

**HERITAGE SURVEY OF THE UPGRADING OF  
BERGVILLE WATER TREATMENT WORKS, BERGVILLE,  
KZN**

**FOR ZONHLA HYDRO AND ENVIRO CONSULTING  
(PTY) LTD**

**DATE: 29 July 2020**

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## DECLARATION OF INDEPENDENCE

I, Gavin Anderson, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

A handwritten signature in black ink, appearing to read 'G. Anderson', with a large, stylized initial 'A'.

Gavin Anderson  
Archaeologist/Heritage Impact Assessor

## **EXPERIENCE OF THE HERITAGE CONSULTANT**

Gavin Anderson has a M. Phil (in archaeology and social psychology) degree from the University of Cape Town. Gavin has been working as a professional archaeologist and heritage impact assessor since 1995. He joined the Association of Professional Archaeologists of Southern Africa in 1998 when it was formed. Gavin is rated as a Principle Investigator with expertise status in Rock Art, Stone Age and Iron Age studies. In addition to this, he was worked on both West and East Coast shell middens, Anglo-Boer War sites, and Historical Period sites.

## TERMS OF REFERENCE

- Undertake a desktop HIA to determine area sensitivity
- Undertake a field survey to locate, record and assess heritage sites
- Undertake a desktop PIA

## **EXECUTIVE SUMMARY**

*Bergville Municipality is upgrading the existing water treatment works. The new rising main pipeline will use the existing pipeline routes. The new rising main pipeline will have three route options, of which each needs to be assessed.*

*A heritage survey was undertaken and much of the development will occur in already disturbed areas, while parts of the new pipeline will run adjacent to the road and then towards the reservoir. Some of the pipeline options will also be in, and near, historical buildings.*

*The heritage survey noted individual artefacts on the hill near the main reservoir. These artefacts are not significant and do not constitute a site. The HIA chose Alternative 1 as the preferred Route Alignment due to its minimal impact on heritage resources.*

*The palaeontological assessment noted that the proposed development occurred in very sensitive area. However, it also noted that the area was already disturbed and that the rock was highly weathered. The proposed infrastructure is unlikely to effect palaeontological layers and no further mitigation is required, apart from a Chance Find Protocol to form part of the EMP.*

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## Abbreviations

HP	Historical Period
IIA	Indeterminate Iron Age
LIA	Late Iron Age
EIA	Early Iron Age
ISA	Indeterminate Stone Age
ESA	Early Stone Age
MSA	Middle Stone Age
LSA	Late Stone Age
HIA	Heritage Impact Assessment
PIA	Palaeontological Impact Assessment

## INTRODUCTION

Bergville Municipality is upgrading the existing water treatment works. This entails the following:

- Upgrading the existing water abstraction point from the Tugela River to approximately 10ML (i.e. a new pump will be installed);
- Upgrading of the existing Water Treatment Works from 2ML to 10ML;
- Upgrading the bulk water rising main pipeline (450mm) from the abstraction point to the Water Treatment Works; and
- Upgrading of the bulk water rising pipeline (450mm) from the Water Treatment Work to the command reservoir.

The new rising main pipeline will have three route options, of which each needs to be assessed.

Figures 1 – 4 show the location of the development.



FIG. 1 GENERAL LOCATION OF THE PROPOSED DEVELOPMENT





FIG. 2: AERIAL OVERVIEW OF THE PROPOSED DEVELOPMENT OF ERF 1703

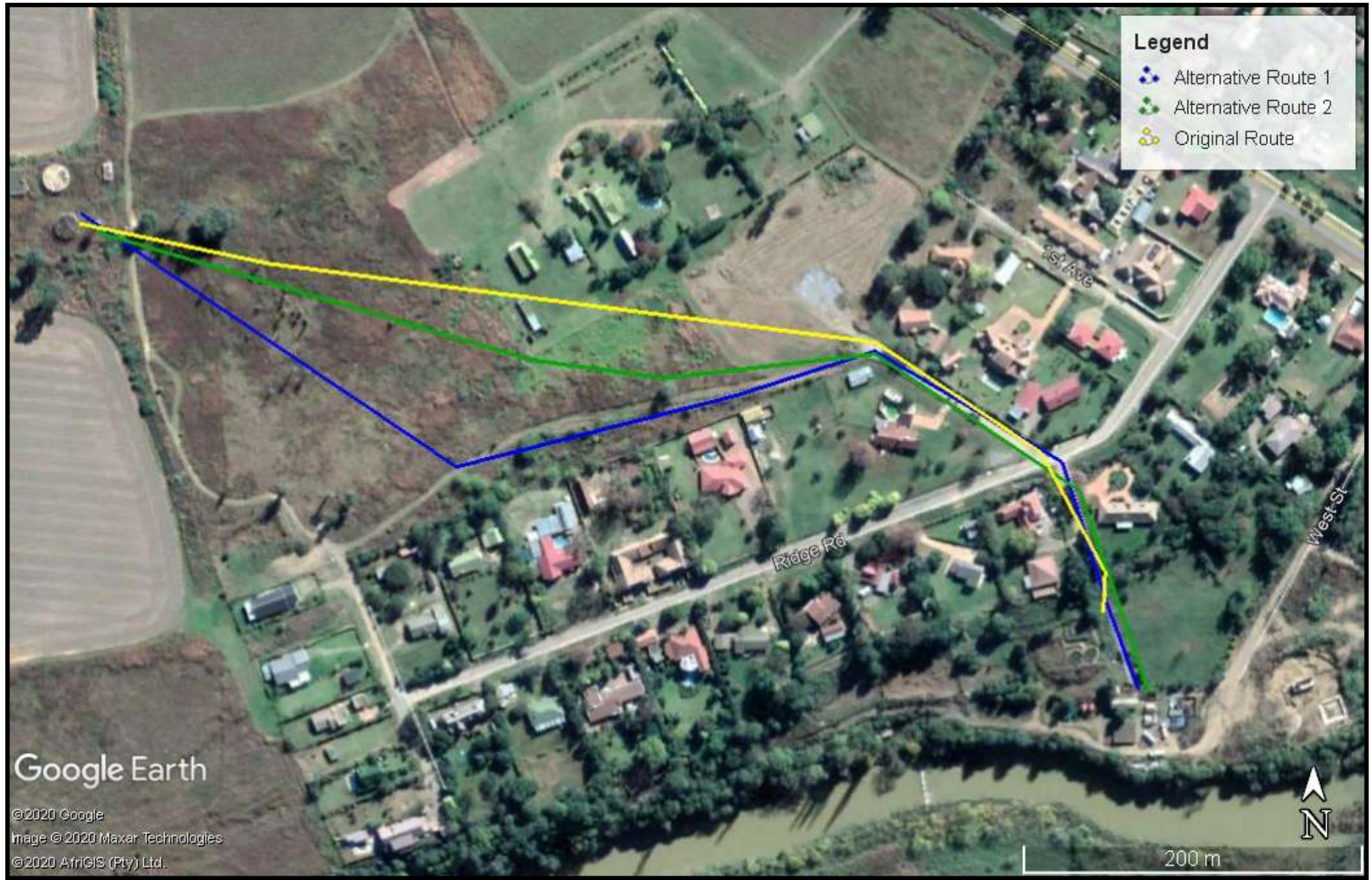




FIG. 3: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT

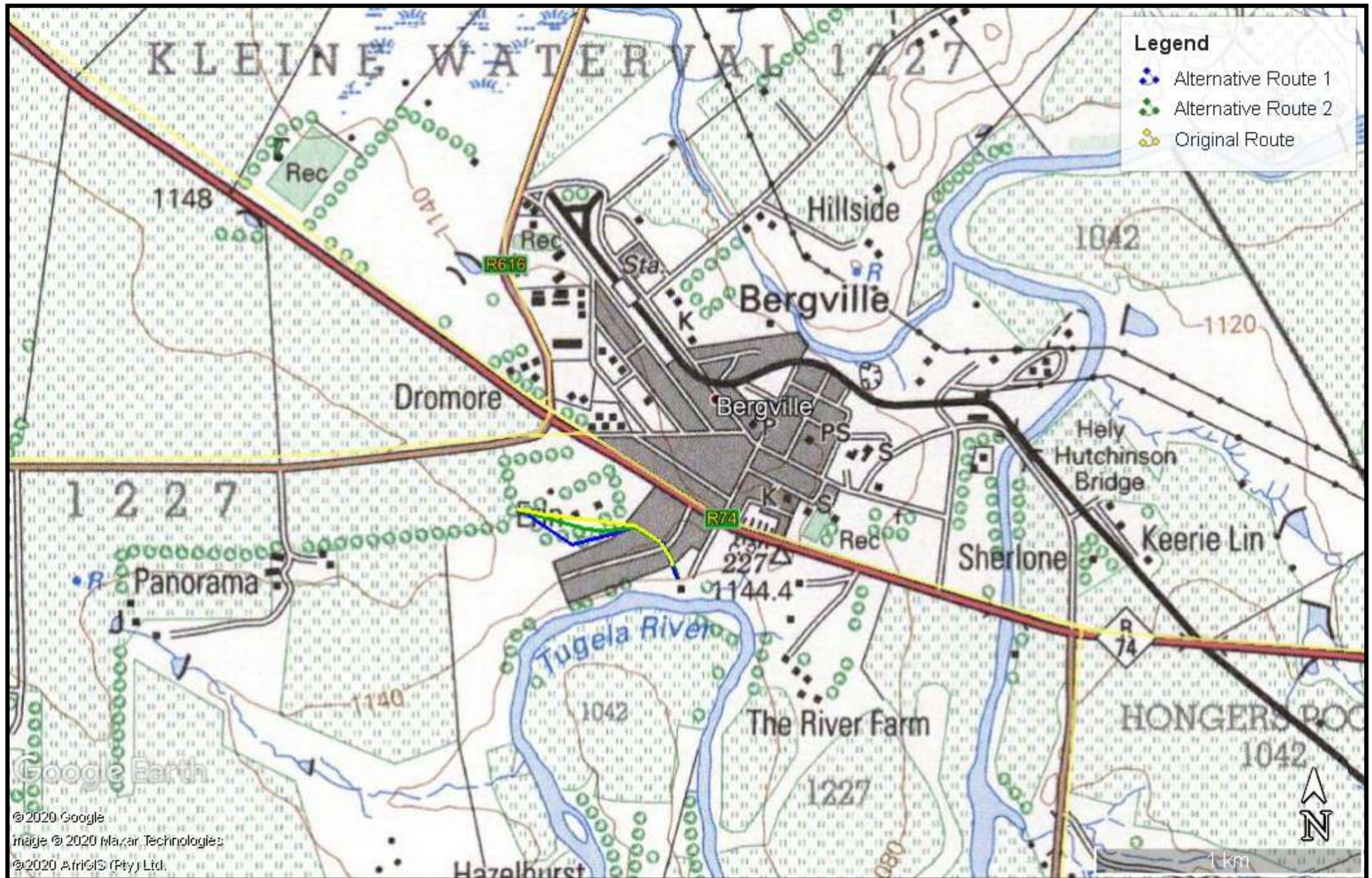




FIG. 4: SCENIC VIEWS OF THE STUDY AREA



**KWAZULU NATAL AMAFA AND RESEARCH INSTITUTE, ACT 05, 2018**

“General protection: 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.
- Where the Council does not grant approval, the Council must consider special protection in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
- The Council may, by notice in the *Gazette*, exempt—
- A defined geographical area; or
- defined categories of sites within a defined geographical area, from the provisions of subsection where the Council is satisfied that heritage resources falling in the defined geographical area or category have been identified and are adequately protected in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
- A notice referred to in subsection (2) may, by notice in the *Gazette*, be amended or withdrawn by the Council.

General protection: Graves of victims of conflict.—No person may damage, alter, exhume, or remove from its original position—

- the grave of a victim of conflict;
- a cemetery made up of such graves; or
- any part of a cemetery containing such graves, without the prior written approval of the Council having been obtained on written application to the Council.
- General protection: Traditional burial places.—
- No grave—
- not otherwise protected by this Act; and
- 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.

The Council may only issue written approval once the Council is satisfied that—

- the applicant has made a concerted effort to consult with communities and individuals who by tradition may have an interest in the grave; and
- the applicant and the relevant communities or individuals have reached agreement regarding the grave.

General protection: Battlefield sites, archaeological sites, rock art sites, palaeontological sites, historic fortifications, meteorite or meteorite impact sites.—

- 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 the prior written approval of the Council having been obtained on written application to the Council.
- 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.
- The Council may, after consultation with an owner or controlling authority, by way of written notice served on the owner or controlling authority, prohibit any activity considered by the Council to be inappropriate within 50 metres of a rock art site.
- 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 the prior written approval of the Council having been obtained on written application to the Council.
- No person may bring any equipment which assists in the detection of metals and archaeological and palaeontological objects and material, or

- excavation equipment onto any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, or meteorite impact site, or use similar detection or excavation equipment for the recovery of meteorites, without the prior written approval of the Council having been obtained on written application to the Council.
- The ownership of any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site, on discovery, vest in the Provincial Government and the Council is regarded as the custodian on behalf of the Provincial Government.”

## METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. This databases contains archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (<http://www.vuvuzela.com/googleearth/monuments.html>) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1<sup>st</sup> and 2<sup>nd</sup> edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult with a local data recording centre, however these tend to be fragmented between different institutions and areas and thus difficult to access at times. We also consult with an historical architect, palaeontologist, and an historian where necessary.



The survey results will define the significance of each recorded site, as well as a management plan.

All sites are grouped according to low, medium, and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips, and decorated sherds are sampled, while bone, stone, and shell are mostly noted. Sampling usually occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

### **Defining significance**

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites.

These criteria are:

#### **1. State of preservation of:**

- 1.1. Organic remains:
  - 1.1.1. Faunal
  - 1.1.2. Botanical
- 1.2. Rock art
- 1.3. Walling
- 1.4. Presence of a cultural deposit
- 1.5. Features:
  - 1.5.1. Ash Features
  - 1.5.2. Graves



- 1.5.3. Middens
- 1.5.4. Cattle byres
- 1.5.5. Bedding and ash complexes

**2. Spatial arrangements:**

- 2.1. Internal housing arrangements
- 2.2. Intra-site settlement patterns
- 2.3. Inter-site settlement patterns

**3. Features of the site:**

- 3.1. Are there any unusual, unique or rare artefacts or images at the site?
- 3.2. Is it a type site?
- 3.3. Does the site have a very good example of a specific time period, feature, or artefact?

**4. Research:**

- 4.1. Providing information on current research projects
- 4.2. Salvaging information for potential future research projects

**5. Inter- and intra-site variability**

- 5.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?
- 5.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

**6. Archaeological Experience:**

6.1. The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

**7. Educational:**

- 7.1. Does the site have the potential to be used as an educational instrument?
- 7.2. Does the site have the potential to become a tourist attraction?
- 7.3. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

**8. Other Heritage Significance:**

- 8.1. Palaeontological sites
- 8.2. Historical buildings
- 8.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites
- 8.4. Graves and/or community cemeteries
- 8.5. Living Heritage Sites
- 8.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts. Table 1 lists the grading system

**TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES**

SITE SIGNIFICANCE	FIELD RATING	GRADE	RECOMMENDED MITIGATION
High Significance	National Significance	Grade 1	Site conservation / Site development
High Significance	Provincial Significance	Grade 2	Site conservation / Site development
High Significance	Local Significance	Grade 3A / 3B	Site conservation or mitigation prior to development / destruction
High / Medium Significance	Generally Protected A		Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Medium Significance	Generally Protected B		

<b>Low Significance</b>	Generally Protected C	On-site sampling monitoring or no archaeological mitigation required prior to or during development / destruction
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## RESULTS

### DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. There have been no prior surveys in the study area. The archaeological sites tend to be open Stone Age and Iron Age scatters of low significance (fig. 5). These sites are found in the similar locations as the route for the project.

The 1937 aerial photograph indicates that there are built structures near the proposed pipeline route (fig. 6). The photograph also indicates that the area is grassland and has been cultivated. This is repeated on the 1953 1:50 000 topographical map (fig. 7).

From the desktop perspective the route assessment is as follows:

1. Original Route occurs near historical buildings and could expose historical middens
2. Alternative Route 1 is clear from the buildings but goes through a possible kraal and potential middens.
3. Alternative Route 2 is on the border of the property and will not expose historical middens.

## PALAEONTOLOGICAL SENSITIVITY

The footprint is in an area of moderate palaeontological sensitivity (fig. 8). A PIA desktop was undertaken by Dr A Smith (See Appendix A). Dr Smith states:

“Bergville is located within Permian Era rocks, about 50m below the Permo-Triassic Boundary. This figure was abstracted from the Harrismith Geological Map and could be out by +/-20m due to the map’s contour control. The Upper Permian is separated from the Triassic by an Extinction Event (known as the Great Dying) when 95% of life on Earth became extinct. The reasons for this are still controversial. There have been five great extinction events in the Phanerozoic Era (541 Mya till Present). Of these the Permo-Triassic Boundary represents the greatest extinction event in the Earth’s history.

This stratigraphic boundary is expected to be found within marine sediments where a complete time record may accumulate. In contrast the Adelaide Subgroup comprises terrestrial sediments sedimentary rocks. Preservation requires a large number of geological processes to come together, but these are less likely to take place during terrestrial deposition. Consequently the placement of the Permo-Triassic Boundary is not accurately known, if it has in fact been preserved in southern Africa, but it must be considered. Present evidence indicates that the Permo-Triassic Boundary is unlikely to be located in the development area.”

While it is possible that significant fossils could be found on site, it is unlikely. This is due to the disturbed area and that the rocks are highly weathered. It is for this reason that further assessment is not required; however a **Chance Find Protocol** has been inserted.

FIG. 5: LOCATION OF KNOWN HERITAGE SITES IN THE GENERAL AREA

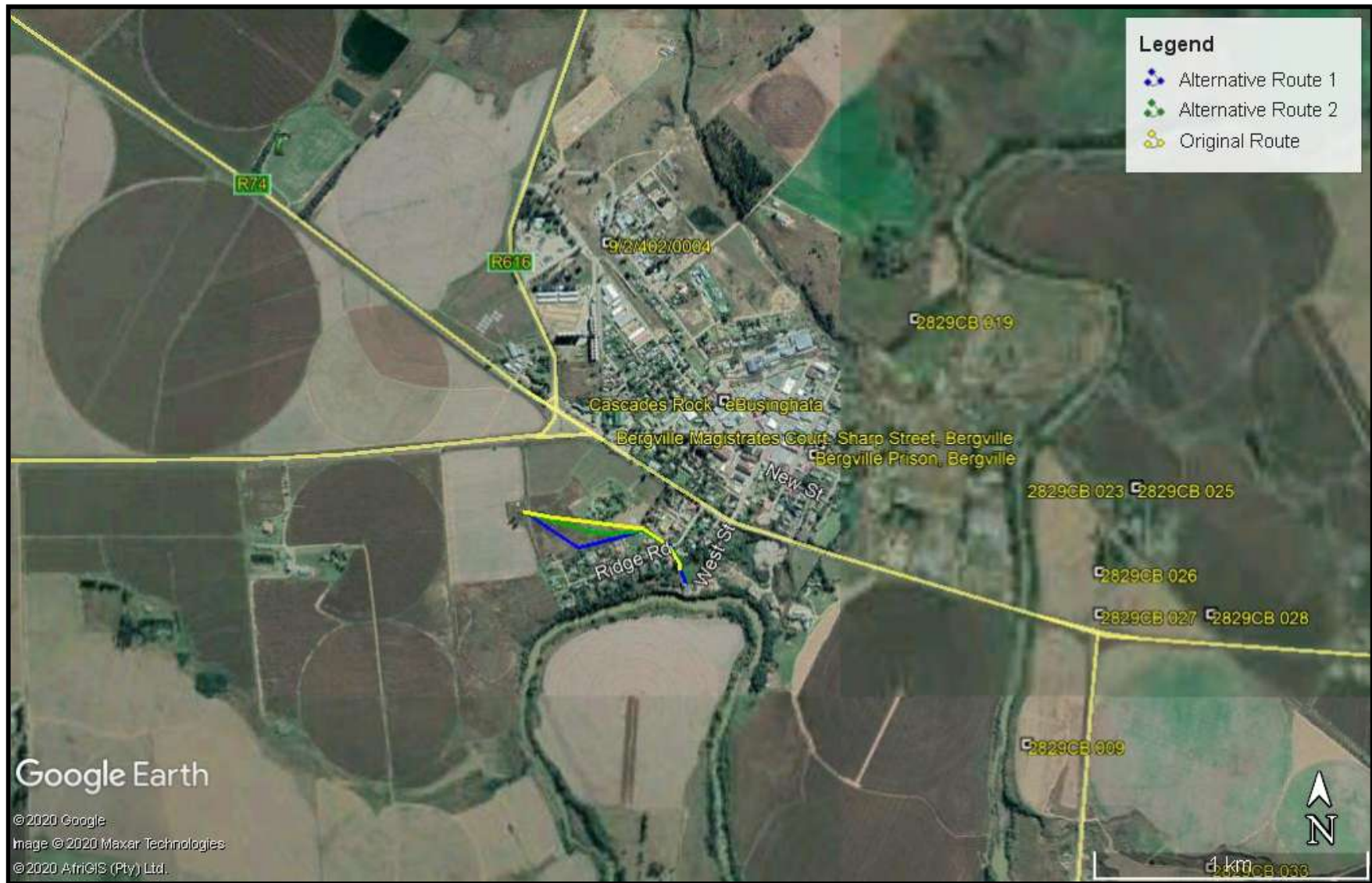




FIG. 6: LOCATION OF PROPOSED DEVELOPMENT IN 1937

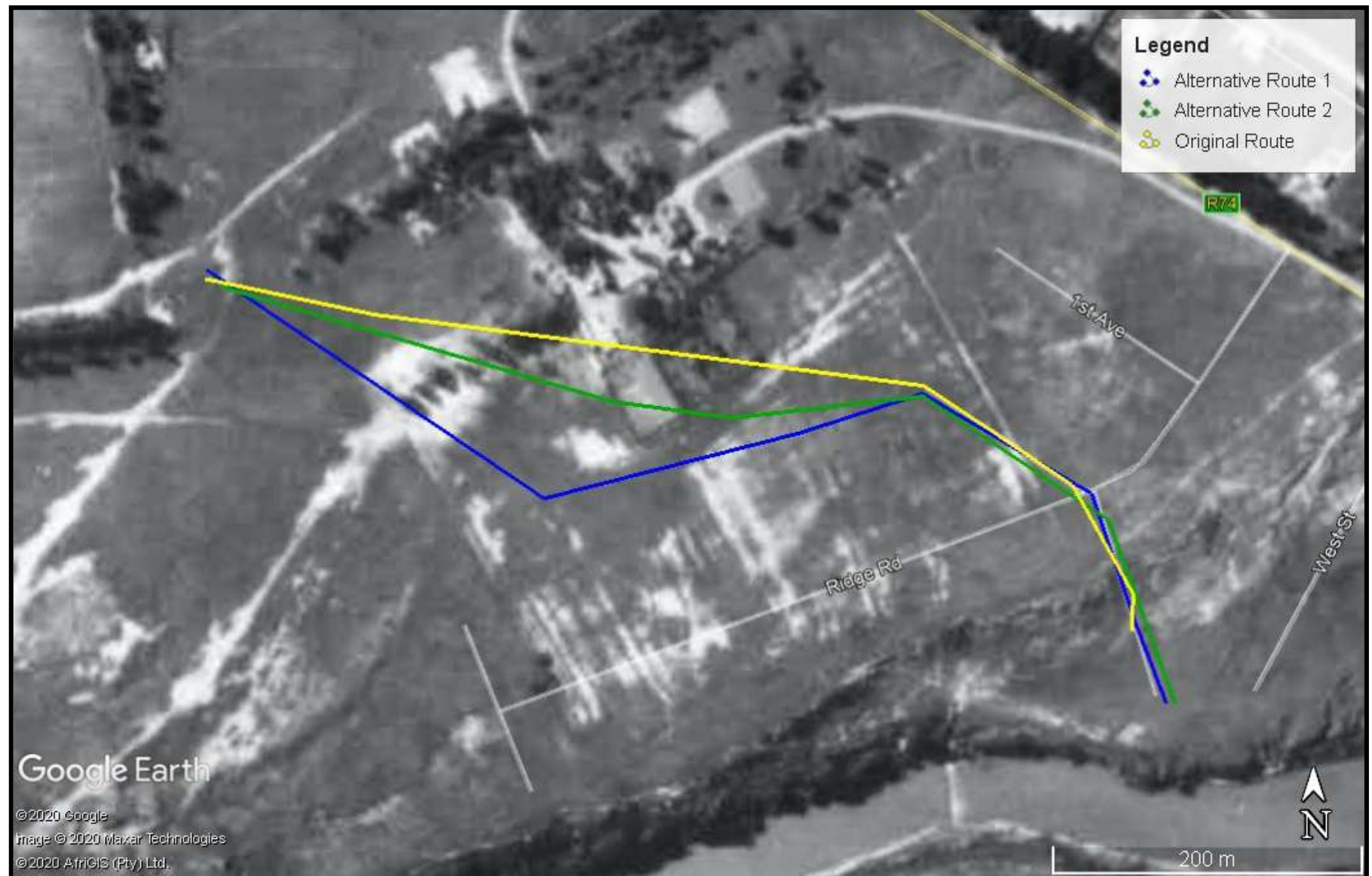


FIG. 7: LOCATION OF PROPOSED DEVELOPMENT IN 1953

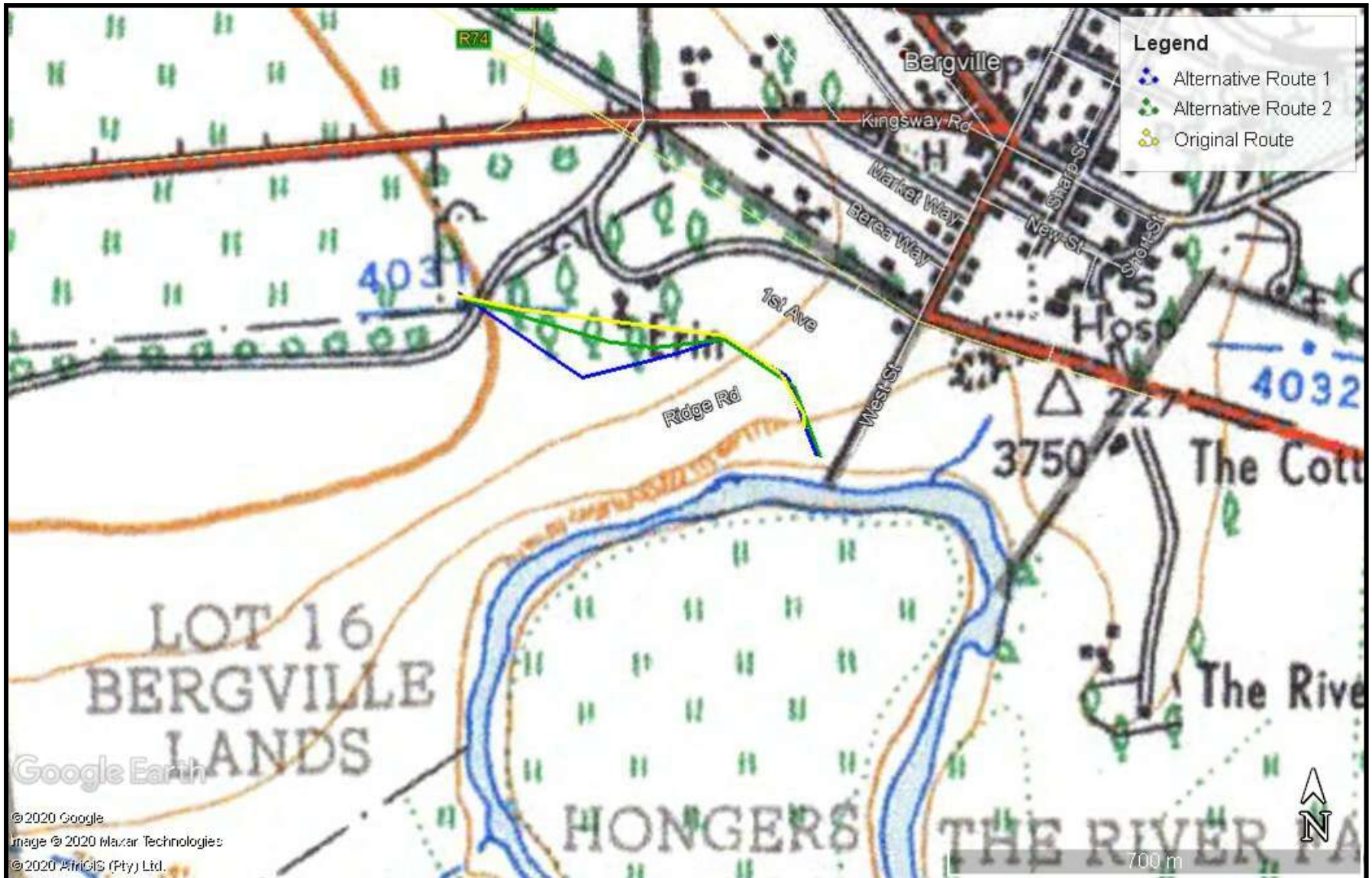




FIG. 8: PALAEOLOGICAL SENSITIVITY MAP



COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

### FIELD SURVEY RESULTS

A field survey was undertaken on the 13 July 2020. Parts of the BWW line were changed after the survey; however, the main impact areas were surveyed. No archaeological sites were noted along the proposed servitudes. Those areas



where the BWWS has been moved occur next to the main road and would have been effected by the road servitude.

As per the desktop, the top of hills have artefacts in secondary context. An upper grinding stone and a MSA flake were noted near the main reservoir (fig. 9). These are in a secondary context and part of a previously ploughed field. The artefacts are of low significance and do not constitute a site. Other isolated artefacts are likely to occur on the hill.

**FIG. 9: ISOLATED ARTEFACTS NEAR THE MAIN RESERVOIR**



The Original Route and Alternative Route 2 occurs within The Farm Erin boundary. The Original Route will occur within 3m of the original farm shed (fig. 10 yellow line). Alternative Route 2 will occur within the original open area related to the shed. It is a possible kraal. Alternative Route 2 occurs within 10m of the building (Fig. 11). Alternative Route 1 will not affect any buildings (Fig. 12).

**FIG. 10: FARM SHED AND LOCATION OF ORIGINAL ROUTE**





**FIG. 11: ALTERNATIVE ROUTE 2**



The buildings and associated middens are older than 60 years in age and are thus automatically protected by the heritage legislation. The Original pipeline



Route, and Alternative 2 occur within 10m of the buildings and could thus affect them. The Original Route occurs too close to the building and will require an assessment by an architect historian if his option is chosen. The excavation will need to be monitored for historical middens.

Alternative 2 is near the old kraal buildings, and goes through the old outer kraal area. It might need to be assessed by an architect historian. It would require monitoring during construction as it passes through potential historical middens.

Alternative 1 does not affect any heritage features.

**FIG. 12: ALTERNATIVE ROUTE 1**



In terms of heritage aspects, Alternative 1 is the preferred option.

## MANAGEMENT PLAN

The HIA noted that there was a likelihood of heritage sites and/or artefacts occurring in the footprint of the project. The field survey noted isolated artefacts in an old agricultural field, as well as farm buildings and related structures predating 1937.

If the Original Route and/or Alternative 2 is chosen then permits relating to the buildings will be required, as well as an assessment by an architect historian. IF any middens are uncovered during construction, then they will require a permit for destruction and sampling. This can be obtained prior to construction and will require on site monitoring by a suitably qualified archaeologist.

Alternative 1 will require no further HIA mitigation.

A Chance Find Protocol has been initiated for the palaeontological aspect of the project, in case any fossil material is unearthed.

## CONCLUSION

A heritage survey was undertaken for the proposed Bergville BWSS upgrade. Much of the development will occur in already disturbed areas, while parts of the new pipeline will run adjacent to the main road and then towards the reservoir.

The heritage survey noted individual artefacts on the hill near the main reservoir. These artefacts are not significant and do not constitute a site. The HIA chose Alternative 1 as the preferred Route Alignment due to its minimal impact on heritage resources.

The palaeontological assessment noted that the proposed development occurred in very sensitive area. However, it also noted that the area was already disturbed and that the rock was highly weathered. The proposed infrastructure is

unlikely to effect palaeontological layers and no further mitigation is required, apart from a Chance Find Protocol to form part of the EMP.

## REFERENCES

2829CB Bergville 1953, 1996

115\_011\_52334

115\_011\_52335

KZN Museum Database

SAHRIS Database

Umlando Database



**APPENDIX A  
PIA DESKTOP**



**THE PROPOSED BERGVILLE WWTW UPGRADE,  
BERGVILLE, KWAZULU - NATAL**

**FOR**

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**August 2020**

## EXECUTIVE SUMMARY

This proposed development is a refurbishment of an existing WWTW. The rocks are Adelaide Subgroup (Beaufort Group), which can contain significant Paleontological Material. However, this site is already highly disturbed due to the original construction and urbanisation. Added to this the rock is weathered. Although this region is red-flagged in the Sahris Palaeosensitivity Map no purpose will be served by a pre-excavation field trip as fresh rock is not visible. A Chance Find Protocol has been inserted in case fossils are found during excavation. Should this take place then a Palaeontologist must be called to inspect the discovery. If any excavation is more than 2m deep then a field visit from a competent Palaeontologist should be arranged. It will be up to the developer to note where excavations will exceed 2m and inform the palaeontologist accordingly.

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## 1. BACKGROUND AND PROPOSED PROJECT

Bergville Municipality is upgrading the existing Waste Water Treatment Works (Fig. 1). This entails the following:

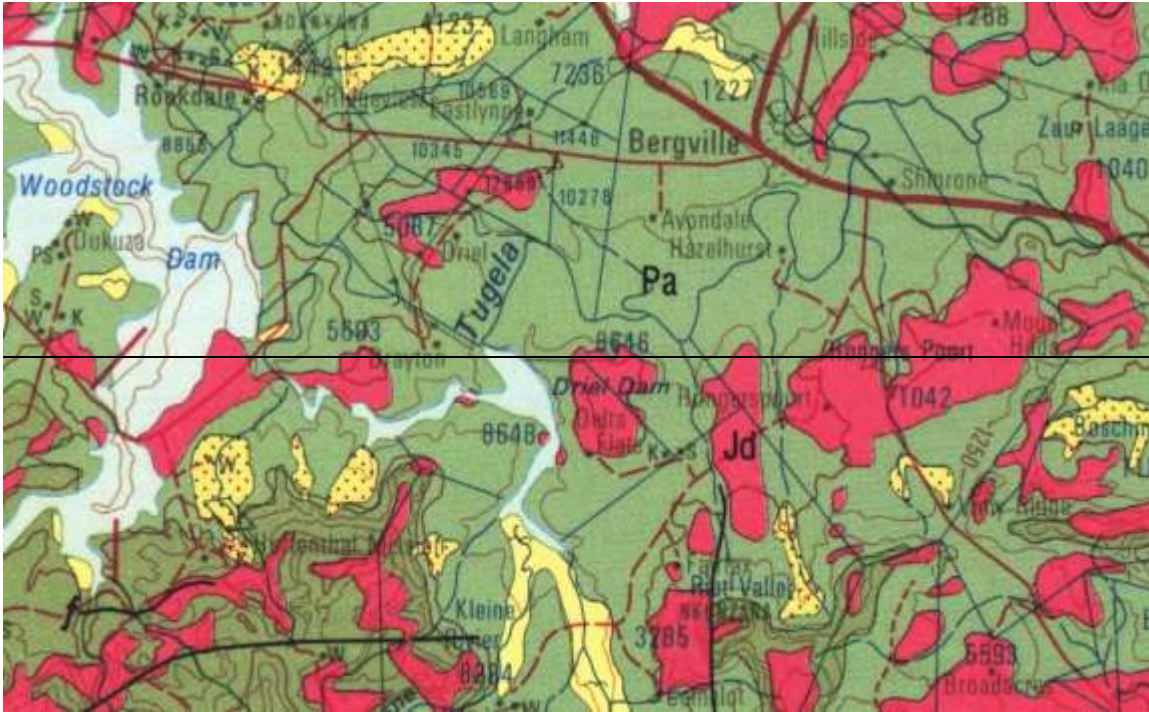
- \* Upgrading the existing water abstraction point from the Tugela River to approximately 10ML (i.e. a new pump will be installed);
- \* Upgrading of the existing Water Treatment Works from 2ML to 10ML;
- \* Upgrading the bulk water rising main pipeline (450mm) from the abstraction point to the Water Treatment Works; and
- \* Upgrading of the bulk water rising pipeline (450mm) from the Water Treatment Work to the command reservoir.



**Figure 1: Location of the proposed project. Source map GoogleEarth.**

## 2. GEOLOGY

The proposed project site is located within the Adelaide Subgroup of the Beaufort Group (Fig. 2).



**Figure 2: Extract from the Harrismith 2828 1:250 000 Geological Map. Green (Pa) is described as Adelaide Subgroup and Red (Jd) is Karoo Dolerite.**

The Beaufort Group (part of the Karoo Supergroup) is a sequence of fluvio-lacustrine sedimentary rocks that accumulated in a landlocked, intracratonic foreland basin in SW Gondwana during the Middle Permian to Middle Triassic (Neveling et al., 2005).

The Lower Beaufort Group is represented by the Adelaide (SACS, 1980). In Kwazulu-Natal the lower Beaufort Group is represented by the Permian Estcourt Formation, which forms flat terrain, the middle, by the Belmont Formation, and the upper by the Otterburn Formation (Green, 1998). This subdivision is not represented on the Harrismith geological map (Fig. 2). These rocks formed from sediments originally deposited within a fluvial-floodplain constructed by meandering rivers in a semi-arid climate (Fig. 3), flowing into a large inland sea (Karoo Sea). Lacustrine environments alternate with fluvial environments indicating a series of transgressive-regressive lacustrine episodes (Green, 1998). Karoo Dolerite which forms koppies within this area.



**Fig. 3: River channel cutting down into red shales of the Adelaide Sub-Group near Bergville.**



## ***Dolerite***

Karoo dolerite intrusions are present. These are 184 million years (Ma) old and represent the onset of the break-up of the Gondwana Supercontinent (Hastie et al (2014). According to Watkeys (2006), Gondwana rifting commenced between 155 and 135 Ma.

### 3. PALAEOLOGY

The Lower Beaufort Group rocks are classified red on the Sahrís Map (Fig. 4). Bergville is located within Permian Era rocks, about 50m below the Permo-Triassic Boundary. This figure was abstracted from the Harrismith Geological Map and could be out by +/-20m due to the map's contour control. The Upper Permian is separated from the Triassic by an Extinction Event (known as the Great Dying) when 95% of life on Earth became extinct. The reasons for this are still controversial. There have been five great extinction events in the Phanerozoic Era (541 Mya till Present). Of these the Permo-Triassic Boundary represents the greatest extinction event in the Earth's history.

This stratigraphic boundary is expected to be found within marine sediments where a complete time record may accumulate. In contrast the Adelaide Subgroup comprises terrestrial sediments sedimentary rocks. Preservation requires a large number of geological processes to come together, but these are less likely to take place during terrestrial deposition. Consequently the placement of the Permo-Triassic Boundary is not accurately known, if it has in fact been preserved in southern Africa, but it must be considered. Present evidence indicates that the Permo-Triassic Boundary is unlikely to be located in the development area.



**Fig. 4: Palaeosensitivity of rocks in the Bergville area.**

### Trace fossils

Evidence of bioturbation is ubiquitous within the Adelaide Subgroup siltstones and mudstones, however the various trace fossil (ichnofossil) types are not always identifiable. Trace fossils are very common within the Beaufort Group (Fig. 5 & 6). These have limited **Palaeontological** usage.





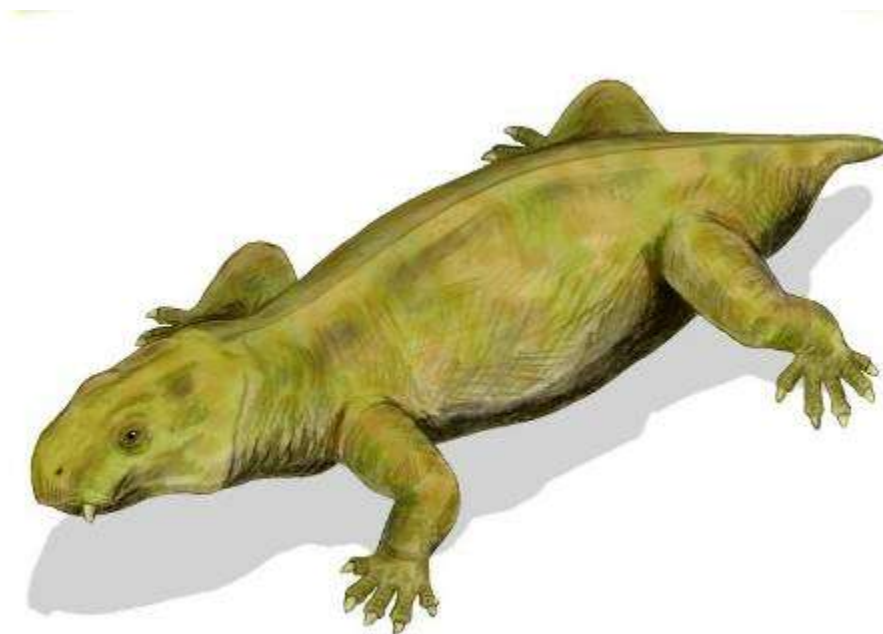
**Fig. 5: Examples of trace fossils found near Bergville. This could be *Arenicolites*.**



**Fig. 6: Trace fossils of unknown species, possibly a shrimp, found near Bergville.**

## Vertebrate Fossils

The Beaufort Group is known internationally for its fossils (Cisneros et al., 2008). It contains plant- and animal- fossils. The latter include a wide variety of body fossils, including the mammal-like reptiles such as the Upper Permian-Dicynodon (Fig. 7) and the Triassic- aged Lystrosaurus (Neveling et al., 2005) and trace fossils (Green, 1997). The Adelaide Subgroup known world-wide for its fossils



**Fig. 7: Dicynodon reproduction (Wikipedia).**

## Karoo Dolerite

Karoo Dolerite is also present. This is an igneous intrusive rock and by definition cannot be fossiliferous.

## Paleontological Material Discussion

Significant Palaeontological Material could be found on site. However there are several mitigating factors:

1. The site is highly disturbed as this is a refurbishment project
2. The site is highly weathered and no fresh rock is exposed.

These factors mitigate against a field visit. It is possible that Paleontological Material could be exposed during site excavation, consequently a **Chance Find Protocol** has been inserted.

### 4. CHANCE FIND PROTOCOL

As this site includes areas flagged red on the SAHRIS PalaeoSensitivity Map (Fig. 4), a “Chance Find Protocol” is **Recommended**.

In the case of any unusual finds, a Palaeontologist must be notified immediately by the ECO and/or EAP and a site visit must be arranged at the earliest possible time with the Palaeontologist.

In the case of the ECO or the Site Manager becoming aware of suspicious looking palaeo-material:

- The construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.
  
- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labeled, boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

### **Functional responsibilities of the Developer**

1. At full cost to the project, and guided by the appointed Palaeontological Specialist, ensure that a representative archive of palaeontological samples and other records is assembled to characterize the palaeontological occurrences affected by the excavation operation.

2. Provide field aid, if necessary, in the supply of materials, labour and machinery to excavate, load and transport sampled material from the excavation areas to the sorting areas, removal of overburden if necessary, and the return of discarded material to the disposal areas.

3. Facilitate systematic recording of the stratigraphic and palaeo-environmental features in exposures in the fossil-bearing excavations, by described and measured geological sections, and by providing aid in the surveying of positions where significant fossils are found.

4. Provide safe storage for fossil material found routinely during excavation operations by construction personnel. In this context, isolated fossil finds in disturbed material qualify as “normal” fossil finds.

5. Provide covered, dry storage for samples and facilities for a work area for sorting, labeling and boxing/bagging samples.

6. Costs of basic curation and storage until collected. Documentary record of palaeontological occurrences must be done.

7. The contractor will, in collaboration with the Palaeontologist, make the excavation plan available to the appointed specialist, in which appropriate information regarding plans for excavations and work schedules must be indicated on the plan of the excavation sites. This must be done in conjunction with the appointed specialist.

8. Initially, all known specific palaeontological information will be indicated on the plan. This will be updated throughout the excavation period.

9. Locations of samples and measured sections are to be pegged, and routinely and accurately surveyed. Sample locations, measured sections, etc., must be recorded three-dimensionally if any “significant fossils” are recorded during the time of excavation.

## 5. CONCLUSIONS & RECOMMENDATIONS

The proposed development is on rock which could be fossiliferous. However, the rock is weathered and the site is highly disturbed. It is unlikely that **Palaeontological Material** will be discovered on a pre-excavation field trip as the rock is highly weathered and fresh rock is not exposed.



A **Chance Find Protocol** has been inserted. Should any **Palaeontological Material** be uncovered a Palaeontologist must be called in to investigate.

Should excavations >2m deep take place and expose fresh rock, a field visit by a competent Palaeontologist should be arranged.

## 6. REFERENCES

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## 7. DETAILS OF SPECIALIST

### **Dr Alan Smith**

**Private Consultant: Alan Smith Consulting, 29 Brown's Grove, Sherwood, Durban, 4091**

&

**Honorary Research Fellow: Discipline of Geology, School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Durban.**

**Role:** Specialist Palaeontological Report production

#### **Expertise of the specialist:**

- PhD in Geology (University of KwaZulu-Natal), Pr. Sc. Nat., I.A.H.S.
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).
- Alan has published in both national and international, peer-reviewed journals. He has published more than 50 journal articles with 360 citations (detailed CV available on request).
- Attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.

- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhekuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- Desktop PIA: Zuka valley, Ballito. Client: Mike Webster, HSG Attorneys.
- Mevamhlope proposed quarry palaeontology report. Client: Enviropro.
- Desktop PIA: Proposed Lovu Desalination site. Client: eThembeni Cultural Heritage.
- Desktop PIA: Tinley Manor phase 2 North & South banks: eThembeni Cultural Heritage
- Desktop PIA: Tongaat. Client: eThembeni Cultural Heritage.
- Palaeontological Assessment Reports (3) to Scatec Solar SA (Pty) Ltd on an Appraisal of Inferred Palaeontological Sensitivity for a Potential Photo Voltaic Park at (1) Farm Roilyf near Groblershoop, N Cape; (2) Farm Riet Fountain No. Portions 1 and 6, 18km SE of De Aar, N Cape; and (3) Dreunberg, near Burgersdorp, Eastern Cape. Client: Sustainable Development Projects.