

approval of the Council having been obtained on written application to the Council.

5. The Council may only issue written approval once the Council is satisfied that—
  - a. the applicant has made a concerted effort to consult with communities and individuals who by tradition may have an interest in the grave; and
  - b. the applicant and the relevant communities or individuals have reached agreement regarding the grave.
  - c. 36. General protection: Battlefield sites, archaeological sites, rock art sites, palaeontological sites, historic fortifications, meteorite or meteorite impact sites.—
6. 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.
7. 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.
8. 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.
9. 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.

10. 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.
11. 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." (KZN Heritage Act of 2008)

## 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 (1<sup>st</sup> edition) 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 consisted of surveying along the line route with a 25m buffer zone on each side of the line. 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.

## **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. Each settlement is given a 50m radius, especially for the older maps, as the maps do not always “fit” correctly. The 1937 aerial photographs noted 80 settlements near the various lines (Fig. 4, Table 1), as well as large areas that have been used for agricultural purposes. Many of these settlements confirm to the traditional pre-20<sup>th</sup> century Zulu settlement pattern.

FIG. 4: LOCATION OF SETTLEMENTS ALONG THE MAKHABELENI RBWSS IN 1937

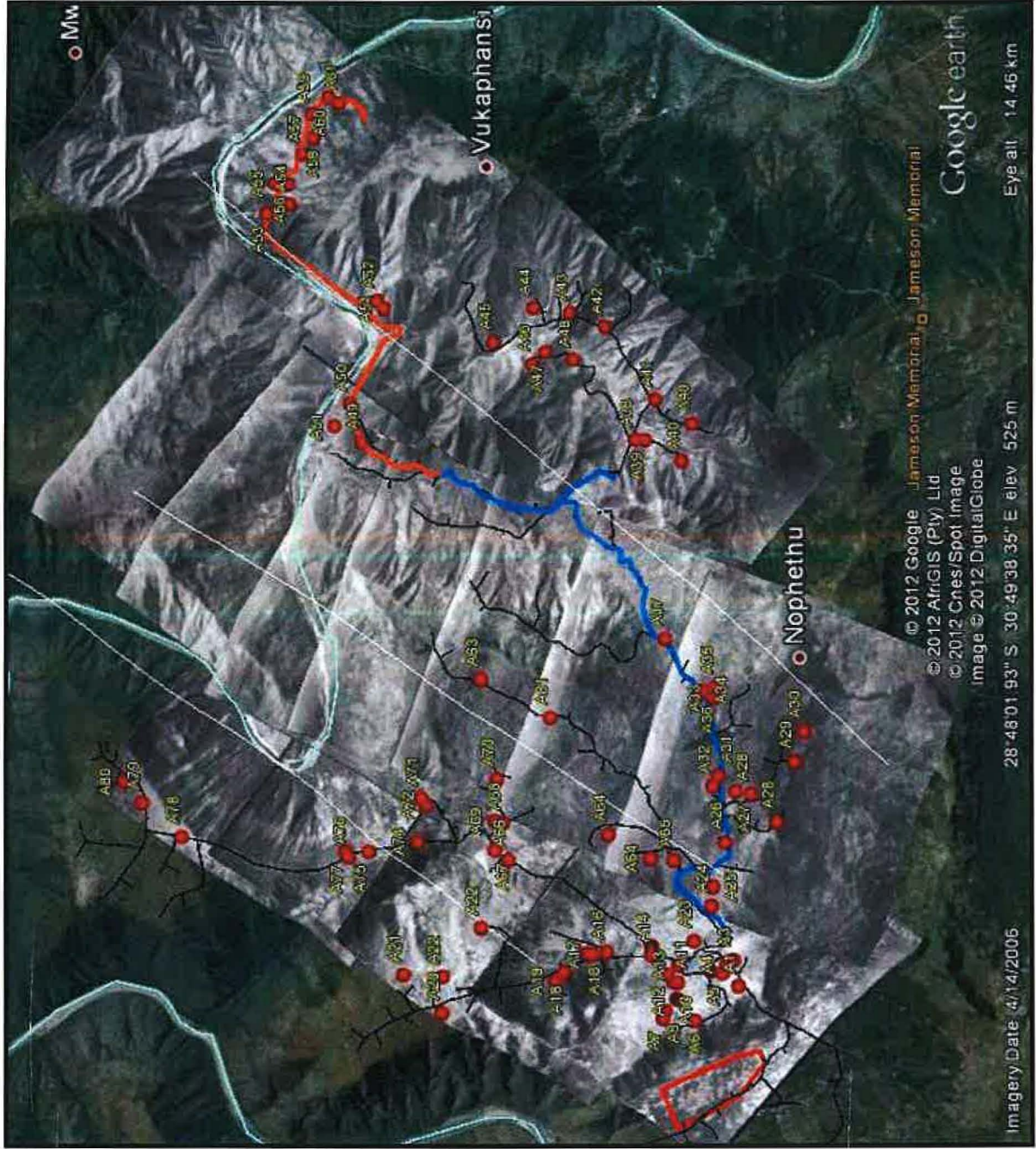




FIG.5: LOCATION OF SETTLEMENTS ALONG THE MAKHABELENI RBWSS IN 1963

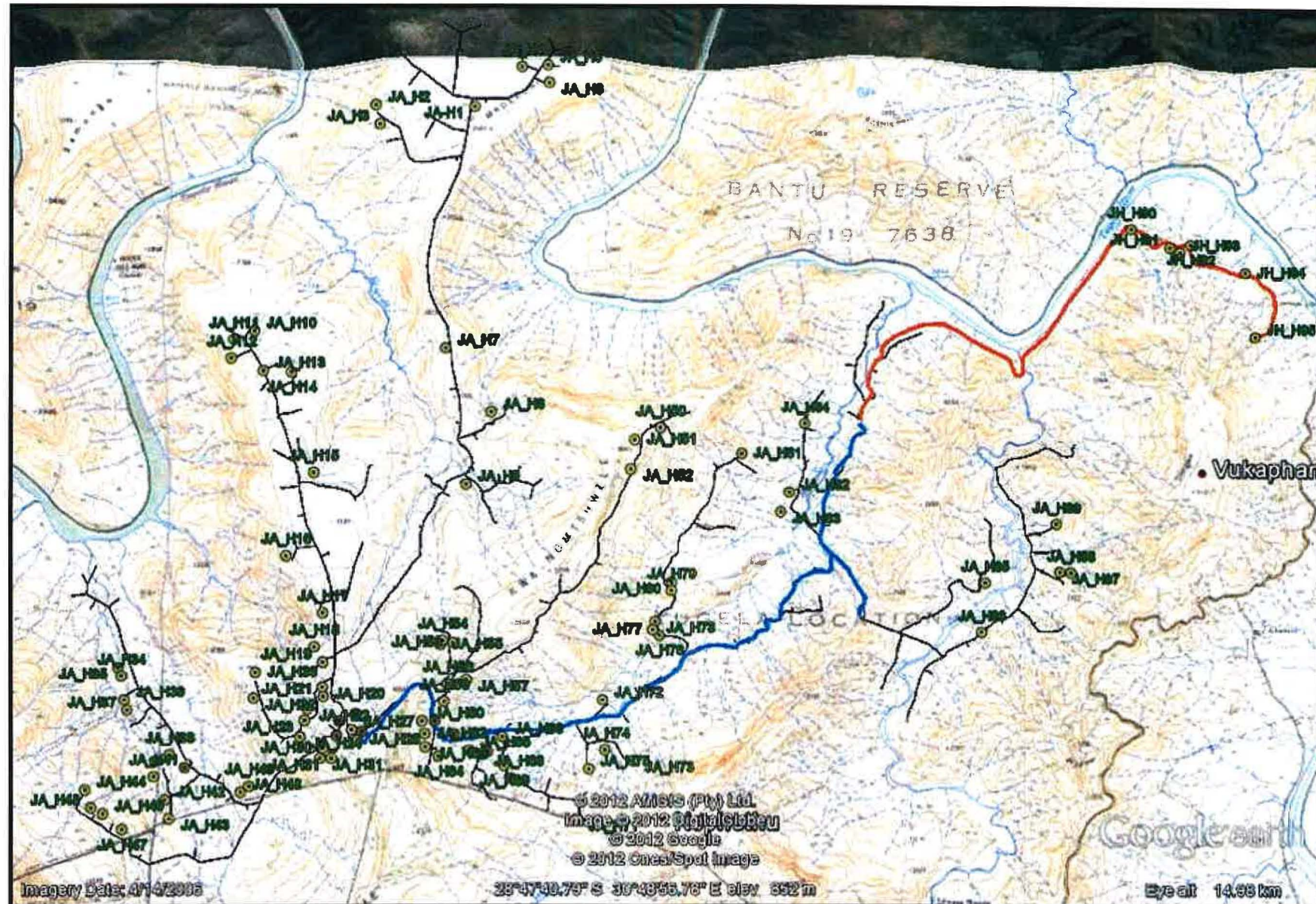




TABLE 1: LOCATION OF SITES IDENTIFIED FROM 1937 AERIAL PHOTOGRAPHS

Name	Latitude	Longitude	Name	Latitude	Longitude	Name	Latitude	Longitude
A1	-28.8269415	30.7702764	A27	-28.8272247	30.7965157	A52	-28.7823251	30.8668789
A2	-28.8236621	30.7722667	A28	-28.8290636	30.7961897	A53	-28.7680667	30.8797888
A3	-28.8262009	30.7741108	A28	-28.8318379	30.7926044	A54	-28.7711951	30.8808767
A4	-28.8254388	30.7734177	A29	-28.834074	30.8009081	A55	-28.7692491	30.884091
A5	-28.8250407	30.772085	A30	-28.8351295	30.8051533	A56	-28.7708778	30.8839185
A6	-28.8218262	30.7650247	A31	-28.8252093	30.7986148	A57	-28.7727423	30.8883066
A7	-28.8180643	30.7650512	A32	-28.8244574	30.7972275	A58	-28.7740879	30.8907821
A8	-28.8183516	30.7660782	A33	-28.8247664	30.8094754	A59	-28.7738007	30.8944041
A9	-28.8197253	30.7678874	A34	-28.8236062	30.81053	A60	-28.7758485	30.896896
A10	-28.8197343	30.7703707	A35	-28.825102	30.8110734	A61	-28.7773151	30.8958471
A11	-28.8192444	30.7704517	A36	-28.8230788	30.8100799	A81	-28.8042119	30.8071184
A12	-28.8184432	30.7716147	A37	-28.8188166	30.8177984	A63	-28.7957495	30.8124545
A13	-28.8197396	30.7730743	A38	-28.8152154	30.8466853	A64	-28.8113767	30.7908985
A14	-28.816594	30.7742368	A39	-28.8165375	30.8465775	A64	-28.8164708	30.7876022
A15	-28.8165748	30.775401	A40	-28.8211337	30.8434245	A65	-28.8192339	30.7876026
A16	-28.8111359	30.774535	A40	-28.8224664	30.8489695	A66	-28.79907	30.7868203
A17	-28.8094011	30.7741789	A41	-28.8177718	30.8524861	A67	-28.7973901	30.7881239
A18	-28.8086147	30.7743105	A42	-28.811361	30.8630637	A68	-28.7984092	30.7920241
A18	-28.8059432	30.7716707	A43	-28.8068026	30.8650888	A69	-28.7973779	30.7923073
A19	-28.8048509	30.7703769	A44	-28.8021173	30.8657389	A70	-28.7976787	30.7983158
A20	-28.7909674	30.765771	A45	-28.7970802	30.8607738	A71	-28.7884092	30.7955305
A21	-28.7862906	30.7709955	A46	-28.8020535	30.8576473	A72	-28.7890163	30.7945353
A22	-28.7910468	30.7707907	A47	-28.8036759	30.8594546	A74	-28.7879114	30.7893149
A22	-28.7957418	30.7777222	A48	-28.8072353	30.8582168	A75	-28.7819274	30.7879541
A23	-28.8215801	30.776591	A49	-28.7803685	30.8463805	A76	-28.7794715	30.7872108
A24	-28.8234818	30.7817733	A50	-28.7788763	30.8520307	A77	-28.7790302	30.7878475
A25	-28.8238653	30.784029	A51	-28.776881	30.8487774	A78	-28.7591294	30.7902401
A26	-28.8256518	30.789683	A51	-28.7831922	30.8657944	A79	-28.7542349	30.7949987
						A80	-28.751961	30.7979408



TABLE 2: LOCATION OF SITES IDENTIFIED FROM 1963 TOPOGRAPHICAL MAPS

Name	Latitude	Longitude	Name	Latitude	Longitude	Name	Latitude	Longitude
JA_H1	-28.7555275	30.7914554	JA_H31	-28.8275315	30.7741275	JA_H64	-28.8276575	30.7871681
JA_H2	-28.7551678	30.7786804	JA_H32	-28.8213089	30.7636617	JA_H65	-28.827212	30.790864
JA_H3	-28.7572923	30.7792086	JA_H33	-28.8184862	30.7638218	JA_H66	-28.8277338	30.792558
JA_H4	-28.7510135	30.7974429	JA_H34	-28.819552	30.74473	JA_H67	-28.8274333	30.7931279
JA_H5	-28.7508676	30.8007765	JA_H35	-28.818631	30.7442489	JA_H68	-28.8259041	30.7949724
JA_H6	-28.7528678	30.8009769	JA_H36	-28.8222608	30.7452263	JA_H69	-28.8290964	30.7952273
JA_H7	-28.7823963	30.7876147	JA_H37	-28.8234355	30.7456253	JA_H70	-28.8305254	30.7960429
JA_H8	-28.7896194	30.7934487	JA_H38	-28.8283908	30.7514393	JA_H71	-28.8347927	30.8045471
JA_H9	-28.7977088	30.7902639	JA_H39	-28.8297745	30.7535043	JA_H72	-28.8221859	30.8076893
JA_H10	-28.7805246	30.7633194	JA_H40	-28.8291357	30.7495767	JA_H73	-28.8288526	30.8116388
JA_H11	-28.7814948	30.7606849	JA_H41	-28.830786	30.7494827	JA_H74	-28.8277728	30.8080004
JA_H12	-28.7835938	30.7604066	JA_H42	-28.8333314	30.7510572	JA_H75	-28.8297647	30.8059891
JA_H13	-28.7850261	30.7645849	JA_H43	-28.835364	30.7517301	JA_H76	-28.8148905	30.8150497
JA_H14	-28.7851813	30.7681943	JA_H44	-28.8317785	30.7416225	JA_H77	-28.8142456	30.8141973
JA_H15	-28.7963818	30.7711306	JA_H45	-28.8337723	30.742374	JA_H78	-28.8133279	30.8144779
JA_H16	-28.8055768	30.7676944	JA_H46	-28.8344298	30.7438916	JA_H79	-28.8097727	30.8166449
JA_H17	-28.811836	30.7724363	JA_H47	-28.8361031	30.7464507	JA_H80	-28.8088322	30.8166865
JA_H18	-28.815602	30.7713433	JA_H48	-28.8323023	30.7611512	JA_H81	-28.7942799	30.825775
JA_H19	-28.8172416	30.77256	JA_H49	-28.8314417	30.7625114	JA_H82	-28.7986819	30.832164
JA_H20	-28.8199144	30.7726728	JA_H50	-28.7914111	30.8152232	JA_H83	-28.8009418	30.8310218
JA_H21	-28.8209482	30.7728205	JA_H51	-28.7927555	30.8119562	JA_H84	-28.79077	30.8342095
JA_H22	-28.8224684	30.7705892	JA_H52	-28.7959993	30.811472	JA_H85	-28.8089498	30.8579568
JA_H23	-28.8236739	30.7703055	JA_H53	-28.8151519	30.7889698	JA_H86	-28.814663	30.8575241
JA_H24	-28.8254744	30.7697643	JA_H54	-28.8149132	30.7876174	JA_H87	-28.8076699	30.8676798
JA_H25	-28.8235807	30.7749396	JA_H55	-28.8153484	30.7873743	JA_H88	-28.8077107	30.8690537
JA_H26	-28.8227377	30.7771031	JA_H56	-28.8195496	30.7883799	JA_H89	-28.8021634	30.8671771
JA_H27	-28.8244361	30.776638	JA_H57	-28.8191961	30.7907139	JH_H90	-28.7678412	30.8775811
JA_H28	-28.8254881	30.7774395	JA_H58	-28.8215648	30.7879146	JH_H91	-28.7700446	30.8825111
JA_H29	-28.8245893	30.7779419	JA_H59	-28.8237406	30.7867618	JH_H92	-28.7696574	30.8853797
JA_H29	-28.825168	30.7746642	JA_H60	-28.8236701	30.7852088	JH_H93	-28.7705923	30.8838388
JA_H30	-28.8264702	30.7729722	JA_H61	-28.8253753	30.7890332	JH_H94	-28.7728057	30.8927635
JA_H31	-28.8275533	30.7726433	JA_H62	-28.8251069	30.7855127	JH_H95	-28.7804326	30.8935367
JA_H31	-28.8275315	30.7741275	JA_H63	-28.8265831	30.78555			

The 1963 map indicated that there were 95 settlements near the pipeline (Fig. 5 and Table 2). Some of these were in the same position as those from the 1937 aerial photographs, suggesting that the houses were reused by the next generation. Many of the current settlements occur in the same place as those from the 1963 map.

The maps indicate that there has been a steady increase in human settlements in the area, often re-using existing houses. This re-use pattern becomes obvious when one notes (in the field) that the re-used houses are mostly on existing terraces.

All of the settlements identified on the maps were visited during the survey, if they occurred within 50m of the line.

## **FIELD SURVEY**

Table 3 and Figure 6 shows the locations of the finds from the survey. A total of 21 sites were recorded. Many of the settlements from the maps either do not exist, or have been continuously renovated, or rebuilt, over time.

Several graves were observed during the survey, and are discussed below. The human graves are not recent in age, but do not appear to be as old as, or older, than 1937. The graves and associated settlements are thus probably not older than 60 years.

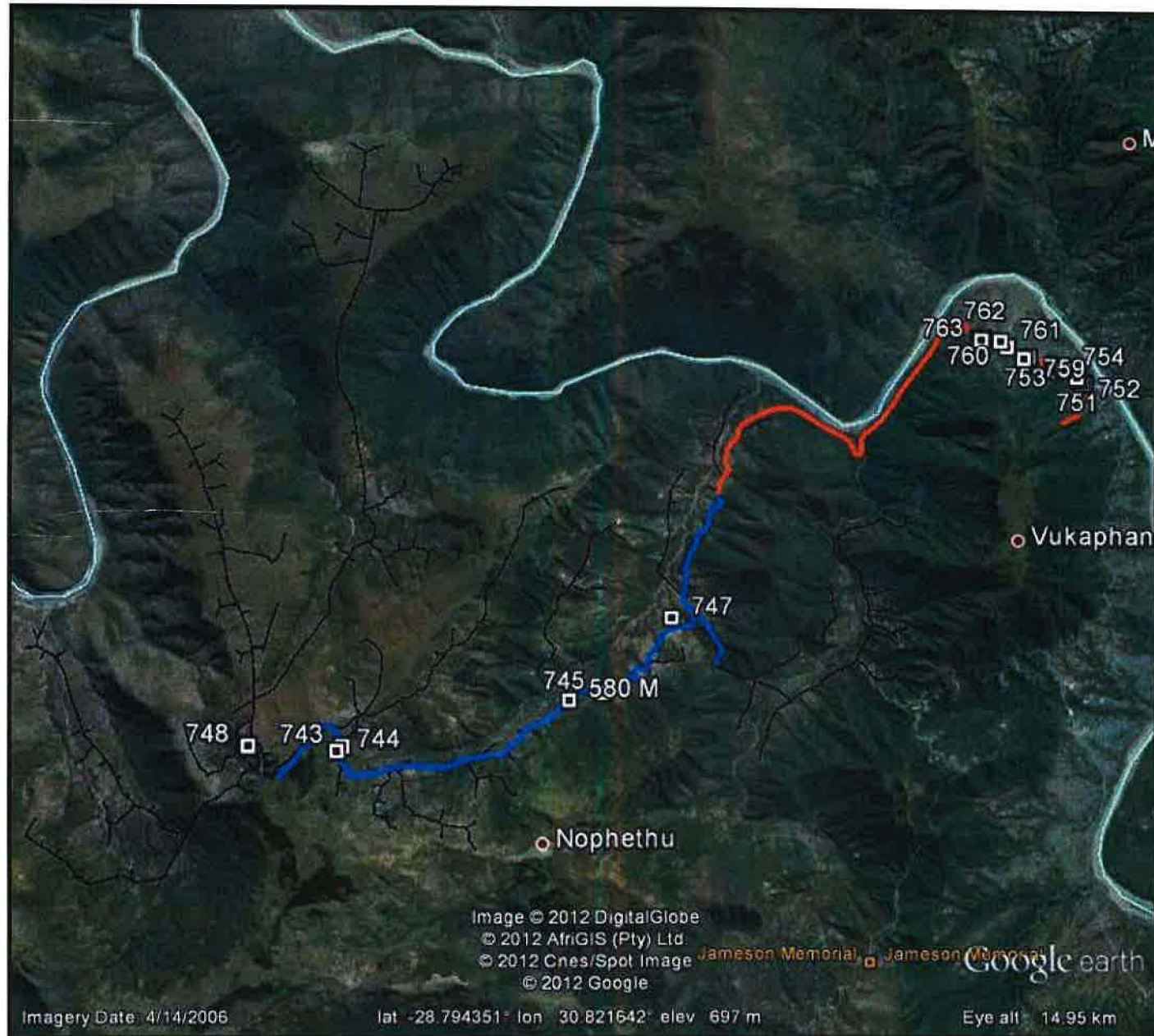
It is Umlando's policy that graves are only affected as a final and last resort, and thus we would not support any grave removals for this project. Community involvement would be required as well where the pipeline affects graves and/or ruined houses.



TABLE 3: LOCATION OF SITES IDENTIFIED FROM THE SURVEY

NAME	DESCRIPTION	LATITUDE	LONGITUDE	AFFECTED BY LINE
743	2-3 graves	-28.821999	30.786176	
744	Stone terracing	-28.822626	30.785886	
580 M	Sensitive area with possible graves	-28.817182	30.819311	
745	House ruins	-28.816221	30.824348	
746	Possible graves related to #746	-28.816109	30.824491	
747	3 modern graves	-28.806549	30.834625	
748	~20 graves	-28.822009	30.773608	
749	Old houses	-28.775367	30.896577	
750	Grave related to #749	-28.775382	30.896746	
751	Recent settlements	-28.774617	30.895743	
752	Recent settlements	-28.774858	30.896083	
753	2 graves	-28.77351	30.893672	
754	1 grave	-28.773388	30.89369	
756	1 grave	-28.773021	30.892259	
757	1 grave	-28.773037	30.892226	
758	2 graves	-28.772045	30.888357	
759	2 graves	-28.772285	30.887515	
760	~10 graves	-28.770771	30.884934	
761	~6 graves	-28.77	30.884038	
762	Northern edge of terracing	-28.769669	30.88142	
763	Southern edge of terracing	-28.769849	30.88113	
764	20+ graves	-28.769664	30.880761	

FIG. 6: LOCATIONS OF RECORDED SITES ALONG THE MAKHABELENI RBWSS





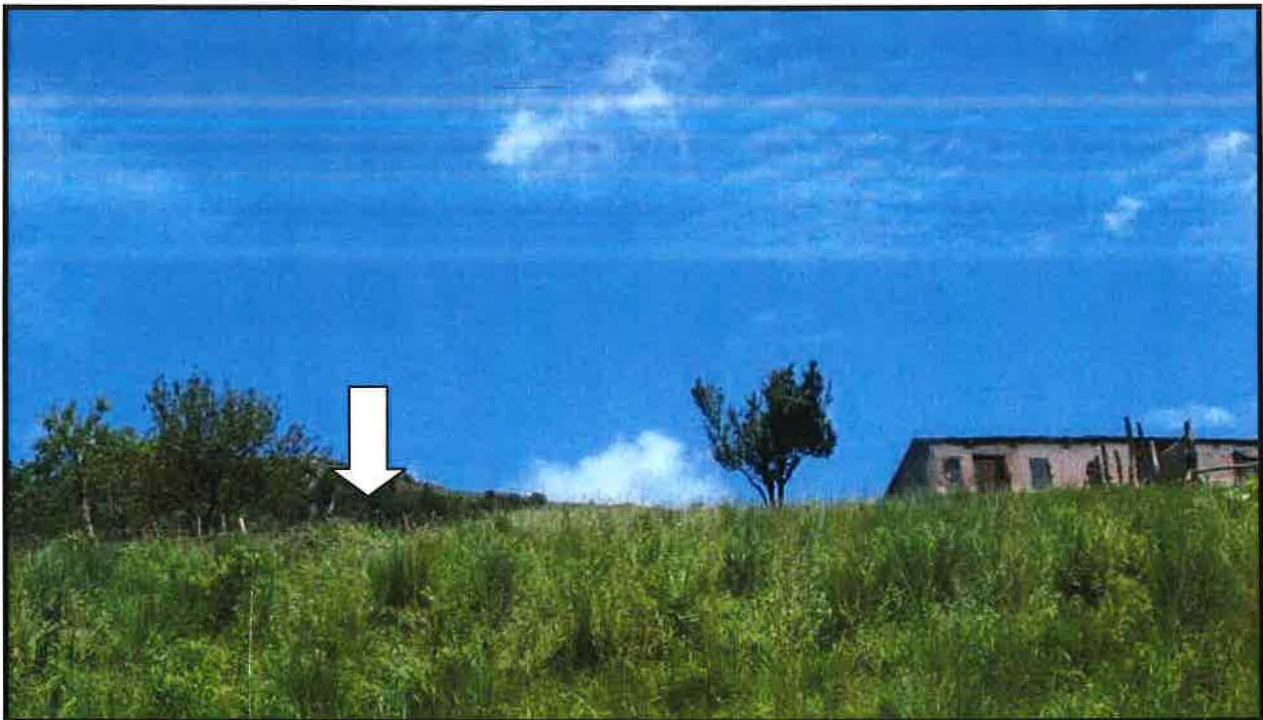
### **SITE 743**

Site 743 is located on the top of a hill, near a modern house. The site consists of two – three graves between the embankment and the house (Fig. 7). The exact location of the main line and the reticulation is unclear, as it currently goes between the houses, while it probably should be placed beside the road.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG. 7: LOCATION OF GRAVES AT SITE 743**



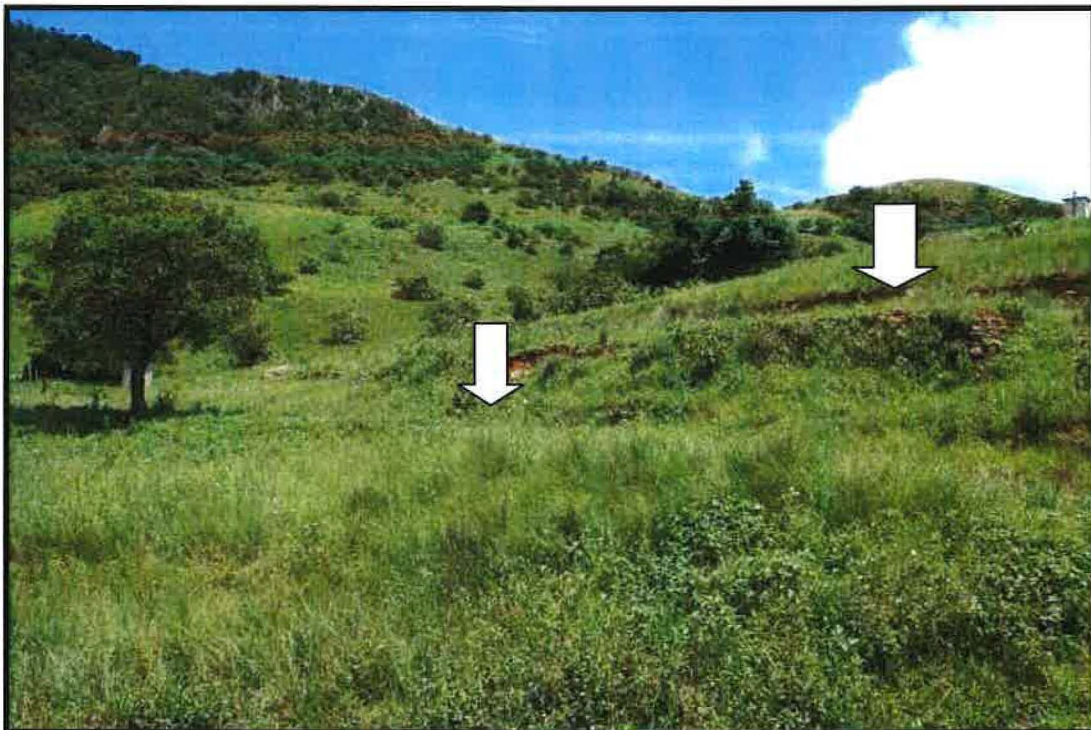
**SITE 744**

Site is located at the base of the hill of where Site 743 is located. The site consists of two areas of terracing for previous houses, although there are currently no foundations or other features (fig. 8). No other features such as graves were visible.

Significance: The site is of low significance.

Mitigation: No further mitigation is required; however, there is a possibility of subsurface features, such as graves in the immediate area.

**FIG. 8: LOCATION OF TERRACING AT SITE 743**























**UMLANDO ARCHAEOLOGICAL SITE RECORD FORM****SITE CATEGORY:** (X where applicable)

Stone Age:  
 Early Iron Age:  
 Late Iron Age:  
 Historical Period:

Recorder's Site No.: **756 and 757**

Official Name:

Local Name:

Map Sheet:

GPS reading: 756	S28 46 22.9 E30 53 32.1	353 m
757	S28 46 22.9 E30 53 32.0	352 m

**DIRECTIONS TO SITE: SKETCH OR DESCRIPTION.**

From the Kranskop Police Station drive northwest and turn left onto unpaved road after 68m. Turn right onto the P16-2 after 188m. Follow this road for 34.3km then turn left onto an unpaved road. 756 and 757 is 1.4km from here, near the road.

**SITE DESCRIPTION:**

Type of Site: Graves and settlement  
 Merits conservation: Yes  
 Threats: Yes  
 What threats: Makhabeleni Water Supply

**RECORDING:**

Graphic record: Yes

Digital pictures: x

Tracings :

Re-drawings:

Recorder/Informant: Name: Gavin and Louise Anderson

Address: PO Box 102532, Meerensee, 3901

Date: 18/01/2012

Owner:

References:

**Description of site and artefactual content.**

Site 756 and 757 are located near the road. Both Sites are individual graves near each other. The remains of the settlement are visible in recent aerial photography and occur in front of an existing settlement. The graves are currently ~16m north of the line.















**APPENDIX B  
PALAEOLOGICAL REPORT**



**PALAEONTOLOGICAL ASSESSMENT OF  
THE MAKHABELENI WATER SUPPLY**

**FOR Umlando**

**DATE: 27 FEBRUARY 2012**

**By**

**Gideon Groenewald**

**Metsi Metseng Geological and Environmental  
Services**

**Fax: 086 619 2136**

**Cell: 082 829 4978**

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## EXECUTIVE SUMMARY

The planned JAMESONS DRIFT PIPELINE DEVELOPMENT is located on a hill slope that is underlain mainly by Pre-Karoo aged rocks of the Natal Metamorphic Province and these rocks are not known to contain any fossils. Very small sections of the pipeline cuts Karoo aged Dwyka Formation and Ecca Group rocks and no significant fossils are expected from these rocks. If fossil material is discovered during the construction phase, it must be appropriately protected and the discovery reported to a palaeontologist for the removal thereof as per SAHRA legislation.

The igneous character of the Dolerite Sill has no significance for palaeontological finds.

## INTRODUCTION

Metsi-Metseng Geological Services CC was appointed to undertake a desktop survey, assessing the potential palaeontology impact of the JAMESONS DRIFT PIPELINE DEVELOPMENT in KwaZulu Natal.

### **SAHRA ACT OR KWAZULU-NATAL HERITAGE ACT NO. 4 OF 2008**

The National Heritage Resources Act of 1999 (pp 12-14) and the KwaZulu heritage Act of 2008 protects a variety of heritage resources. These resources are defined as follows:

1. "For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.
2. Without limiting the generality of subsection (1), the national estate may include -
  - 2.1. Places, buildings, structures and equipment of cultural significance;
  - 2.2. Places to which oral traditions are attached or which are associated with living heritage;
  - 2.3. Historical settlements and townscapes;
  - 2.4. Landscapes and natural features of cultural significance;
  - 2.5. Geological sites of scientific or cultural importance;
  - 2.6. Archaeological and palaeontological sites;
  - 2.7. Graves and burial grounds, including—
  - 2.8. Ancestral graves;
  - 2.9. Royal graves and graves of traditional leaders;
  - 2.10. Graves of victims of conflict;
  - 2.11. Graves of individuals designated by the Minister by notice in the Gazette;
  - 2.12. Historical graves and cemeteries; and
  - 2.13. Other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
3. Sites of significance relating to the history of slavery in South Africa;



- 3.1. Movable objects, -
4. Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- 4.1. Objects to which oral traditions are attached or which are associated with living heritage;
- 4.2. Ethnographic art and objects;
- 4.3. Military objects;
- 4.4. objects of decorative or fine art;
- 4.5. Objects of scientific or technological interest; and
- 4.6. 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).
5. Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—
- 5.1. Its importance in the community, or pattern of South Africa's history;
- 5.2. Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- 5.3. Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- 5.4. Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- 5.5. Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- 5.6. Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- 5.7. Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;

- 5.8. Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- 5.9. sites of significance relating to the history of slavery in South Africa”

### **METHODOLOGY**

The potential palaeontology of a rock unit relates directly to the geology of the area. The desktop survey includes the comparison of relevant referenced geological maps and locality maps and/or waypoints provided for the development project. The potential impact and significance of the palaeontology for a specific rock unit is determined through comparison of existing geological and palaeontology database information.

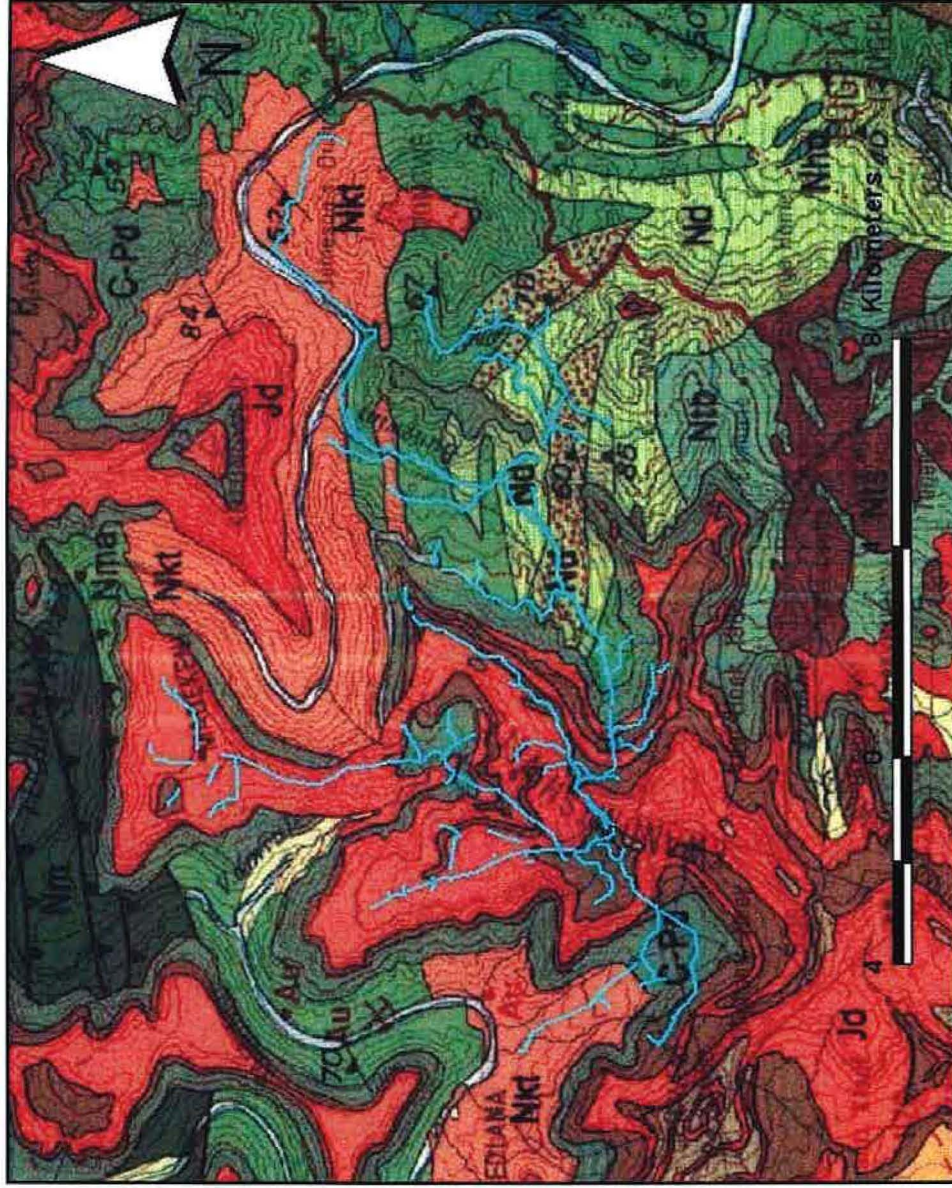
The only limitation on this methodology is the scale of mapping, which restricts comparison of the geology to a scale of 1:250 000. This restriction only applies in areas where major changes in the geological character of the area occur over very short distances.

### **RESULTS**

The study area is mainly underlain by Metamorphic rocks of the Natal Metamorphic Province and Jurassic Dolerite (Figure 1). Small sections of the pipeline cuts into sediments of the Carboniferous to Permian Dwyka Formation and Permian Ecca Group sediments of the Karoo Supergroup.

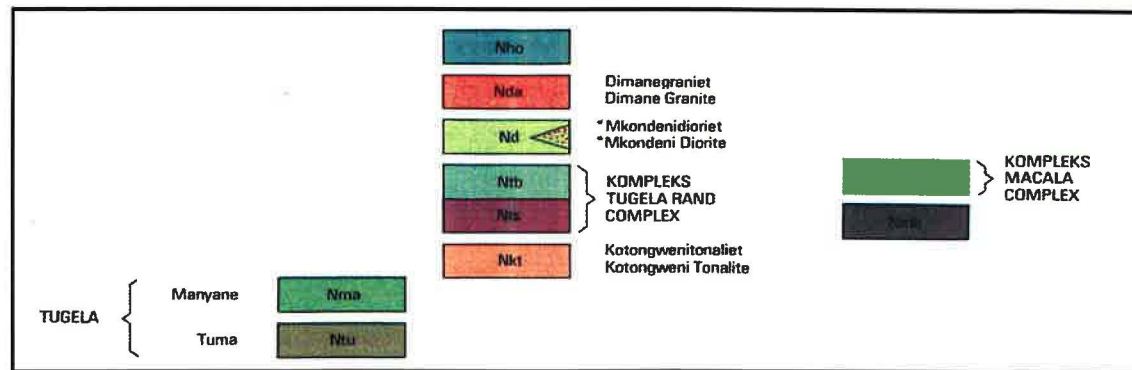
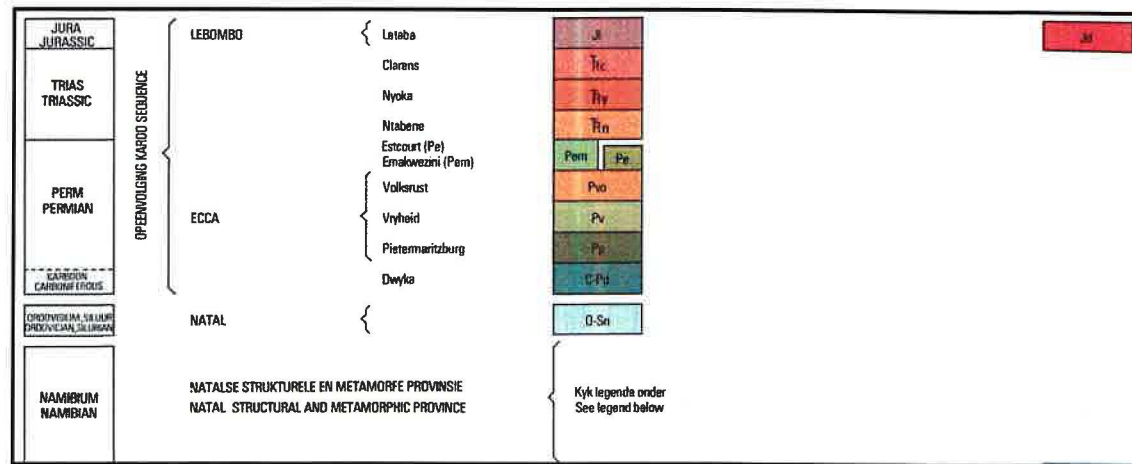


FIG. 1 GEOLOGY OF THE JAMESONS DRIFT PIPELINE DEVELOPMENT (Geomap 2930 Durban)





LEGEND OF FIGURE 1 ABOVE



## **DISCUSSION**

The desktop survey indicate that the proposed development is mainly underlain by deposits of Pre-Karoo aged rocks, mainly granites and metamorphic rocks. It is unlikely that any of these geological formations underlying this study area will contain significant fossils. Sections of the pipeline that cuts through outcrops of the Dwyka Formation and Permian Ecca Group sediments are very limited and will have no effect on the palaeontological heritage of this region.

The Jurassic Dolerite Sill will have no fossil material due to its igneous character.

## **MANAGEMENT PLAN**

The desktop survey indicates that the planned pipeline development is on a hill slope underlain by rocks of Pre-Karoo age and no fossils can be expected in these rocks.

A small section of the pipeline cut deposits of the Dwyka Formation and the Ecca Group but outcrops are limited to small sections and no significant fossil finds are expected from these sequences.

The igneous character of the Dolerite Sill has no significance for palaeontological finds and no management measures for the preservation of these rocks or rescue of palaeontological data are needed.

If fossil material is however discovered during the construction phase, it must be appropriately protected and the discovery reported to a palaeontologist for the removal thereof as per SAHRA legislation.

### **CONCLUSION**

The planned JAMESONS DRIFT PIPELINE DEVELOPMENT is located on a hill slope that is underlain by Pre-Karoo aged rocks and limited outcrops of Karoo aged sediments. No significant fossils are expected in these sediments. The ECO must however be made aware of possible trace fossils in the shale outcrops and a palaeontologist must be informed if any trace fossils are recorded

The igneous character of the dolerite has no significance for palaeontological finds.

### **REFERENCES**

**Johnson MR , Anhaeusser CR and Thomas RJ (Eds) (2006).** The Geology of South Africa. GSSA, Council for Geoscience, Pretoria.



### **QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR**

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

#### Declaration of Independence

I, Gideon Groenewald, 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 palaeontological heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.



Dr Gideon Groenewald  
Geologist

### **AREA 580M**

Area 580M to Site 745 appears to be in a sensitive area. This area was not surveyed due to the very dense vegetation (fig 9). The modern aerial photographs (from Google Earth) indicate that there are at least two recently abandoned settlements within this thicket. These would post-date the 1963 topographical map. The area that extends for ~ 400m may contain human graves.

Significance: The area cannot be assessed.

Mitigation: The ~400m will need to be assessed after vegetation clearance for this section has occurred. If graves are located during vegetation clearance, then the line will need to be realigned accordingly.

**FIG. 9: LOCATION OF DENSE VEGETATION FROM AREA 580M**





### **SITE 745 & 746**

Site 745 and Site 746 are part of the same settlement with the latter being a possible grave. The site is located near the road, in an area that has been cleared and flattened. The site does not show on the older maps and thus probably post-dates 1963. The site consists of the ruins of one square mud-brick house (fig. 10 left), a few stone-lined bases, and a possible grave (fig. 10 right).

The line occurs ~25m from the house, and 35m from the possible grave.

**Significance:** The house and related structures are of low significance. All human graves are of high significance. If a feature is regarded as a possible grave, then it should be treated as if it was a grave.

**Mitigation:** The graves need to be fenced off if they occur within 50m of the line. The fencing will need to occur 5m from the edge of the cairn, and be supervised by a qualified archaeologist.

**FIGURE 10: SITE 745 AND GRAVE AT SITE 746**





### **SITE 747**

Site 747 is located halfway down the hill, and ~140m west of the line. The site consists of two – three graves downhill from an existing house (fig. 11). The exact location of the main line and the reticulation is unclear, as it currently goes between the houses, while it probably should be placed beside the road.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG. 11: GRAVES AT SITE 747**



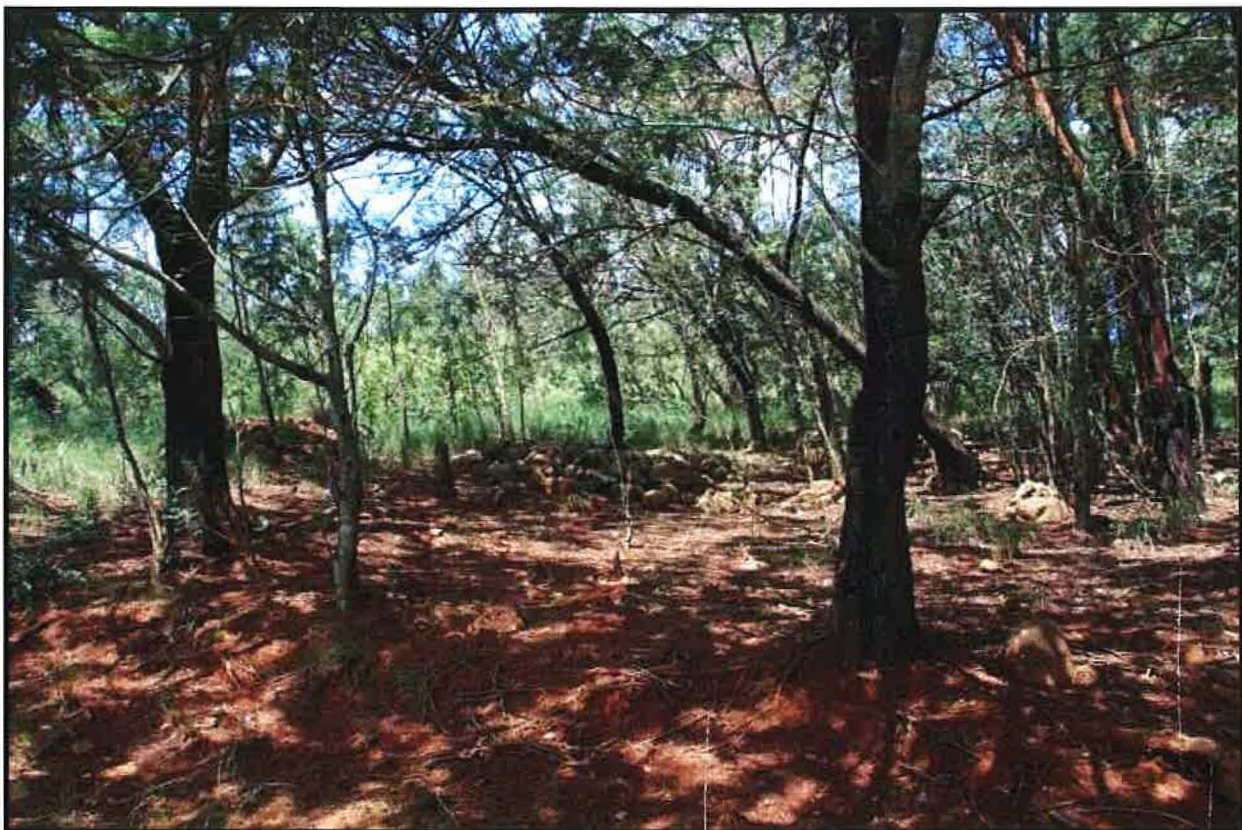
**SITE 748**

Site 748 is located near the top of a hill and in an old wattle wood lot (fig. 12). The site consists of 20+ graves of various ages. The graves are ~75m from a reticulation line and thus are not affected.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG. 12: GRAVES AT SITE 748**





**SITE 749 and 750**

Site 749 is a group of buildings while Site 750 is a grave associated with the buildings (fig. 13). The site is located near the road while the grave occurs between the house remains and the road. The grave occurs ~35m from the pipeline. The houses do not occur on the older maps, and thus they probably post-date 1963.

Significance: The grave is of high significance, while the houses are of low significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG. 13: GRAVE AT SITE 750**





### **SITE 753 AND 754**

Site 753 and 754 are located near the road, underneath Acacia trees. Site 753 (fig. 14) consists of two human graves near each other, while Site 754 is located ~10m southwards. The graves form part of the same settlement. The settlement is no longer visible, although it could be related to the site A59 from the aerial photographs, or to a more recent settlement still in use to the south. The graves are currently ~2m and 16m from the line.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment. The pipe will need to be realigned, as it should not be closer than 20m to the graves. One option would be to move the line route to the opposite side of the road, or further south between the houses. The latter area has not been surveyed, and would require some form of assessment prior to construction phase.

**FIG. 14: TWO GRAVES AT SITE 753**



### SITE 756 and SITE 757

Site 756 and 757 are located near the road. Both Sites are individual graves near each other. The remains of the settlement are visible in recent aerial photography (fig. 15 – outlined in green) and occur in front of an existing settlement. The graves are currently ~16m north of the line.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment. The pipe will need to be realigned, as it should not be closer than 20m to the graves. One option would be to move the line route to the opposite side of the road, or further south between the houses. The latter area has not been surveyed, and would require some form of assessment prior to construction phase.

FIG. 15: LOCATION OF GRAVES AND SETTLEMENT





### **SITE 758**

Site 758 is located on the northern side of the road. The site consists of two (fig. 16). There are possible remains of an older settlement to the north and west of the graves. The line is currently ~22m from the graves.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG 16: GRAVES AT SITE 758**





**SITE 759**

Site 759 is located on the southern side of the road near Site 758. The site consists of two (fig. 17) graves. There are possible remains of an older settlement to the south the graves and two occupied settlements on each side of the graves. The line is currently ~13m from the graves.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG 17: GRAVES AT SITE 758**



**SITE 760**

Site 760 is located on the western side of the road. The site consists of at least ten graves (fig. 18). There are possible remains of an older settlement to the west of the graves. The line is currently ~30m from the graves.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG 18: GRAVES AT SITE 758**





**SITE 761**

Site 761 is located on the southern side of the road. The site consists of the recent ephemeral remains of a settlement and six graves (fig. 18). The line is currently ~16m from the graves.

Significance: The graves are of high significance.

Mitigation: The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment.

**FIG 18: GRAVES AT SITE 758**





### **SITE 761 and 763**

Site 761 and 763 is located on both sides of the road point 761 and 762 refer to the various terracing of the settlement (fig. 19), while point 763 refers to the cluster of graves (fig. 20). There are 20+ graves downhill from the terracing and they appear to have been placed there for some time. The line is currently ~30m from the graves.

**Significance:** The graves are of high significance.

**Mitigation:** The graves need to be fenced off if they occur within 50m of the line. The location of the graves will need to be plotted in relation to the final route alignment. The terracing is of low significance in that it is recent. However, given that terracing is re-used for new houses, there should be no impact.

**FIG 19: TERACCING AT SITE 761**



**FIG 20: GRAVES AT SITE 763**



### **PALAEONTOLOGICAL IMPACT ASSESSMENT**

The PIA was undertaken at a desktop level. The results are as follows:

“The desktop survey indicate that the proposed development is mainly underlain by deposits of Pre-Karoo aged rocks, mainly granites and metamorphic rocks. It is unlikely that any of these geological formations underlying this study area will contain significant fossils. Sections of the pipeline that cuts through outcrops of the Dwyka Formation and Permian Ecca Group sediments are very limited and will have no effect on the palaeontological heritage of this region.

The Jurassic Dolerite Sill will have no fossil material due to its igneous character.” (See Appendix B)



## MANAGEMENT PLAN

Most of the human graves appear to be less than 60 years in age, and are thus not covered by the KZN Heritage Act of 2008. Local Municipal by-laws and regulations would cover these graves. I do believe that they should still be managed in the same way, in terms of fencing and demarcation. This will minimise possible damage during the construction phase. If the pipeline occurs to close to the human graves, then the local community may accuse the project of disturbing ancestral spirits.

All graves within 50m of the pipeline will need to be fenced off and clearly demarcated. There should be 5m buffer between the edge of a grave and the fence. No development should occur within 20m of this fence.

Two areas could not be surveyed due to the dense vegetation. These were Point 580M, and part of the Bulk Gravity Main line (from the end to Site JH\_H90). These will need to be resurveyed once vegetation clearance has occurred, and before construction phase.

The early 1937 aerial photographs, and 1963 1:50 000 topographical maps indicated where sensitive areas occur. A 50m radius should be placed around the sites to counter alignment errors when overlaying on Google Earth. These areas should be noted during construction phase for possible human remains. If human remains are observed during construction phase, then all work in that area will need to stop and Amafa KZN will need to be informed immediately.



## CONCLUSION

A heritage survey was undertaken for the Makhabeleni Regional Bulk Water Supply Scheme. A total of 90 settlements were noted as occurring near the pipeline in 1937, and 95 settlements in 1963. During the survey, only 21 sites were observed near the pipeline, and these appear to post date 1963.

Several graves will require the pipeline to be realigned so that they remain 25m away from grave. The graves need to be clearly demarcated during construction phase.

The pipeline route is unlikely to yield any palaeontological material.

Final route realignment can be "surveyed" via a desktop assessment to determine if further fieldwork would be required.

**APPENDIX A  
SITE RECORD FORMS**







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 \*\*\* TX Report \*\*\*  
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**Amafa AkwaZulu-Natali**

**Heritage KwaZulu-Natal**

**Erfenis KwaZulu-Natal**



PO Box 2685  
 Pietermaritzburg 3200

Tel: 033 394 6543

Fax: 033 342 6097

Email: [archaeology@amafapmb.co.za](mailto:archaeology@amafapmb.co.za)

Website: [www.heritagekzn.co.za](http://www.heritagekzn.co.za)

Date: 22 August 2012

Ref: 12/08/08-03

Attention: Andrew Botha  
 AFZELIA  
 Tel: 031 303 2835  
 Fax: 086 692 2547  
 Email: [andrew@afzelia.co.za](mailto:andrew@afzelia.co.za)

Dear Andrew

**RE: PROPOSED MAKHABELENI REGIONAL WATER SUPPLY SCHEME  
 INCLUDING BULK RETICULATION AND STORAGE INFRASTRUCTURE  
 BETWEEN JAMESON'S DRIFT KWASENGE, WARD 10, UMVOTI**

We acknowledge receipt of your dBAR including HIA Report by Umlando for the above mentioned development. In terms of KwaZulu Natal Heritage Act No. 4 of 2008 and the National Heritage Resources Act No.25 of 1999 (Section 38 (1)), we have no objection to the proposed development but require that the following conditions be adhered to prior to any developments taking place:

1. A 25m buffer is required on the graves tabled on page 18 of the Umlando Heritage report.
2. No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Amafa.
3. Re- survey the densely vegetated area after vegetation clearance but before any construction activities commence. The report thereof must be submitted to Amafa for final comments.

Best regards,

*Handwritten signature*

**Amafa AkwaZulu-Natali**

**Heritage KwaZulu-Natal**

**Erfenis KwaZulu-Natal**



PO Box 2685  
Pietermaritzburg 3200

Tel: 033 394 6543

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Email: [archaeology@amafapmb.co.za](mailto:archaeology@amafapmb.co.za)

Website: [www.heritagekzn.co.za](http://www.heritagekzn.co.za)

Date: 22 August 2012

Ref: 12/08/08-03

Attention: Andrew Botha  
AFZELIA  
Tel: 031 303 2835  
Fax: 086 692 2547  
Email: [andrew@afzelia.co.za](mailto:andrew@afzelia.co.za)

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3. Re- survey the densely vegetated area after vegetation clearance but before any construction activities commence. The report thereof must be submitted to Amafa for final comments.

Best regards,

Weziwe Tshabalala  
Archaeology Permits  
For: Annie van de Venter - Radford  
(Deputy Director: Research & Professional Services)



\*\*\*\*\*  
 \*\*\* TX Report \*\*\*  
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 RESULT OK

**Amafa AkwaZulu-Natali**

**Heritage KwaZulu-Natal**

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Email: bernadep@amafapmb.co.za

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Date: 08 August 2012

Ref: 12/08/08-03

Attention: Andrew Botha  
 AFZELIA  
 Tel: 031 303 2835  
 Fax: 086 692 2547  
 Email: andrew@afzelia.co.za

Dear Andrew

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 INCLUDING BULK RETICULATION AND STORAGE INFRASTRUCTURE  
 BETWEEN JAMESON'S DRIFT KWASENGE, WARD 10, UMVOTI**

We acknowledge receipt of your Application form Needs & Desirability and R600.00 handling fee for the above mentioned development. In terms of the KwaZulu Natal Heritage Act No. 4 of 2008 and the National Heritage Resources Act No.25 of 1999 (Section 38 (1)), **a Heritage Impact Assessment is required as part of the EIA process.**

Please download a list of Amafa accredited HIA specialists on our website:  
[www.heritagekzn.co.za](http://www.heritagekzn.co.za)

Heritage Resources are protected in terms of the KwaZulu-Natal Heritage Act (No.4 of 2008)

Kind regards

Weziwe Tshabalala

**Amafa AkwaZulu-Natali**

**Heritage KwaZulu-Natal**

**Erfenis KwaZulu-Natal**



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Email: bernadetp@amafapmb.co.za

Website: www.heritagekzn.co.za

Date: 08 August 2012

Ref: 12/08/08-03

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AFZELIA  
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Fax: 086 692 2547  
Email: andrew@afzelia.co.za

Dear Andrew

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Heritage Resources are protected in terms of the KwaZulu-Natal Heritage Act (No.4 of 2008)

Kind regards

Weziwe Tshabalala  
Archaeology Permits  
For: Annie van de Venter - Radford  
(Deputy Director: Support and Professional Services)

**APPENDIX B: 1:50 000 AERIAL IMAGERY & COORDINATES**



POINT_X (DD)	POINT_Y (DD)	Point Number	X (DMS) East			Y (DMS) South		
			Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
30.89262	-28.78097	1 (Start)	30	53	33.4320	28	46	51.4920
30.89614	-28.77812	2	30	53	46.1040	28	46	41.2320
30.89496	-28.77435	3	30	53	41.8560	28	46	27.6600
30.89046	-28.77282	4	30	53	25.6560	28	46	22.1520
30.88565	-28.77162	5	30	53	8.3400	28	46	17.8320
30.88217	-28.76942	6	30	52	55.8120	28	46	9.9120
30.87833	-28.76816	7	30	52	41.9880	28	46	5.3760
30.8746	-28.76991	8	30	52	28.5600	28	46	11.8760
30.87173	-28.77364	9	30	52	18.2280	28	46	25.1040
30.86869	-28.77726	10	30	52	7.2840	28	46	38.1360
30.86566	-28.78086	11	30	51	56.3760	28	46	51.0960
30.86321	-28.78441	12	30	51	47.5560	28	47	3.8760
30.86029	-28.78274	13	30	51	37.0440	28	46	57.8640
30.85578	-28.78062	14	30	51	20.8080	28	46	50.2320
30.8511	-28.77915	15	30	51	3.9600	28	46	44.9400
30.8463	-28.78054	16	30	50	46.6800	28	46	49.9440
30.84341	-28.7839	17	30	50	36.2760	28	47	2.0400
30.84261	-28.78799	18	30	50	33.3960	28	47	16.7640
30.84143	-28.79201	19	30	50	29.1480	28	47	31.2360
30.83887	-28.79558	20	30	50	19.9320	28	47	44.0880
30.83681	-28.79953	21	30	50	12.5160	28	47	58.3080
30.83609	-28.80394	22	30	50	9.9240	28	48	14.1840
30.83941	-28.80727	23	30	50	21.8760	28	48	26.1720
30.84166	-28.81117	24	30	50	29.9760	28	48	40.2120
30.83563	-28.80773	25	30	50	8.2680	28	48	27.8280
30.83207	-28.81059	26	30	49	55.4520	28	48	38.1240
30.82915	-28.81331	27	30	49	44.9400	28	48	47.9160
30.82607	-28.81577	28	30	49	33.8520	28	48	56.7720
30.82137	-28.81628	29	30	49	16.9320	28	48	58.6080
30.81754	-28.81879	30	30	49	3.1440	28	49	7.6440
30.81299	-28.82097	31	30	48	46.7640	28	49	15.4920



**APPENDIX C: COLOURED AERIAL IMAGERY OF PROPOSED  
DEVELOPMENT SITE**