

**HERITAGE SURVEY OF THE PROPOSED
HOLLINGWOOD LOW COST HOUSING PROJECT,
PIETERMARTIZBURG, KWAZULU-NATAL**

FOR K2M ENVIRONMENTAL

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INTRODUCTION

The Msunduzi Local Municipality, initiated a process for the establishment of a subsidised housing development on several ervens. The proposed project is a “Greenfield Development” which entails the construction of approximately 1 713 subsidised housing units as well as supporting facilities such as schools, community halls etc. The total number of erven will however only be finalised during the EIR phase. The total extent of the project area is approximately 115.42Ha. The development will entail the construction of road networks and relevant services such as sanitation and water supply. The applicant, Msunduzi Local Municipality believes that the proposed development is a viable one as it will assist in addressing the housing back log within the Msunduzi Municipality. It has also been identified in the Msunduzi IDP (2014/2015-2016/2017) as an area for new housing projects. Furthermore, the proposed site has a low suitability for arable agriculture and hence no agricultural activities will be able to take place.

The proposed development site is located approximately 4km east of Pietermaritzburg. The project area is situated within a portion of Ward 35 of the Msunduzi Local Municipality, which is one of seven local municipalities making up the Umgungundlovu District Municipality of KwaZulu-Natal

The property is currently vacant; however, a portion of the property has been zoned as agricultural whilst the remainder is zoned as urban. The property will need to be rezoned to accommodate the development proposal. The aim of the development is to optimise the land for residential purposes including the provision of supporting facilities to ensure the establishment of a sustainable human settlement. The development will consist of:

- 1713 Proposed residential facilities
- 1 Proposed School
- 19 Conservation and Wetland Areas
- 7 Proposed Road Network

Figures 1 – 3 indicate the location of the proposed development.

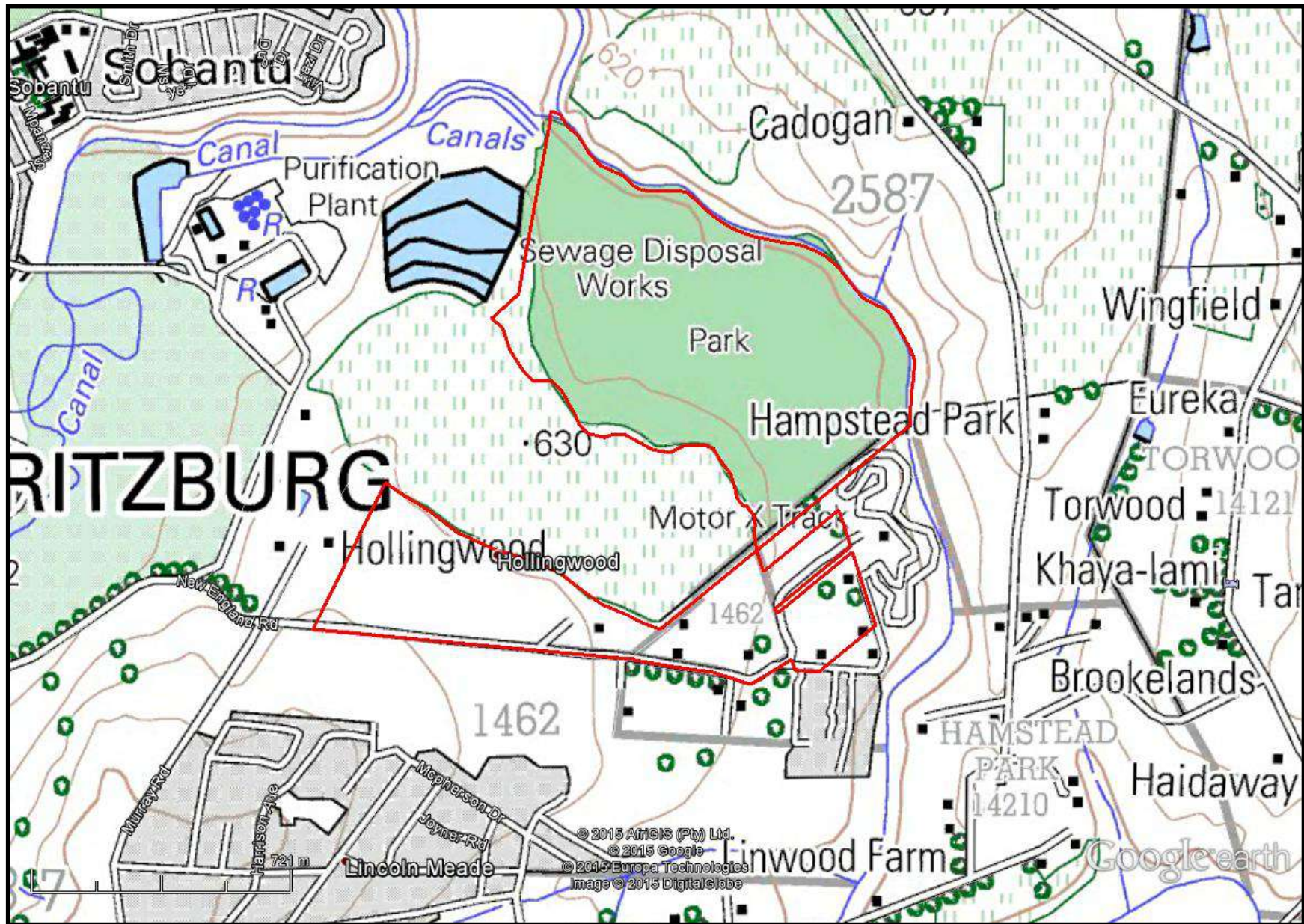
FIG. 1: GENERAL LOCATION OF THE STUDY AREA



FIG. 2: AERIAL OVERVIEW OF THE STUDY AREA



FIG. 3: TOPOGRAPHICAL OVERVIEW OF THE STUDY AREA



KWAZULU-NATAL HERITAGE ACT NO. 4 OF 2008

“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.” (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. These 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 1st and 2nd 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.

All sites are graded according to a SAHRIS rating. This rating is summarised in Table 1.

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 - C	
High / Medium Significance	Generally Protected A	3A	Site conservation or mitigation prior to development / destruction
Medium Significance	Generally Protected B	3B	Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Low Significance	Generally Protected C	3C	On-site sampling monitoring or no archaeological mitigation required prior to or during development / destruction

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. The archaeological database indicates that there are archaeological sites in the general area (fig. 4). These sites include all types of Stone Age and Iron Age sites as well as Historical Period sites. No listed buildings occur in study area. A section of the study area formed part of a previous HIA (eThembeni 2006) where they noted eight buildings. These buildings were assessed by Dr Debbie Whelan and rated in the eThembeni report (see Table 2). An HIA was undertaken for the Darvill treatment plant by Prins (2013). No archaeological sites were noted in either of these surveys.

TABLE 2: ASSESSMENT OF PREVIOUSLY RECORDED BUILDINGS¹

House number	Location	Age	Significance	Mitigation
1	29 36 32.5S 30 25 52.6E	> 60 years	Medium	Retain, restore with permit from Amafa
2	29 36 29.1S 30 25 55.8E	> 60 years	Medium	Retain, including rondavel, restore with permit from Amafa
3	29 36 30.0S 30 25 53.1E	E > 60 years	Medium	Retain, including wood and iron outbuilding, restore with permit from Amafa
4	29 36 40.7S 30 26 32.6E	< 60 years	Low	Demolish with permit from Amafa
5	29 36 40.1S 30 26 41.7E	> 60 years	High	Retain, restore with permit from Amafa
6	29 36 37.3S 30 26 32.3E	< 60 years	Low	Demolish with permit from Amafa
7	29 36 36.1S 30 26 33.3E	> 60 years	Low	Demolish with permit from Amafa
8	29 36 37.0S 30 26 23.0E	> 60 years	Medium to high	Retain, restore with permit from Amafa

¹ Orange shading occurs in the study area.

The 1937 aerial photographs indicate that there are many buildings of various sizes in the study area (fig.5). By 1968, some of these buildings had been demolished, while new ones had been built. There is a sizeable community with a school in the northern section of development. The location of these buildings and clusters of buildings is given in Table 3. By 2010 only five buildings occur in the study area.

TABLE 3: LOCATION OF BUILT STRUCTURES IN THE DESKTOP REPORT

	Name	Latitude	Longitude	Description
1937	a01	-29.609689496	30.432939595	Building
	a02	-29.607586385	30.433935205	Building
	a03	-29.610273346	30.435768595	Building
	a04	-29.610133870	30.440223631	Building
	a05	-29.611352621	30.444275380	Building
	a06	-29.609210659	30.446619926	Building
	a07	-29.608442439	30.446722941	Building
	a08	-29.607886546	30.446956637	Building
	a09	-29.609050877	30.445251201	Building
	a10	-29.607323867	30.447585764	Building
	a11	-29.607120440	30.447565431	Building
	a12	-29.606129640	30.448300022	Building
	a13	-29.606969978	30.448896160	Building
	a14	-29.608995862	30.449040721	Building
	a15	-29.609263916	30.449185693	Building
	a16	-29.609833719	30.448279976	Building
	a17	-29.609378717	30.448044199	Building
	a18	-29.608659953	30.447880924	Building
	a19	-29.608516762	30.448228115	Building
	a20	-29.608340385	30.447870639	Building
	a21	-29.607933236	30.447717795	Building
	a22	-29.609739473	30.450220550	Building
	a23	-29.610537401	30.450107005	Building
	a24	-29.610778829	30.449456718	Building
	a25	-29.610641177	30.448630719	Building
	a26	-29.605275910	30.448689730	Building
	a27	-29.603696951	30.447621282	Building
1968	b01	-29.610318518	30.440258760	several buildings
	b02	-29.610630225	30.442784422	buildings
	b03	-29.611234626	30.444886310	2 x Building
	b04	-29.609299868	30.444396712	Building
	b05	-29.610891959	30.446357519	3 x Building
	b06	-29.60998532	30.446938966	Building
	b07	-29.611248107	30.448041979	2 x Building
	b08	-29.611016792	30.449124650	2x Building
	b09	-29.608189675	30.446976370	2x Building
	b10	-29.607333475	30.448271030	Cluster Buildings
	b11	-29.608906749	30.445557102	3x Building

FIG. 4: LOCATION OF KNOWN HERITAGE SITES NEAR THE STUDY AREA

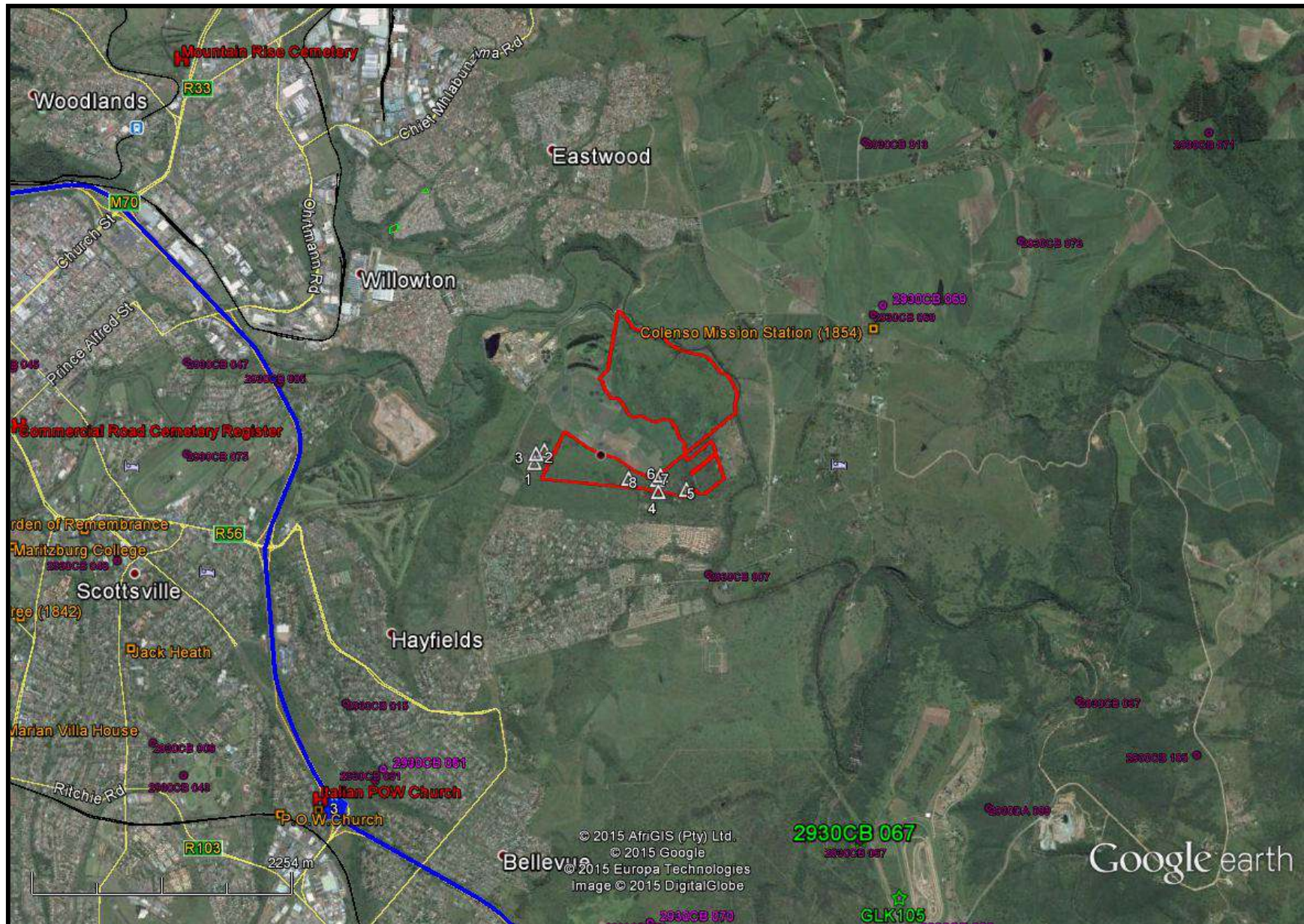
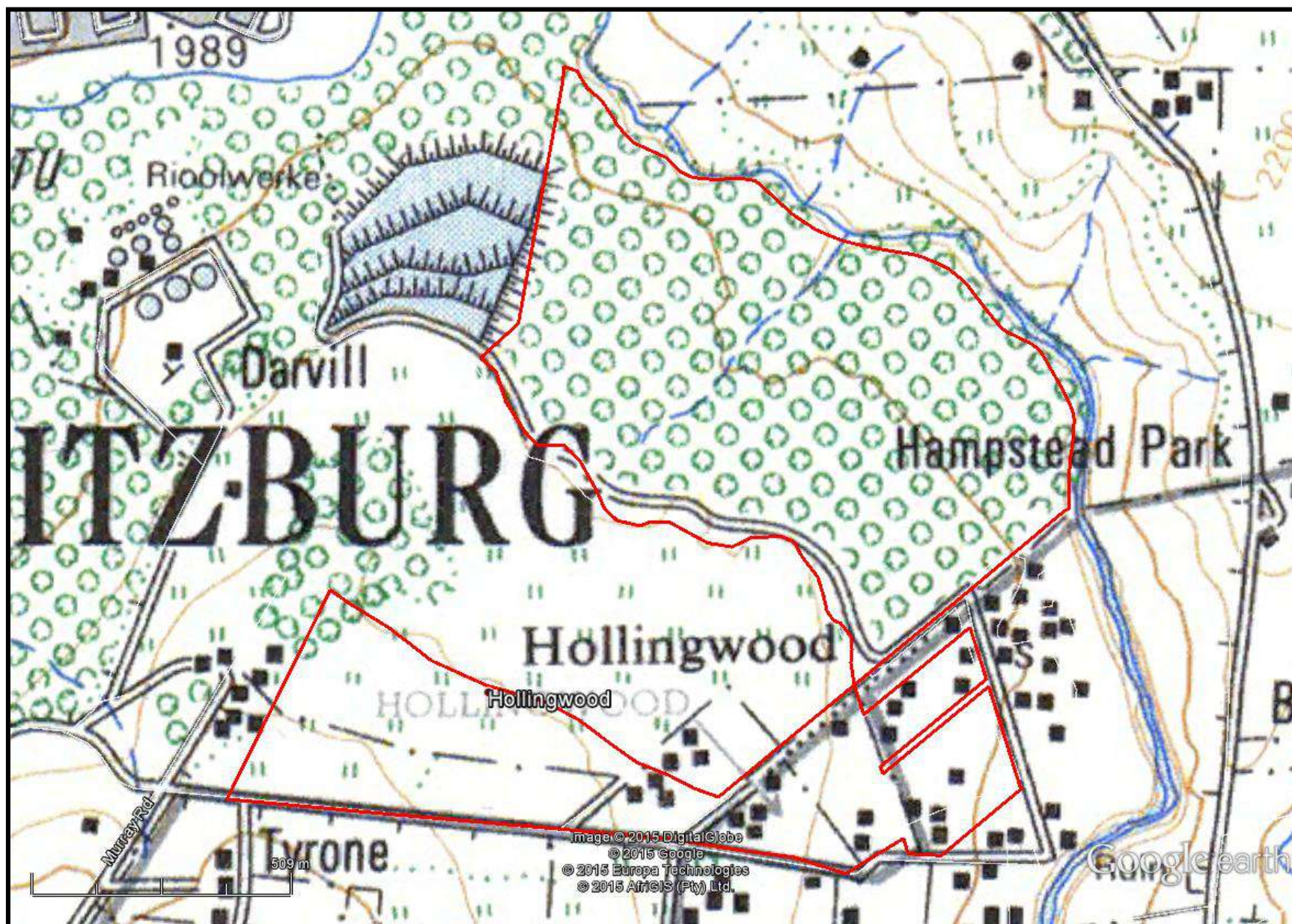


FIG. 5: STUDY AREA IN 1937



FIG. 6: STUDY AREA IN 1968



FIELD SURVEY

The field survey was undertaken in June 2015. The vegetation was dense in most areas where there was no housing, and in many instances the ruins from some of the older houses were barely visible. The northern part of the study area consists of old afforested areas that have been ploughed as well. These areas now consist of bushes and long grass, and visibility was poor.

Figure 7 shows some of the views of the study area. Table 4 gives the location and description of the sites while Fig.8 shows the location of these sites.

TABLE 4: LOCATION OF RECORDED SITES

NAME	LATITUDE	LONGITUDE	PREVIOUS NAMES ²	DESCRIPTION
HOL1	-29.611129178	30.442488522	b2, e4	Building
HOL2	-29.611221090	30.444698007	a5, b2, e5	Building
HOL3	-29.608421353	30.431812739	e2	Outside study area
HOL4	-29.610232654	30.440040069	a4, b1, e8	Building
HOL5	-29.610155565	30.442631366	b2, e7	Building
HOL6	-29.610525170	30.442251031	b2, e6	Building
HOL7	-29.610885959	30.449081976		Informal Cemetery
HOL8	-29.611272885	30.441019008	a22	Building
HOL09	-29.610256	30.435828	a3	Building, on border

The survey including informal conversations with people at HOL2 and HOL7. These people noted that there has been an informal settlement in this area for many years. They were moved out of the area in the 1970s-1980s, but several have returned (no one was sure of the exact date of removals). This would be supported by the 1937 aerial photographs and 1968 topographical map that show a high density of houses/structures in the eastern area around the motocross field. The large informal cemetery at HOL7 is further support.

² a = 1937, b = 1968, e = eThembeni reference

FIG. 7: GENERAL VIEWS OF THE STUDY AREA



FIG. 8: LOCATION OF RECORDED SITES



HOL1

HOL1 is a house with additional buildings next to the New England Road (fig. 9). The house post dates 1968 and is thus not protected by heritage legislation.

Significance: The building was given low architectural significance.

Mitigation: No mitigation is required.

SAHRA Rating: 3c

HOL2

HOL2 is located near the end of the New England Road (fig. 10). "It was constructed by Thomas Phipson in 1854 and he and his family lived there until his death in 1876 (Currey 1968). Phipson and his family immigrated to South Africa from Britain in 1849 and became prominent local citizens during the establishment of Pietermaritzburg (Currey 1968, Gordon 1981). Phipson Lane and Phipson Road in Scottsville are named for them. Thomas Phipson worked for the Natal Witness and served as the sheriff of Natal. The shale house is one of the oldest remaining residential structures in Pietermaritzburg, and therefore KwaZulu-Natal, with consequent high significance due to its historical, aesthetic, scientific and social values, rarity and representivity. Its conservation and future use should be managed accordingly" (eThembeni 2006). Phipson eventually hung himself on 29 October 1876 at the Pietermaritzburg Gaol that was also serving as an asylum (Parle 2004).

Significance: The house was rated as having high significance.

Mitigation: The building may not be damaged in any manner and it should be restored. Amafa Built Environment should contact Umsunduzi Municipality about the upkeep of this building. The house would also fall under Historical Archaeology and some areas would require excavations, especially around the older middens.

SAHRA Rating: 2

FIG. 9: BUILDINGS AT HOL1



FIG. 10: PHIPSON HOUSE



HOL3

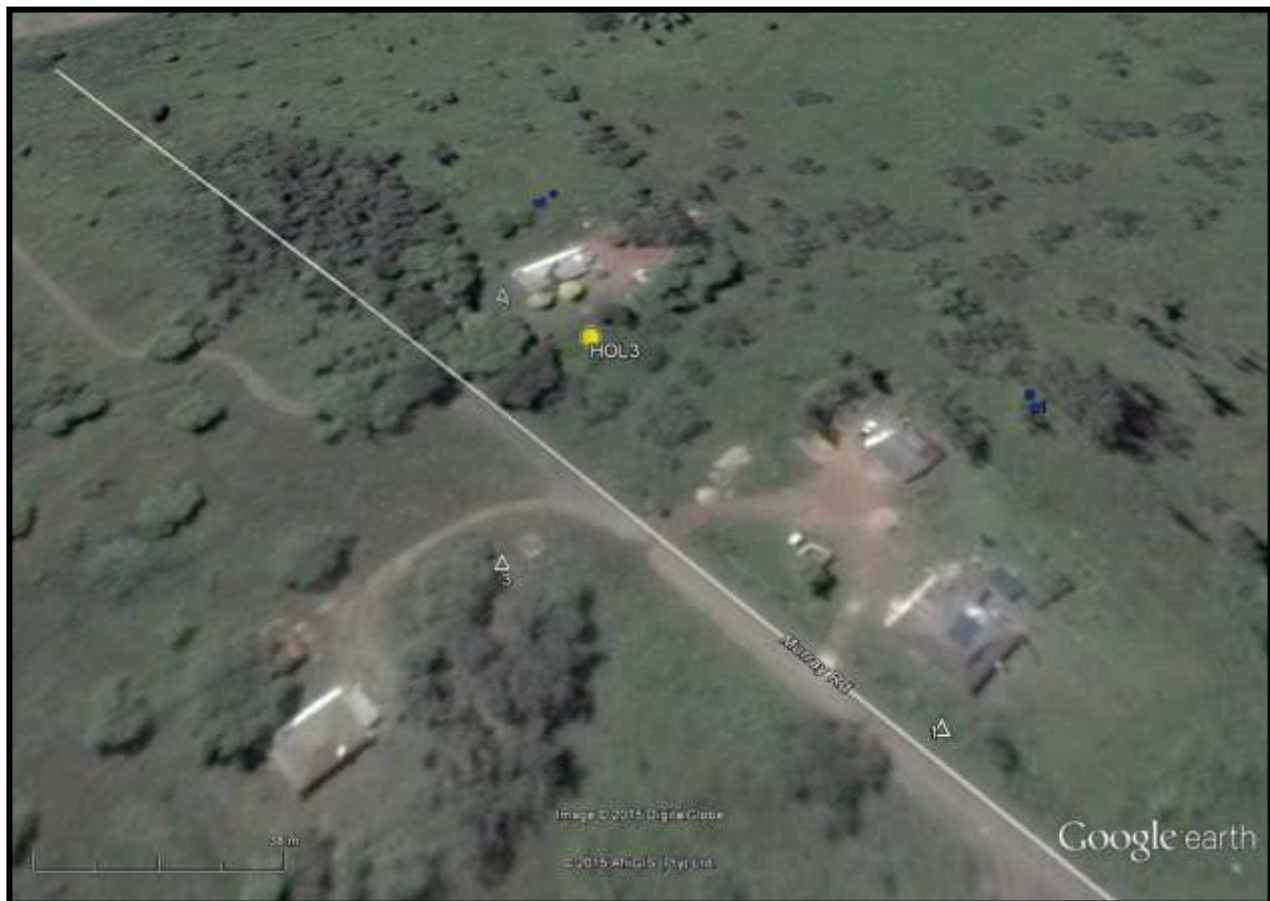
HOL3 is located just outside the border of the study area. The site consists of three houses that pre-date 1937 (fig. 11). These houses were sites 1 – 3 in eThembeni's report. They are noted in this report as they are within the buffer zone of the development.

Significance: The houses 1 – 3 were given a rating of low, high and medium significance respectively.

Mitigation: House 1 may be demolished; however houses 2 and 3 need to be retained.

SAHRA Rating: 3c, 2 and 2

FIG. 11: AERIAL VIEW OF HOL3 CLUSTER



HOL4

HOL4 occurs ~100m north of the New England Road (fig. 12). The site consists of a main building with several additions as well as outbuildings that are obscured by vegetation. The main house predates 1937.

Significance: The site was rated as having medium-high significance.

Mitigation: The buildings are to be retained and not damaged.

SAHRA Rating: 2

FIG. 12: BUILDING AT HOL4



HOL5

HOL5 is located ~200m northeast off the New England Road. HOL5 predates 1968, but post-dates 1937. The site is a house with a few outer buildings. Figure 13 shows the house.

Significance: The site was rated as having low significance.

Mitigation: No mitigation is required. A permit for its destruction will be required from Amafa KZN.

SAHRA Rating: 3C

HOL6

HOL6 is located ~150m northeast off the New England Road. HOL6 predates 1968, but post-dates 1937. The site is a house with a few outer buildings. Figure 14 shows the house.

Significance: The site was rated as having low significance.

Mitigation: No mitigation is required. A permit for its destruction will be required from Amafa KZN.

SAHRA Rating: 3C

FIG. 13: HOUSE AT HOL5



FIG. 14: HOUSE AT HOL6



HOL7

HOL7 is a large informal cemetery that occurs just outside the study area. It is noted because of its proximity to the development. Mrs E. Mbanjwa showed me the location of the cemetery and stated that it is very old, possibly relating to the first labourers who lived in the area. Mrs E. Mbanjwa told me that she goes back at least two generations in this area. The extent is ~200m x 75m in size. This was confirmed by the occupants at HOL2. The 1937 aerial photographs clearly show small structures in this area, and thus some of the graves might pre-date 1937. The extent of the cemetery is shown in fig. 15, while fig. 16 shows some of the graves. The graves are mostly unmarked and do not have headstones. Some of the graves have cairns of (Coronation) bricks, and one has plants.

This is an unrecorded cemetery and has already been affected by the motocross track that has been partially placed over some of the graves. The municipality should be made aware that people were moved off this land and relocated post 1970s.

Significance: The site is of high significance.

Mitigation: A full social impact assessment will be required if any of these graves are to be affected. This is a process that can take over six months to complete. If the development were to affect the cemetery then the human remains would need to be exhumed. This will be an expensive process, as the graves are not clearly demarcated and the boundaries are not known. A qualified archaeologist would need to manage the process, as these remains are older than 60 years. A permit from Amafa KZN will be required to affect any part of this area.

SAHRA Rating: 3A

FIG. 15: ESTEMITAED EXTENT OF CEMETERY AT HOL7



FIG. 16: CEMETERY AT HOL7



HOL8

HOL8 is located on the border of the study area. Figure 17 shows the house. The house predates 1937 and is thus protected by the heritage legislation. This house was not assessed in 2006 as it was probably outside of the study area. The site falls within the buffer zone of the proposed development. It is probably a general dealer's store.

Significance: To be assessed by a qualified architect historian.

Mitigation: Pending assessment

SAHRA Rating: Pending assessment

FIG. 17: BUILDING AT HOL8



HOL9

HOL9 is located 40m from the New England Road. The site consists of the ruins of a house that pre-date 1937. The house relates to site a3 in the desktop. The house was demolished by 1968. The vegetation was too dense to make a proper assessment, however most of the building has been destroyed. The middens around the house might have historical archaeological value, depending on when the house was first built. This would require further investigation.

Significance: The site is of low significance

Mitigation: No mitigation required for the building as it is already destroyed. The site should be re-assessed after vegetation clearance for possible historical middens (i.e. 19th century middens).

SAHRA Rating: 3b

FIG. 18: RUINS AT HOL9



HOL10

HOL10 is located ~50m from the New England Road and probably relates to site b5 from the desktop study. The site consists of the foundations of a house, the remains of a water holder and walling, and three circular floors. There are (teacup or plate) ceramics on the floor, with other post 1970s artefacts.

Significance: The site is of low significance

Mitigation: No mitigation required for the building as it is already destroyed. The site should be re-assessed after vegetation clearance for possible historical middens (i.e. 19th century middens).

SAHRA Rating: 3b

GENERAL COMMENT

There are around Pietermaritzburg is noted for have Early, Middle and Late Stone Age artefacts, as well as Early and Late Iron Age artefacts. I only noted one Late Stone Age flake on banded agate during the survey. While this is probably a result of poor visibility, it is also highly unlikely that any in situ sites remain due to the various activities that have occurred within the study area.

PALAEONTOLOGY

A desktop PIA was undertaken (see Appendix A) as this area was given moderate sensitivity. Dr Groenewald states “significant trace fossils have been described from the Dwyka Formation and that there are also trace fossils present in the shale of the upper Pietermaritzburg Formation.

All sections of the development where trenching for infrastructure will be deeper than 1,5m, the trenches must be inspected and if fossils are recorded, a professional Palaeontologist must be appointed to record and collect the fossils according to SAHRA and AMAFA specifications as part of a Phase 1 Palaeontological Impact Assessment.

FIG. 19: RUINS AT HOL10



MANAGEMENT PLAN

Much of the study area has been under some form of agriculture for over 100 years and these areas are very disturbed and have little heritage significance. This tends to occur in the northern and southwestern parts of the study area. There are however several buildings that have medium to high architectural significance that should not be affected in any manner. These buildings are: HOL2, HOL3, HOL4. HOL2 is rated as having such high significance that it was suggested that the building needs to be restored. This is an issue between Amafa KZN and Umsunduzi Municipality. I do need to note that the owner of the land is responsible for the upkeep of historically significant houses. If these buildings are not allowed to be destroyed for the low cost housing project, then they would need to be incorporated into it, and this will need approval from Amafa KZN. The full effect of low cost housing around these houses has not been established and should also be considered. The report by eThembeni (2006) gave a brief assessment of the architecture of these buildings. While the assessment was undertaken by Debbie Whelan Amafa might require a further in depth assessment for these houses as the requirements for assessments have changed since 2006. A 50m sensitivity radius should be placed around the edge of HOL2 for these middens. And alteration to these buildings would also require a permit from Amafa KZN.

The ruined structures require no further assessments; however they may yield historical middens. If the development is to continue, then I suggest that some areas such as HOL9 are revisited after bush clearance to determine if 19th century historical middens occur. Similarly any historical middens exposed during development would need to be reported to Amafa KZN. This would be especially the case for middens around HOL2.

The cemetery at HOL7 should be considered a red flag. The area is large and the boundaries of the cemetery are unclear. This would be a very costly exercise to undertake. In addition to that the remains would need to be relocated to

another cemetery, and if one does not exist, and then a new one will need to be made. This in itself will trigger another EIA. I am concerned that the motocross track is on some of the graves, according to the informant. This is an issue for Amafa KZN to resolve and is not of direct relevance to this project.

Any excavations that are more than 1.5m deep are likely to expose palaeontological layers. The project will require a palaeontologist to be on site to inspect these excavations for fossils. These depths need to be determined before construction occurs as a permit from Amafa KZN is required for disturbing palaeontological sites.

CONCLUSION

A heritage survey was undertaken for the proposed Hollingwood low cost housing project, in Pietermaritzburg. Ten heritage sites were noted during the survey and these consisted mostly of houses dating from the 1850s to the 1970s. Three of these houses are red flags and should not be damaged by the proposed development. A large cemetery possible predating 1937 was recorded as well and was regarded as a red flag.

The Umsunduzi Municipality will need to apply to Amafa KZN for a permit to damage any of the buildings and/or ruins identified in this report.

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APPENDIX A
PIA DESKTOP REPORT

**DESKTOP PALAEONTOLOGICAL
ASSESSMENT FOR THE PROPOSED
HOLLINGWOOD LOW COST HOUSING
DEVELOPMENT, MSUNDUZI
MUNICIPALITY, KWAZULU-NATAL
PROVINCE.**

**FOR
Umlando**

DATE: 25 June 2015

By

**Gideon Groenewald
Cell: 078 713 6377**

EXECUTIVE SUMMARY

Gideon Groenewald was appointed to undertake a desktop survey, assessing the potential palaeontological impact of the proposed Hollingwood Low Cost Housing Development near Pietermaritzburg, Msunduzi Municipality, KwaZulu-Natal.

The study area is underlain by sedimentary rocks of the Carboniferous to Permian-aged Dwyka and Permian-aged Pietermaritzburg formations. Invertebrate, plant and trace fossils are known from the Dwyka Formation and trace fossils have been reported from the Pietermaritzburg Formation.

As a result, the study area has been allocated a Moderate sensitivity.

Recommendations:

1. The EAP and ECO of the project must be informed of the fact that significant trace fossils have been described from the Dwyka Formation and that there are also trace fossils present in the shale of the upper Pietermaritzburg Formation..
2. All sections of the development where trenching for infrastructure will be deeper than 1,5m, the trenches must be inspected and if fossils are recorded, a professional Palaeontologist must be appointed to record and collect the fossils according to SAHRA and AMAFA specifications as part of a Phase 1 Palaeontological Impact Assessment.

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INTRODUCTION

Gideon Groenewald was appointed to undertake a desktop survey, assessing the potential palaeontological impact of the proposed Hollingwood Low Cost Housing Development near Pietermaritzburg, Msunduzi Municipality, KwaZulu-Natal (Figure 1).

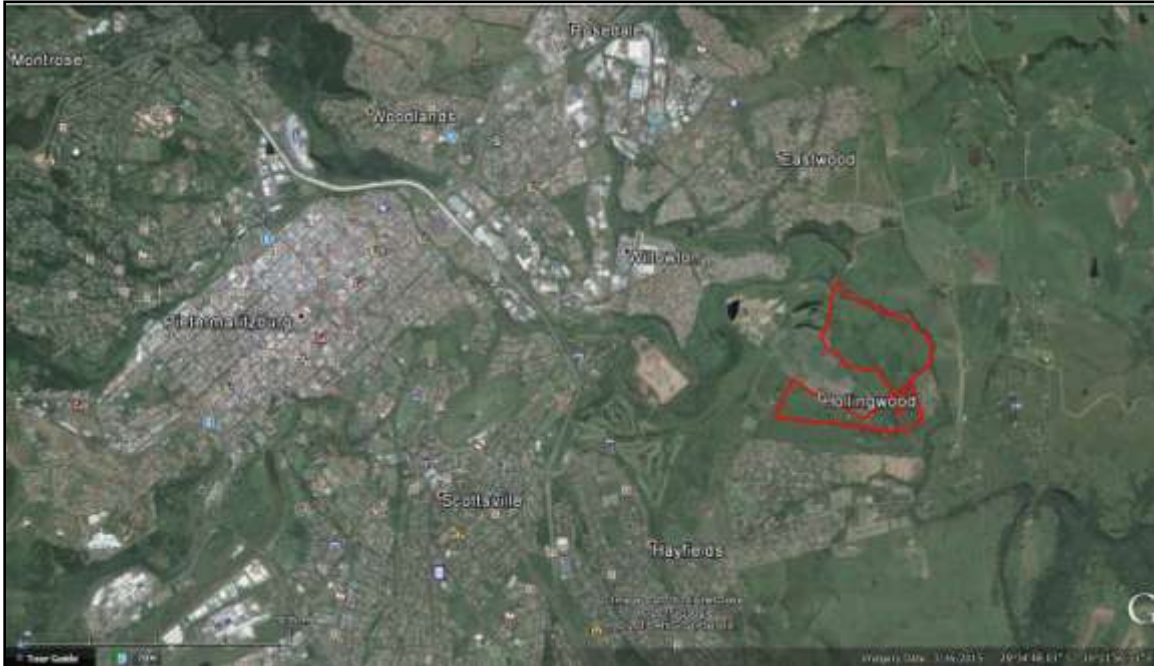


Figure 1 Aerial view of the Hollingwood study area (Outlined in Red).

SOUTH AFRICAN NATIONAL HERITAGE RESOURCE ACT NO 25/1999 AND KWAZULU-NATAL HERITAGE ACT NO 4/2008

This Palaeontological Assessment forms part of the Heritage Impact Assessment (HIA) and complies with the requirements of the South African National Heritage Resource Act No 25 of 1999 as well as the KwaZulu-Natal Heritage Act No 4 of 2008. In accordance with Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint.

Categories of heritage resources recognised as part of the National Estate in Section 3 of the Heritage Resources Act, and which therefore fall under its protection, include:

- geological sites of scientific or cultural importance;

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

METHODOLOGY

Following the "SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports" the aims of the palaeontological impact assessment are:

- to identify exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assess the level of palaeontological significance of these formations;
- to comment on the impact of the development on these exposed and/or potential fossil resources and
- to make recommendations as to how the developer should conserve or mitigate damage to these resources.

In preparing a palaeontological desktop study the potential fossiliferous rock units (groups, formations etc) represented within the study area are determined from geological maps and Google Earth imagery. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region and the author's field experience.

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1 below.

Table 1 Palaeontological sensitivity analysis outcome classification

PALAEONTOLOGICAL SIGNIFICANCE/VULNERABILITY OF ROCK UNITS	
The following colour scheme is proposed for the indication of palaeontological sensitivity classes. This classification of sensitivity is adapted from that of Almond et al 2008.	
RED	Very High Palaeontological sensitivity/vulnerability. Development will most likely have a very significant impact on the Palaeontological Heritage of the region. Very high possibility that significant fossil assemblages will be present in all outcrops of the unit. Appointment of professional palaeontologist, desktop survey, phase I Palaeontological Impact Assessment (PIA) (field survey and recording of fossils) and phase II PIA (rescue of fossils during construction) as well as application for collection and destruction permit compulsory.
ORANGE	High Palaeontological sensitivity/vulnerability. High possibility that significant fossil assemblages will be present in most of the outcrop areas of the unit. Fossils most likely to occur in associated sediments or underlying units, for example in the areas underlain by Transvaal Supergroup dolomite where Cenozoic cave deposits are likely to occur. Appointment of professional palaeontologist, desktop survey and phase I Palaeontological Impact Assessment (field survey and collection of fossils) compulsory. Early application for collection permit recommended. Highly likely that a Phase II PIA will be applicable during the construction phase of projects.
GREEN	Moderate Palaeontological sensitivity/vulnerability. High possibility that fossils will be present in the outcrop areas of the unit or in associated sediments that underlie the unit. For example areas underlain by the Gordonia Formation or undifferentiated soils and alluvium. Fossils described in the literature are visible with the naked eye and development can have a significant impact on the Palaeontological Heritage of the area. Recording of fossils will contribute significantly to the present knowledge of the development of life in the geological record of the region. Appointment of a professional palaeontologist, desktop survey and phase I PIA (ground proofing of desktop survey) recommended.
BLUE	Low Palaeontological sensitivity/vulnerability. Low possibility that fossils that are described in the literature will be visible to the naked eye or be recognized as fossils by untrained persons. Fossils of for example small domal Stromatolites as well as micro-bacteria are associated with these rock units. Fossils of micro-bacteria are extremely important for our understanding of the development of Life, but are only visible under large magnification. Recording of the fossils will contribute significantly to the present knowledge and understanding of the development of Life in the region. Where geological units are allocated a blue colour of significance, and the geological unit is surrounded by highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on

	significant palaeontological finds that might occur in the unit that is allocated a blue colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in larger alluvium deposits. Collection of a representative sample of potential fossiliferous material is recommended.
GREY	Very Low Palaeontological sensitivity/vulnerability. Very low possibility that significant fossils will be present in the bedrock of these geological units. The rock units are associated with intrusive igneous activities and no life would have been possible during emplacement of the rocks. It is however essential to note that the geological units mapped out on the geological maps are invariably overlain by Cenozoic aged sediments that might contain significant fossil assemblages and archaeological material. Examples of significant finds occur in areas underlain by granite, just to the west of Hoedspruit in the Limpopo Province, where significant assemblages of fossils and clay-pot fragments are associated with large termite mounds. Where geological units are allocated a grey colour of significance, and the geological unit is surrounded by very high and highly significant geological units (red or orange coloured units), a palaeontologist must be appointed to do a desktop survey and to make professional recommendations on the impact of development on significant palaeontological finds that might occur in the unit that is allocated a grey colour. An example of this scenario will be where the scale of mapping on the 1:250 000 scale maps excludes small outcrops of highly significant sedimentary rock units occurring in dolerite sill outcrops. It is important that the report should also refer to archaeological reports and possible descriptions of palaeontological finds in Cenozoic aged surface deposits.

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a field-based assessment by a professional palaeontologist is usually warranted.

The key assumption for this desktop study is that the existing geological maps and datasets used to assess site sensitivity are correct and reliable. However, the geological maps used were not intended for fine scale planning work and are largely based on aerial photographs alone, without ground-truthing.

These factors may have a major influence on the assessment of the fossil heritage significance of a given development and, without supporting field assessments, may lead to either:

- an underestimation of the palaeontological significance of a given study area due to ignorance of significant recorded or unrecorded fossils preserved there, or
- an overestimation of the palaeontological sensitivity of a study area, for example when originally rich fossil assemblages inferred from geological maps have in fact been destroyed by weathering, or are buried beneath a thick mantle of unfossiliferous “drift” (soil, alluvium etc).

GEOLOGY

The study area is underlain by Carboniferous to Permian-aged rocks of the Dwyka Formation, Karoo Supergroup and Permian-aged rocks of the Pietermaritzburg Formation of the Ecca Group, Karoo Supergroup (Figure 2).

Dwyka Formation (C-Pd)

The Carboniferous to Permian aged Dwyka Formation consists mainly of poorly sorted tillites. These rocks overly the Natal Group and comprise a thick unit of tillite that was deposited in a glacial environment by retreating ice sheets about 300 million years ago.

At this time South Africa was part of the supercontinent Gondwana, which was situated near the South Pole and covered with ice. Rocks imbedded in the slowly moving ice sheets scoured and polished the underlying older rocks giving rise to glacial pavements. Striation directions indicate that ice flow was from north to south - valuable information when it comes to reconstructing Gondwana.

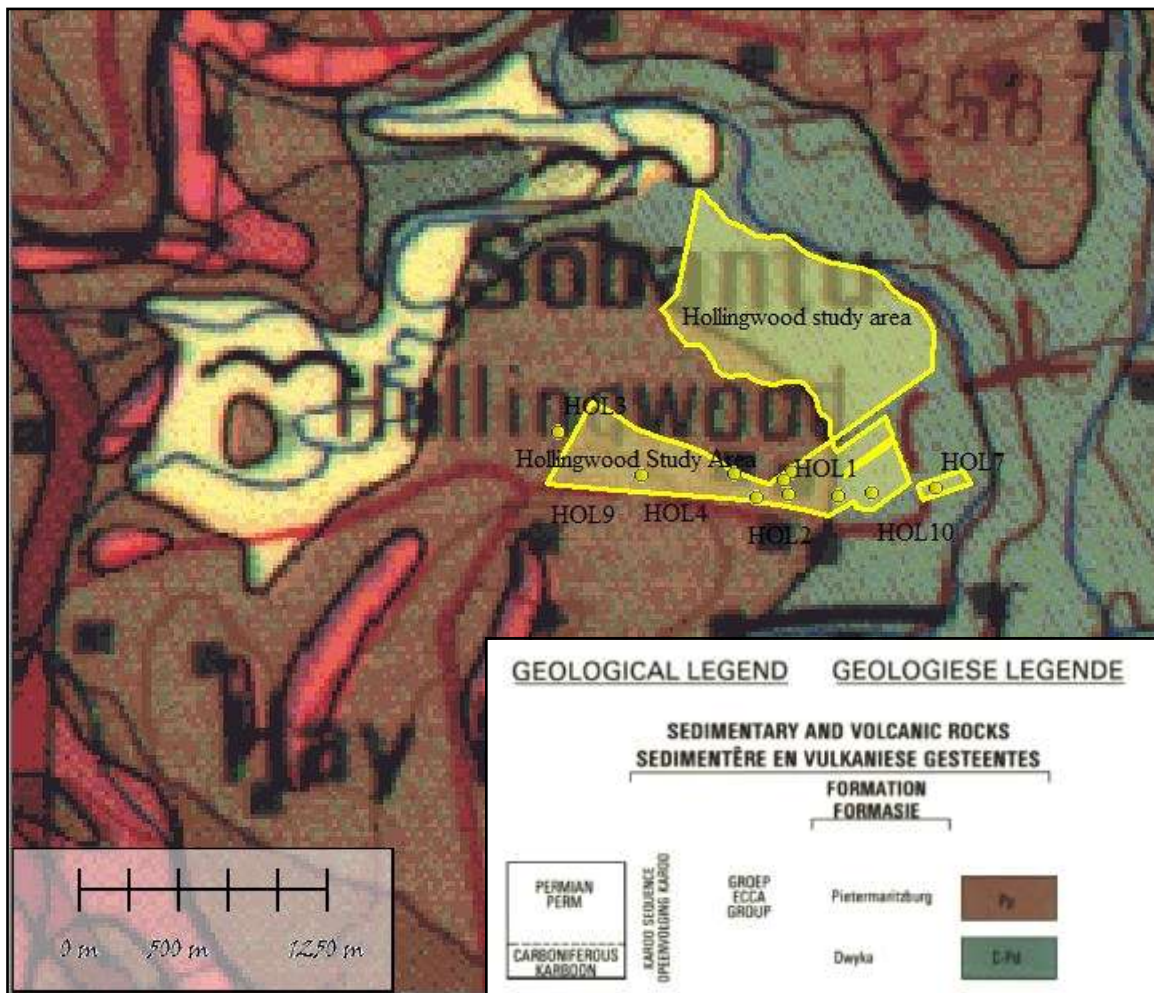


Figure 2 Geology of the study area.

Pietermaritzburg Formation (Pp)

As Gondwana moved north towards the equator, thick clay and silt beds were laid down in a large sea that occupied the Karoo Basin, leading to the deposition of the Eccca Group. These sediments, deposited in deep water, now form the shales of the Pietermaritzburg Formation. The shales are easily weathered and often present slope stability problems.

PALAEONTOLOGY

Dwyka Formation (C-Pd)

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

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

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

Pietermaritzburg Formation (Pp)

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

DISCUSSION

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews. Significant fossils have been recorded from the Dwyka Formation and the recording of trace fossils and other fossils from this part of the Karoo Basin will contribute significantly to our understanding of the palaeo-environments that existed during the Permian. No significant fossils are expected from the Pietermaritzburg Formation.

MANAGEMENT PLAN

The likely impact of the proposed development on local fossil heritage is determined on the basis of the palaeontological sensitivity of the rock units concerned and the nature and scale of the development itself, most notably the extent of unweathered bedrock excavation envisaged. The different sensitivity classes used are explained in Table 1.

The palaeontological sensitivity of the development is related to the specific geology that underlies the development footprints. For the sake of this desktop survey it is assumed that there are significant outcrops on site, and that trenching of up to 2m depth will in fact expose bedrock of all the geological formations recorded in the desktop survey. Due to the fact that the recording of fossils will have a significant impact on our understanding of the palaeo-environments in this part of the basin, a Moderate Palaeontological sensitivity is allocated to the study area.

The palaeontological sensitivity of the study area is shown in Figure 3.



Figure 3. A Moderate Palaeosensitivity is allocated to the development site. For colour coding see Table 1

CONCLUSION AND RECOMMENDATIONS

The study area is underlain by sedimentary rocks of the Carboniferous to Permian-aged Dwyka and Permian-aged Pietermaritzburg formations.

Invertebrate, plant and trace fossils are known from the Dwyka Formation and trace fossils have been reported from the Pietermaritzburg Formation.

As a result, the study area has been allocated a Moderate sensitivity.

Recommendations:

1. The EAP and ECO of the project must be informed of the fact that significant trace fossils have been described from the Dwyka Formation and that there are also trace fossils present in the shale of the upper Pietermaritzburg Formation.
2. All sections of the development where trenching for infrastructure will be deeper than 1,5m, the trenches must be inspected and if fossils are recorded, a professional Palaeontologist must be appointed to record and collect the fossils according to SAHRA and AMAFA specifications as part of a Phase 1 Palaeontological Impact Assessment.

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QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Dr Gideon Groenewald has a PhD in Geology from the University of Port Elizabeth (Nelson Mandela Metropolitan University) (1996) and the National Diploma in Nature Conservation from Technicon RSA (the University of South Africa) (1989). He specialises in research on South African Permian and Triassic sedimentology and macrofossils with an interest in biostratigraphy, and palaeo-ecological 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