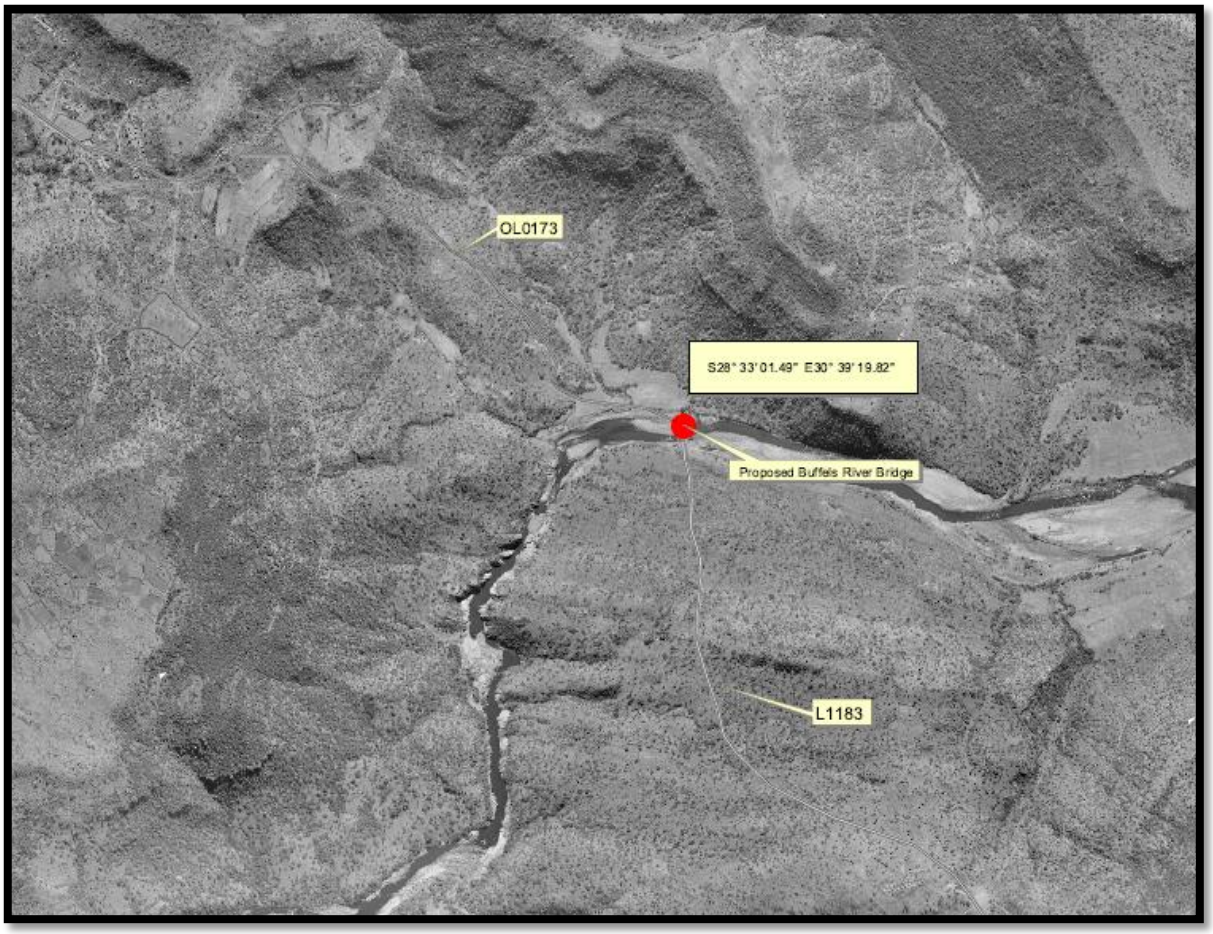

Figure 2. Aerial photograph showing the location of the proposed Buffels River Bridge in the Mlaba area (Source: GBS).

Figure 3. View over the project area.

Figure 4. Location of the proposed Buffels River Bridge

7 REFERENCES

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Appendix 1

Phase 1 Palaeontological Impact Assessment of a proposed new bridge over the Buffalo River near Dundee, KZN Province.

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1. Executive Summary

A Phase 1 palaeontological impact assessment was conducted for the construction of a proposed new bridge over the Buffalo River, located about 22 km due east of the town of Pomeroy and 58 south-east of Dundee, KZN Province. Potentially fossiliferous rock units within the broader region include 2.9 Ga Nsuze Group sediments of the Pongola Group and Late Carboniferous to Early Permian strata of the Karoo Supergroup. A survey of weathered exposures visible within the study area has indicated that the proposed development will impact on unfossiliferous Dwyka tillites, which is largely mantled by geologically recent superficial deposits (alluvium, surface gravels and residual soils) of low to very low palaeontological sensitivity. It is concluded that the proposed Buffalo River Bridge development will not pose a significant threat to local fossil heritage resources. However, should considerable fossil remains be exposed in unweathered Dwyka sediments as a result of bedrock excavations during development, the responsible ECO must immediately report the findings to the relevant heritage authority so that appropriate mitigation measures can be put in place. Potential palaeontological impact resulting from this particular development is considered low. The study area is assigned a site rating of General Protection C (GP C).

2. Introduction

A Phase 1 palaeontological impact assessment was conducted for the construction of a proposed new bridge over the Buffalo River about 22 km due east of the town of Pomeroy and 58 south-east of Dundee, KZN Province (**Fig. 1**).

3. Methodology

The affected area was evaluated on the basis of existing field data, geological maps and published literature. A 50 m – wide section, where the proposed bridge will cross the river, was investigated by means of a pedestrian survey. The study area is rated according to field rating categories as prescribed by SAHRA (**Table 1**).

4. Locality data

1 : 50 000 scale topographic map: 2830DA Collessie

1 : 250 000 scale geological map 2830 Dundee

Site coordinates: 28°33'1.49"S 30°39'19.82"E.

The site is situated 22 km due east of Pomeroy via the D2287 road off the R33 (**Fig. 1 & 2**). The study area is located within highly broken terrain consisting of deep valleys and flat-topped mountains that are drained by the Buffalo River **(Fig. 3).**

5. Palaeontological Background

Palaeontological heritage in and around the study area is represented by Pongola and Karoo Supergroup strata (**Fig. 4**). Well-preserved stromatolites have been found in some limestone units of the Late Swazian / Early Randian Nsuze Group of the Pongola Supergroup (Linstrom, 1987, Gold 2006). Karoo Supergroup sediments in the area are made up of the Late Carboniferous Dwyka Group and the Early Permian, Pietermaritzburg Formation of the overlying Ecca Group (Lindstrom 1987; Visser *et al.* 1990). Dwyka tillites are normally unfossiliferous, but trace fossils, including fish and arthropod trackways and chondrichthyian coprolites, have been recorded from fine-grained matrix within the Dwyka Group (Linstrom, 1987). Other fossil remains also recorded include plant remains (spores, pollen, lycopods, cf. proto-glossopterid taxa and wood from primitive gymnosperms),

microfossils (foraminifera, radiolarians, bryozoans and sponge spicules) marine invertebrates (primitive starfish, nautiloids, cephalopods, gastropods and brachiopods) and palaeoniscoid fish (McLachlan and Anderson 1973; Anderson and Anderson 1985; MacRae 1999). Fine-grained Dwyka shales have also yielded fossil plant remains, including spores and pollens, lycopods, as well as cf. proto-glossopterid taxa and wood from primitive gymnosperms (McLachlan and Anderson 1973; Anderson and Anderson 1985; MacRae, 1999).

The Pietermaritzburg Formation is generally considered to be moderately sensitive in terms of paleontological heritage It is by and large barren, although trace fossils have been recorded from the upper layers of the formation by Linstrom (1987). Dolerites in the form of dykes and sills are common in the region and are not palaeontologically significant. Geologically recent (Quaternary) and localized fossil-rich alluvial exposures, assigned to the Quaternary Cornelia Formation, are found about 200 km to north of Dundee. There is currently no record of Quaternary fossil remains or exposures from the study area.

6. Field Assessment

The proposed bridge site is situated within an outcrop area of blue to grey looking Dwyka Group tillites (**Fig. 5**). To the south and west of the study area, the Dwyka unconformably overlies Late Swazian Pongola Supergroup strata, which are made up of an alternating sequence of sedimentary and volcanic rocks. Early Permian Pietermaritzburg Formation mudrocks (Ecca Group, Karoo Supergroup) coupled with Jurassic dolerite intrusions, are exposed to the east and north of the study area (**Fig. 6**). Quaternary alluvial deposits concentrated along low-lying drainage areas along the river valley are made up of unconsolidated accumulations of grey and yellow sands, silts and clays (**Fig. 7**).

7. Impact Statement and Recommendations

Potentially fossiliferous rock units within the broader region include 2.9 Ga old Nsuze Group sediments of the Pongola Group and Late Carboniferous to Early Permian strata of the Karoo Supergroup. A survey of weathered exposures visible

within the study area has indicated that the proposed development will impact on unfossiliferous Dwyka tillites, which is largely mantled by geologically recent superficial deposits (alluvium, surface gravels and residual soils) of low to very low palaeontological sensitivity. It is concluded that the proposed Buffalo River Bridge development will not pose a significant threat to local fossil heritage resources. However, should considerable fossil remains be exposed in unweathered Dwyka sediments as a result of bedrock excavations during development, the responsible ECO must safeguard it and immediately report the findings to the relevant heritage authority so that appropriate mitigation measures can be put in place. Potential palaeontological impact resulting from this particular development is considered low. The study area is assigned a site rating of General Protection C (GP C).

8. References

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9. Tables and Figures

Table 1. Field rating categories as prescribed by SAHRA.

Field Rating	Grade	Significance	Mitigation
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

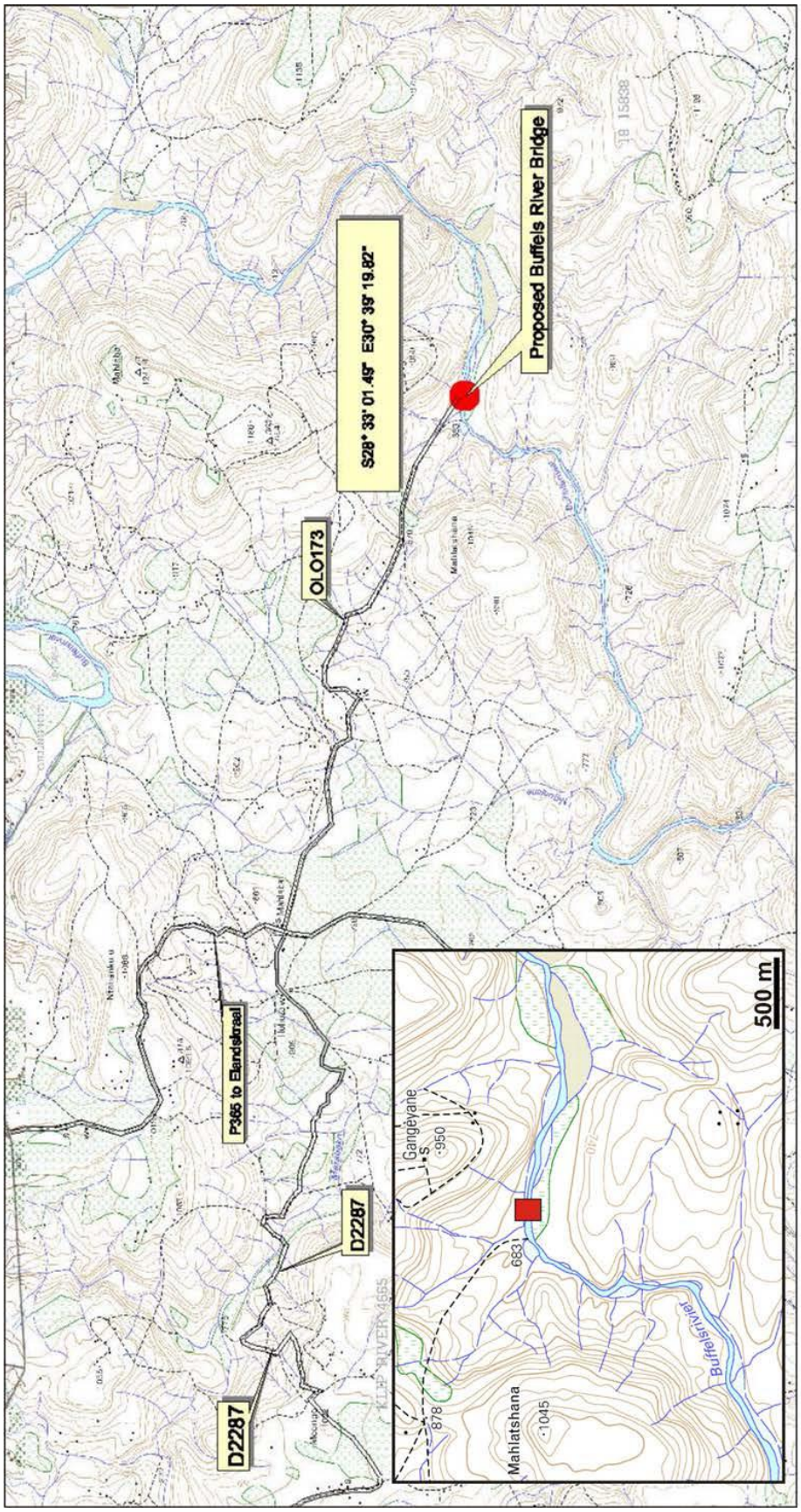

Figure 1. The proposed Buffalo River Bridge locality (portion of 1:50 000 scale topographic map 2830DA Collessie).

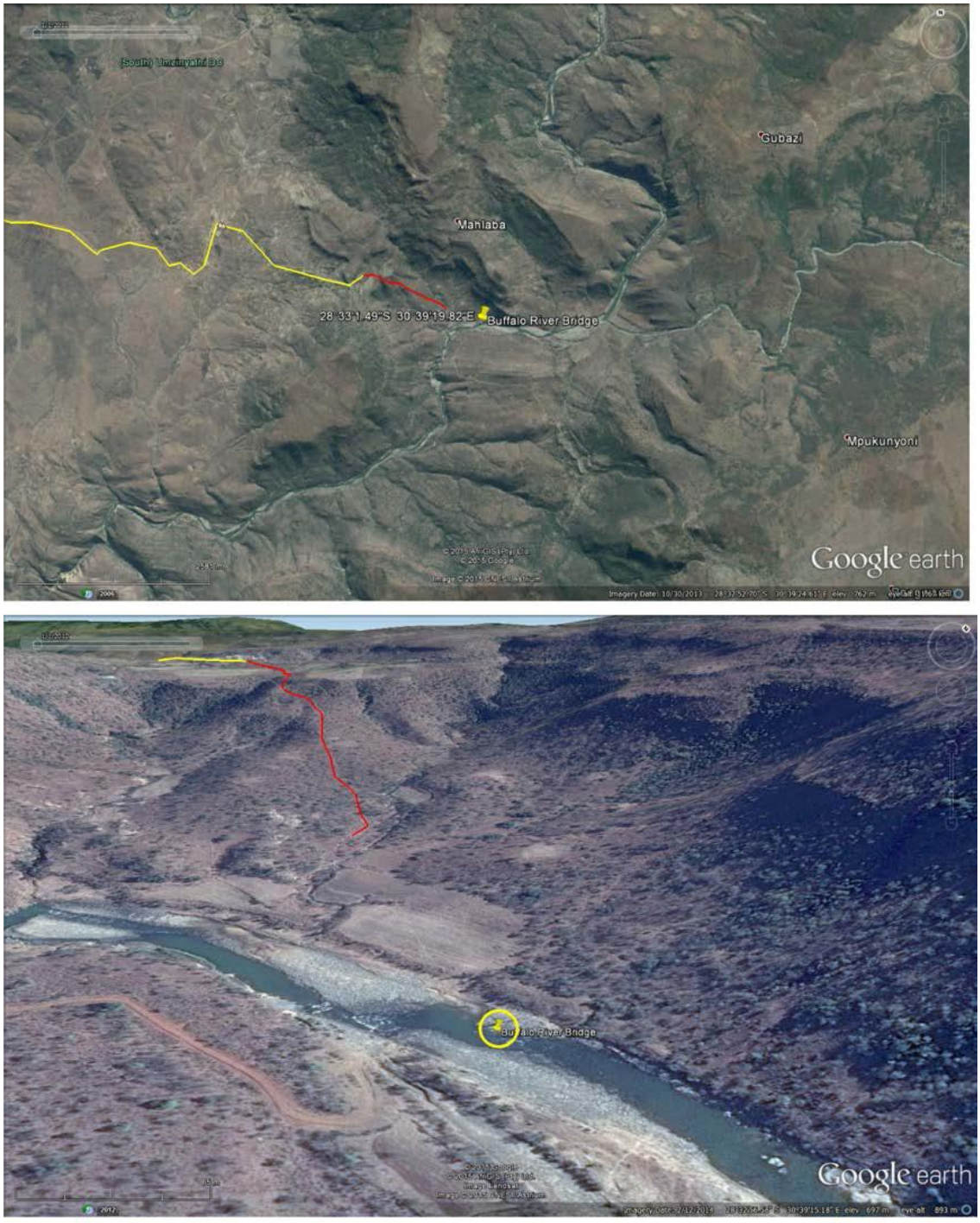

Figure 2. Aerial views of the Buffalo River Bridge site.

Figure 3. Panoramic view of the Buffalo River valley, looking southeast towards the proposed bridge locality.

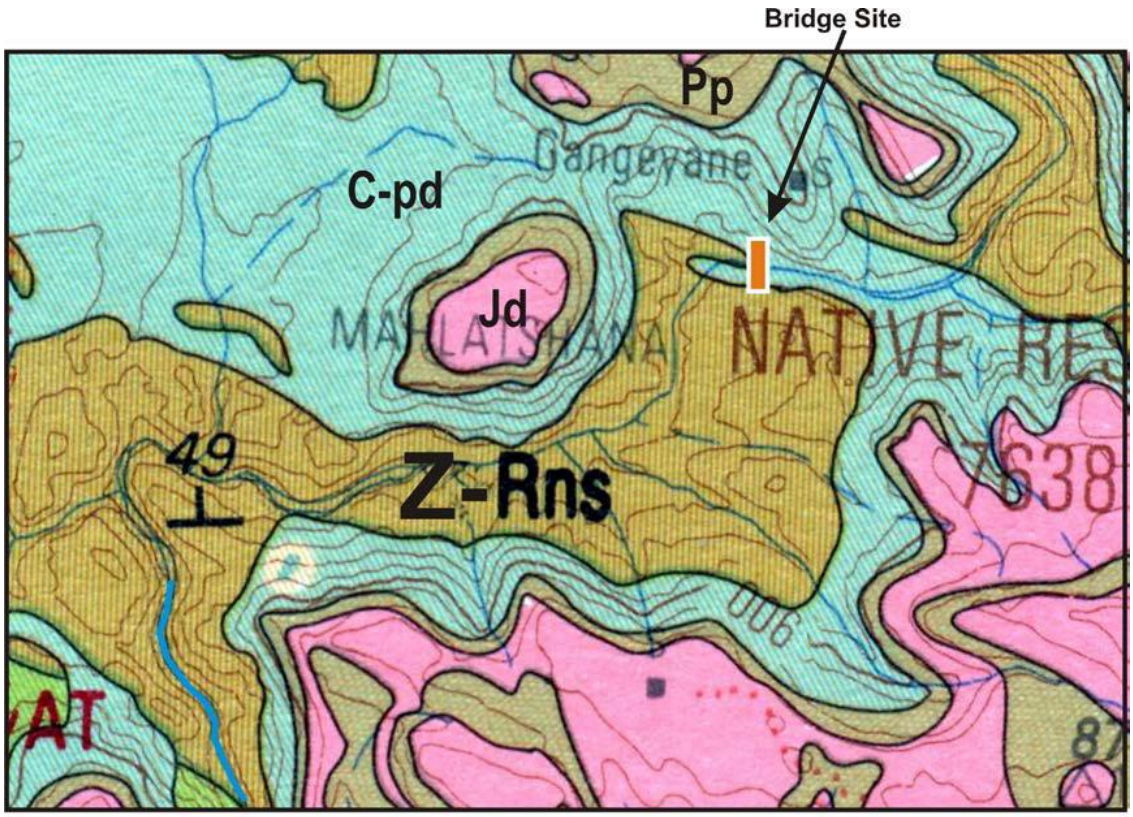

Figure 4. Portion of 1:250 000 geological map 2830 Dundee. To the south and west of the study area, Dwyka Group rocks (*C-pd*) unconformably overlies Late Swazian Pongola Supergroup strata, which are made up of an alternating sequence of sedimentary and volcanic rocks (*Z-rns*). Early Permian Pietermaritzburg Formation mudrocks (*Pp*), coupled with Jurassic dolerite intrusions (*Jd*), are exposed to the east and north of the study area. Superficial alluvial deposits are concentrated along low-lying drainage areas along the river valley (not shown on map).

Figure 5. Fine-grained, blue-grey to greenish tillite matrix containing boulder-sized erratics. Scale 1 = 10 cm.

Figure 6. Calcretized, weathered Dwyka Group tillites capped by reddish-brown gravelly soils.

Figure 7. Laminated, carbonaceous mudrocks of the Pietermaritzburg Formation (Ecca Group) and associated dolerite intrusion (bottom left), exposed about 1.8 km northwest of the study area. Scale 1 = 10 cm.