HERITAGE SURVEY OF PROPOSED BEACHWOOD RESORT AND ESTATE DEVELOPMENT, ETHEKWINI MUNICIPALITY, KWAZULU-NATAL

FOR TRIPLO4 SUSTAINABLE SOLUTIONS (PTY) LTD

DATE: 8 MARCH 2018

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Abbreviations

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

INTRODUCTION

Durban Country Club Trust has proposed a development that comprises a resort and an estate situated in Virginia on the existing Beachwood Golf Course within the eThekwini Municipality.

Umlando was appointed by Triplo4 Sustainable Solutions to undertake an HIA for the proposed Beachwood Resort and Estate Development. This report deals with the Heritage Impact Assessment for the development footprint.

The development is located in Durban North just south of Virginia Airport. Figures 1 – 4 show the location of the development.

Subsequent to the survey the client indicated that they wish to expand the study area to include the previous EIA study area. The previous environmental consultant had commissioned a series of specialist studies to assess the potential impact of the proposed development on the protected area as a sensitive receiving area located approximately 300m to the south of the proposed site. These specialist studies have included assessment of the vegetation, wetlands, mangroves, dunes and beaches on or in close proximity to the proposed site. The results of these specialist studies have shown that it is highly improbable that the proposed development will have any direct or indirect detrimental impacts on the Beachwood Mangroves Nature Reserve, or the dunes and beaches east of the proposed site. For this reason, the project has been exempted from the need to conduct a Heritage Impact Assessment for the western side of the development. This was approved by Amafa KZN (see MER 2014).

HISTORY OF THE BEACHWOOD CLUB

"Durban Country Club was officially opened on December 9, 1922. All earth-moving had to be done manually. Giant sand dunes were flattened, dense bush and trees chopped down and carted away (http://www.durbancountryclub.co.za/home/golf/durban-country-club/history-heritage-and-traditions/). The area was revamped in the early 1990s. Several high ranking tournaments have been played at the gold club over the years.

To the south of the club is the Beachwood Mangrove Nature Reserve that was proclaimed a National Monument in 1977 (http://www.kznwildlife.com/beachwood-mangrove-overview.html).

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.

FIG. 1 GENERAL LOCATION OF THE STUDY AREA

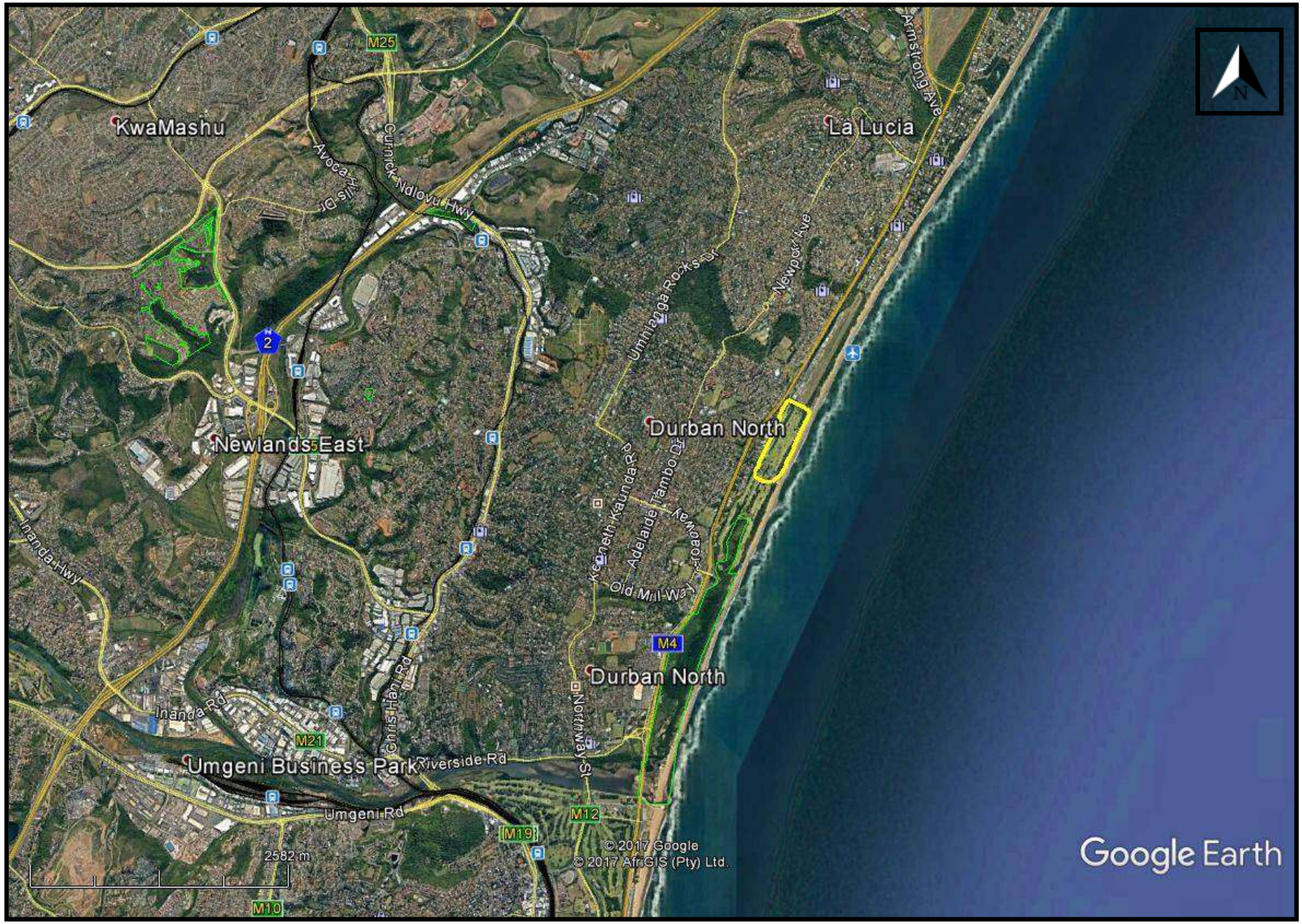


FIG. 2: AERIAL OVERVIEW OF THE STUDY AREA

FIG. 3: TOPOGRAPHICAL OVERVIEW OF THE STUDY AREA

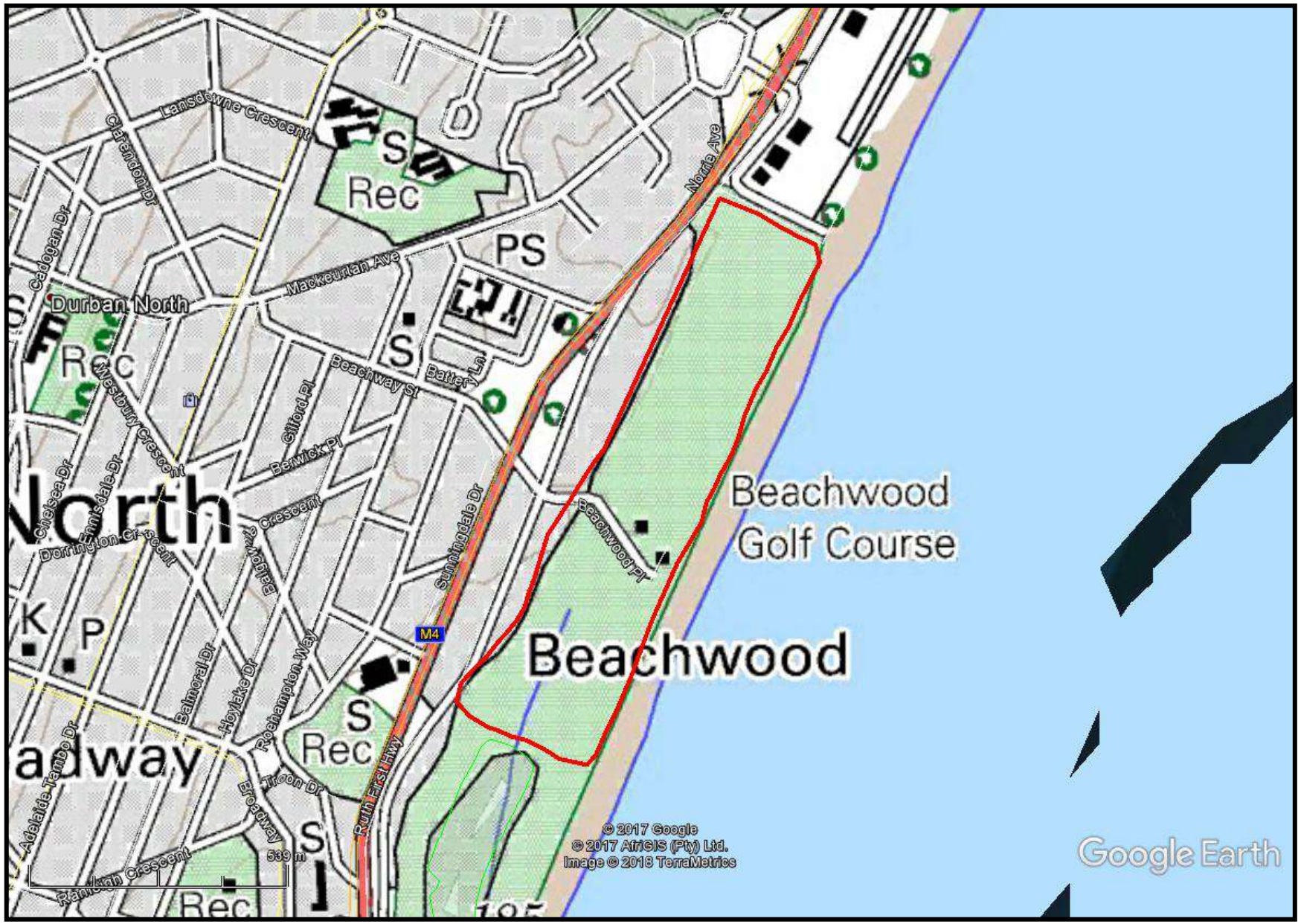


FIG. 4: SCENIC VIEWS OF THE STUDY AREA

- 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.

The above significance ratings allow one to grade the site according to SAHRA's grading scale. This is summarised in Table 1.

TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES

SITE	FIELD	GRADE	RECOMMENDED

SIGNIFICANCE	RATING		MITIGATION
High Significance	National Significance	Grade 1	Site conservation / Site development
High Significance	Provincial Significance	Grade 2	Site conservation / Site development
High Significance	Local Significance	Grade 3A / 3B	
High / Medium Significance	Generally Protected A		Site conservation or mitigation prior to development / destruction
Medium Significance	Generally Protected B		Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Low Significance	Generally Protected C		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 coastline and fist 500m is of very high archaeological sensitivity. These area tend to have a high concentration of shell middens mostly dating to the last 4000 years. The sensitivity increases dramatically in areas where there are rock outcrops on the shoreline.

The archaeological database indicates that there are heritage sites in the general area (fig. 5). Most of the heritage sites are listed buildings. One general area was reported to have Late Stone Age and Late Iron Age artefacts. This site (2931CC 021) occurs at the southern part of Virginia Airport. This also suggests that sites should occur to the north and south.

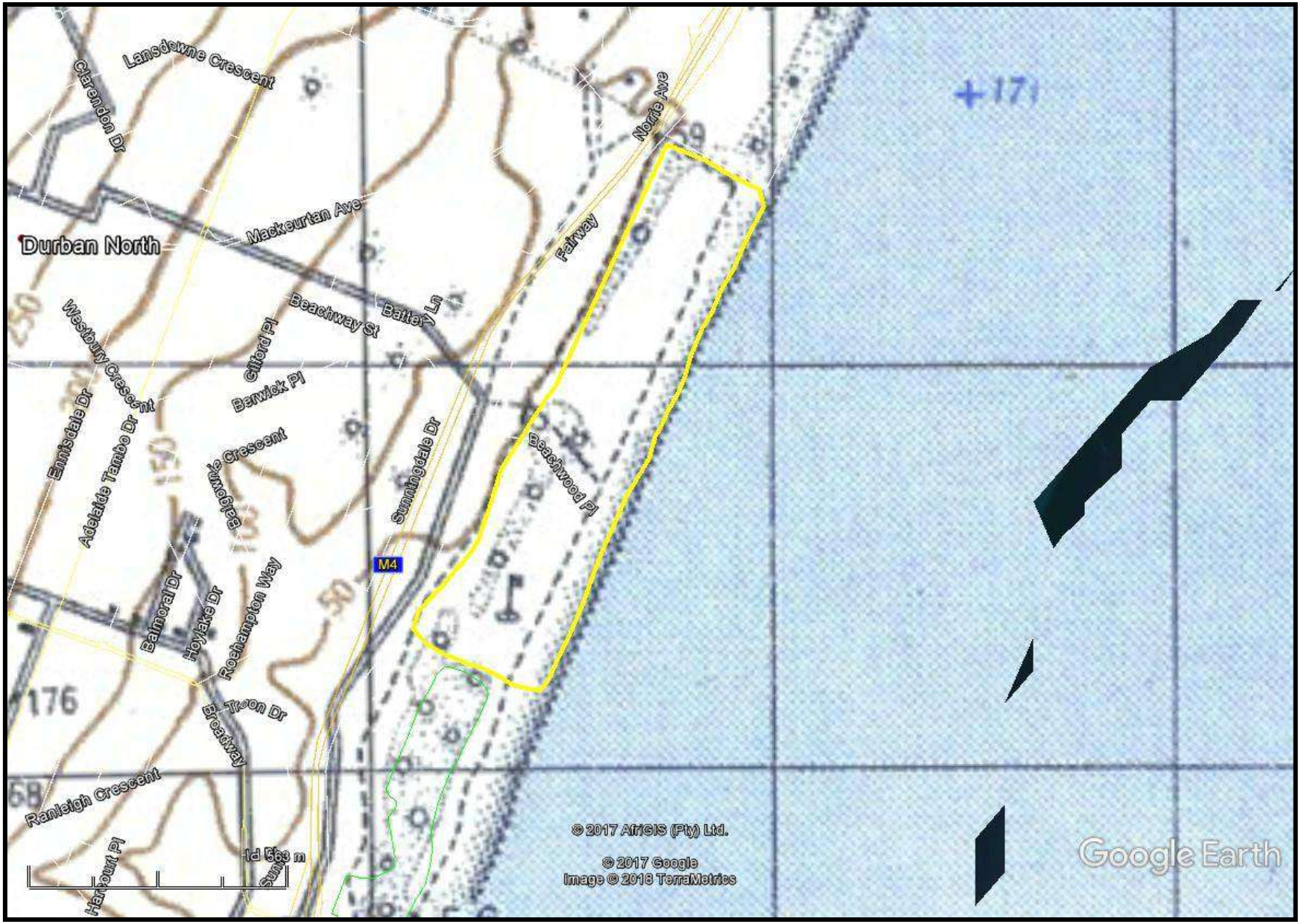
No national monuments, battlefields, or historical cemeteries are known to occur in the study area.

The 1937 aerial photographs (fig. 6) indicates the golf course in the study area as does the 1940 1:50 000 topographical map (fig. 7). What the two maps indicate is that there has been a significant amount of earthmoving within the study area. This in turn has probably destroyed heritage sites that could have occurred.

FIG. 5: LOCATION OF KNOWN HERITAGE SITES NEAR THE STUDY AREA

FIG. 6: STUDY AREA IN 1937

FIG. 7: STUDY AREA IN 1942



FIELD SURVEY

The field survey was undertaken on 25 November 2017. Due to the nature of a golf course, there was very little ground visibility. I surveyed the edges along the vegetation corridors for potential archaeological sites. In addition to this, I surveyed the beach side of the dunes, and small inland tracks for potential shell middens.

No heritage sites were observed in the study area nor along the dune cordon. This is probably a result of the original construction of the golf estate.

If shell middens, i.e. layers of marine shell, are uncovered during construction activity, then this needs to be reported to the Environmental Compliance Officer (ECO), who will then inform a qualified archaeologist. This can be undertaken with a photograph.

PALAEONTOLOGICAL IMPACT ASSESSMENT

Dr Gideon Groenewald undertook a desktop PIA survey of the study area (appendix A). Most of the study area is of low palaeontological significance; however the western section is of high significance.

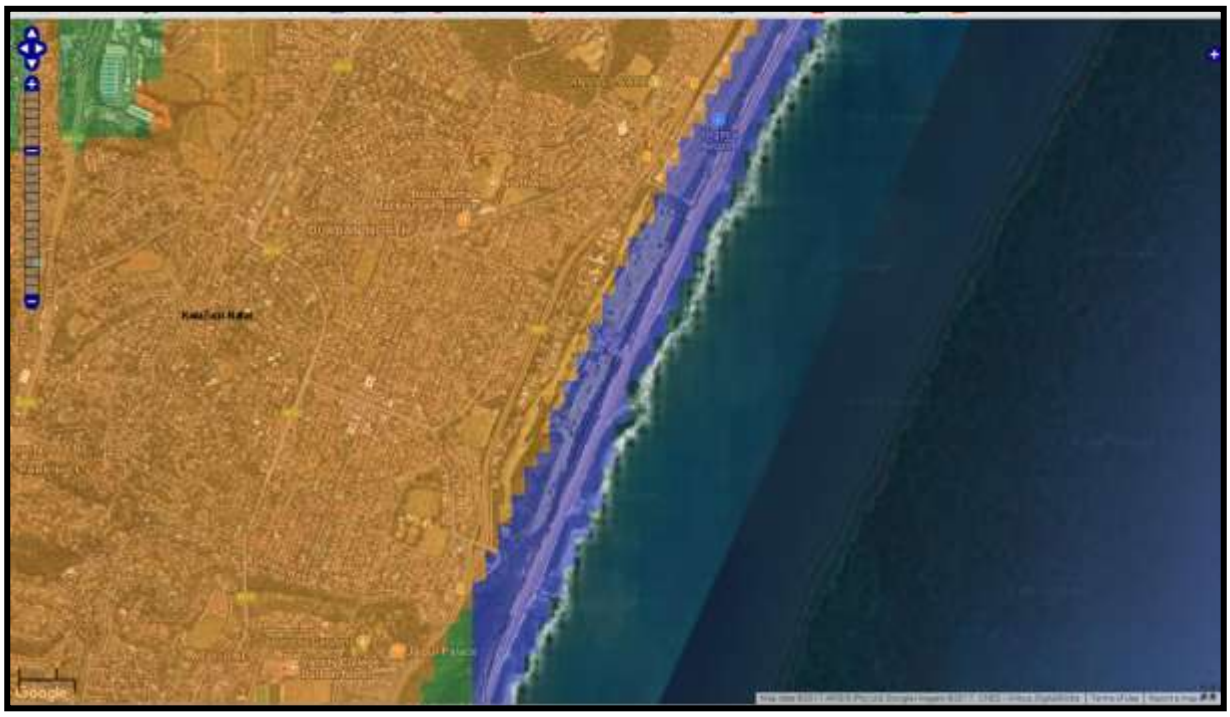
“No significant fossils are expected before deep excavation (>1.5m) are done and if fossils are recorded during excavations, it will contribute significantly to our knowledge of the Palaeontological Heritage of the KwaZulu-Natal Province.

It is recommended that:

- The EAP and ECO must be informed of the fact that a High Palaeontological Sensitivity is allocated to the western edge of the study area. A Phase 1 PIA document is needed for this part of the project, but can only be assessed **after clearing** of the site for development have started.

- Recommendations contained in the Desktop assessment must be used to compile a “Chance Find Protocol” document that needs to be included in the EMPr of the project for approval by AMAFA. The CFP must be ready for inclusion in the EMPr of the project, before the final EIA application can be presented to the Competent Authority responsible to the ROD of this EIA process. If fossils are observed during construction the HIA specialist and Palaeontologist must be informed to take immediate and appropriate action to preserve a representative sample of the fossils” (PIA report Appendix A)

FIG. 8: PALAEONTOLOGICAL SENSITIVITY OF THE STUDY AREA



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

CONCLUSION

A heritage survey was undertaken for the proposed Beachwood Resort and Estate Development. No heritage sites were observed in the study area no further direct mitigation is required.

IF any shell middens, or layers of marine shell are exposed during construction then the ECO needs to be informed. The ECO then needs to inform Amafa KZN, or the archaeologist for the project for further comment. The extension to the area after the survey is unlikely to yield any archaeological material. The only area of concern is the first dune cordon; however this will not be affected.

The northern section of the development will require on site inspection during construction in terms of the palaeontology. The same area recognised as having palaeosensitivity in the PIA desktop will continue along the western side of the proposed development.

REFERENCES

MER 2014: FINAL BASIC ASSESSMENT REPORT: Residential Development within the Beachwood Golf Course Precinct. MER Report 1/2014

150 000 topographical 2930DD_2931CC Durban, 1940, 2000

Aerial photograph: 117B_053_54258, 1937

SAHRIS Database

Natal Museum Database

Umlando Database

EXPERIENCE OF THE HERITAGE CONSULTANT

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

DECLARATION OF INDEPENDENCE

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

Gavin Anderson
Archaeologist/Heritage Impact Assessor

APPENIDIX A

DESKTOP PALAEONTOLOGICAL IMPACT ASSESSMENT

DESKTOP PALAEONTOLOGICAL ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE BEACHWOOD RESORT AND ESTATE DEVELOPMENT IN THE ETHEKWINI METROPOLITAN MUNICIPALITY, KWAZULU-NATAL PROVINCE.

FOR

Umlando

DATE: 04 December 2017

By

Gideon Groenewald

Cell: 078 713 6377

EXECUTIVE SUMMARY

Gideon Groenewald was appointed by Umlando to undertake a Desktop Survey, assessing the potential Palaeontological Impact related to an application for the proposed development of the Beachwood Resort and Estate Development in the Ethekwini Metropolitan Municipality, Kwazulu-Natal Province.

The development site applicable to the application for the proposed development of the development of the Beachwood Resort and Estate Development in the Ethekwini Metropolitan Municipality, Kwazulu-Natal Province, is underlain by Quaternary aged red sand of the Berea Formation, Maputuland Group and Quaternary aged sand dunes.

No significant fossils are expected before deep excavation (>1.5m) are done and if fossils are recorded during excavations, it will contribute significantly to our knowledge of the Palaeontological Heritage of the KwaZulu-Natal Province.

It is recommended that:

- The EAP and ECO must be informed of the fact that a High Palaeontological Sensitivity is allocated to the western edge of the study area. A Phase 1 PIA document is needed for this part of the project, but can only be assessed **after clearing** of the site for development have started.
- Recommendations contained in the Desktop assessment must be used to compile a “Chance Find Protocol” document that needs to be included in the EMPr of the project for approval by AMAFA. The CFP must be ready for inclusion in the EMPr of the project, before the final EIA application can be presented to the Competent Authority responsible to the ROD of this EIA process. If fossils are observed during construction the HIA specialist and Palaeontologist must be informed to take immediate and appropriate action to preserve a representative sample of the fossils.

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INTRODUCTION

Gideon Groenewald was appointed by Umlando to undertake a Desktop Survey, assessing the potential Palaeontological Impact related to an application for the proposed development of the Beachwood Resort and Estate Development in the Ethekwini Metropolitan Municipality, Kwazulu-Natal Province.

Legal Requirements

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 amended 2014 and 2017) 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 on palaeontological heritage within the development footprint.

Categories of heritage resources recognised as part of the National Estate in Section 38 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; and
- objects with the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage.

Aims and Methodology

A Desktop investigation is often the only opportunity to record the fossil heritage within the development footprint. These records are very important to understand the past and form an important part of South Africa's National Estate.

Following the "*SAHRA APM Guidelines: Minimum Standards for the Archaeological & Palaeontological Components of Impact Assessment Reports*" (amended 2017) the aims of the palaeontological impact assessment are:

- to identifying exposed and subsurface rock formations that are considered to be palaeontologically significant;
- to assessing 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.

Prior to a field investigation a preliminary assessment (desktop study) of the topography and geology of the study area is made using appropriate 1:250 000 geological maps (2930 Durban) in conjunction with Google Earth. Potential fossiliferous rock units (groups, formations etc) are identified within the study area and 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.

Priority palaeontological areas are identified within the development footprint to focus the field investigator's time and resources. The aim of the desktop survey is to document any exposed fossil material and to assess the palaeontological potential of the region in terms of the type and extent of rock outcrop in the area.

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 minimal extent of fresh 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) and Groenewald et al., (2014)	
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) compulsory.
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 dolerite sill outcrops. Collection of a representative sample of potential fossiliferous material recommended. At least a Desktop Survey and "Chance Find Protocol" is compulsory. The Chance Find Protocol must be included in the EMPr for the project.
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 implacement 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. At least a Desktop Survey and "Chance Find Protocol" document is compulsory. The Chance Find Protocol must be included in the EMPr of the project.

When rock units of moderate to high palaeontological sensitivity are present within the development footprint, palaeontological mitigation measures must be incorporated into the Environmental Management Plan. All projects falling on Low to Very Low Palaeontological sensitivity geology must be discussed in a Desktop Survey or a Chance Find Protocol document. If any fossils are recorded the findings and recommendations must form part of the EMPr of the project.

Scope and Limitations of the Desktop Study

The study will include: i) an analysis of the area's stratigraphy, age and depositional setting of fossil-bearing units; ii) a review of all relevant palaeontological and geological literature, including geological maps, and previous palaeontological impact reports; iii) data on the proposed development provided by the developer (e.g. location of footprint, depth and volume of bedrock excavation envisaged) and iv) where feasible, location and examination of any fossil collections from the study area (e.g. museums).

The key assumption for this scoping 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. There is also an inadequate database for fossil heritage for much of

the RSA, due to the small number of professional palaeontologists carrying out fieldwork in RSA and the Kingdom of Lesotho. Most development study areas have never been surveyed by a palaeontologist.

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.).

Locality and Proposed Development

The Beachwood Resort and Estate Development is planned on a property north of Durban and will mainly concentrate on the supply of resort facilities and estate ownership housing in this newly developed area (Figure 1).

Figure 1 Locality of the study area north of Beachwood Road

GEOLOGY

The site of the development falls entirely on Quaternary aged red sand dunes of the Berea Formation (Qb), Maputuland Group as well as recent sand dunes (Qs) (Figure 2).

Figure 2 Geology underlying the study area indicated in yellow. Berea Formation (Qb) and sand dunes (Qs) underlies the study site

Maputuland Group

The Maputuland Group forms a thin blanket of Tertiary and Cretaceous successions that extend from Durban northwards into Mozambique. The less detailed subdivision of Wolmarans and Du Preez (1986) are mapped on the scale of this project and is, for reasons of simplicity, preferred to the more detailed subdivision of Johnson et al (2009).

Berea Formation (Qb)

In the study area the Bluff Formation is overlain by the Berea Formation which consists of red, orange and yellow Aeolian sand, in the form of dune cordons along the coast of KwaZulu-Natal. The Berea Formation is interpreted as the weathering product of the Bluff Formation (Wolmarans and Du Preez, 1986).

In Durban these now form the Berea and Bluff Ridges. In most areas deep weathering of old dunes has produced dark red coloured sand called the Berea Red Sand (Groenewald, 2012).

Sand Dunes (Qs)

Resent sand dunes are constantly reworked and covers most of this part of the near-shore areas in the region (Figure 2)

PALAEONTOLOGY

Maputuland Group

Berea Formation (Qb)

Up to date, no significant vertebrate fossils have been recorded from the Berea Formation (Wolmarans and Du Preez, 1986). Petrified wood, mainly flattened *Syzigium* logs, have however been described from the Formation.

Quaternary Sand Dunes (Qs)

Up to date no significant fossils have been recorded from the sand deposits in this region and any discovery of fossil material will contribute significantly to our understanding of the Palaeontology of the region.

PALAEONTOLOGICAL IMPACT AND MITIGATION

The predicted palaeontological impact of the development is based on the initial mapping assessment and literature reviews as well as information gathered during the desktop investigation. The desktop investigation confirms that the study area is underlain by relatively deep (>2m) sandy soil associated with red sand dunes of the Berea Formation.

The excavations for the construction of the infrastructure for this development will expose some important sandy soil deposits. Due to the deeply weathered nature of the Berea Formation, fossils are not expected to be commonly present before the excavation and clearing of sites for development. Judging from the

Google Images, the site is overgrown with present day vegetation and it is not recommended that a Phase 1 PIA be done at this stage.

Due to the High likelihood of the discovery of significant plant fossils with flattened *Syziguim* logs in the red sands during clearing of the site for development, it is recommended that the High sensitivity for Palaeontological Heritage for the western part of the site is retained (Figure 3). The recommendation is that a suitably accredited Palaeontologist be appointed to do a Phase 1 PIA site inspection after at least 1km^2 of indigenous and/or exotic vegetation has been removed. The Palaeontologist must record all exposed *Syzigium* fossil logs on site. A representative sample of the fossils must then be deposited at the appropriate Institution under permit from AMAFA.

The fossils finds must be recorded according to a “Chance Find Protocol” that need to be discussed with the Contractors during the initial stages of the clearing operation. This recommendation must be incorporated into the EMPr of the Project.

No significant fossils have up to date been recorded in the recent windblown sand of this region and a Low Sensitivity is allocated to a very large part of the site (Figure 3)

Figure 3 Palaeosensitivity of the study area. For colour coding see Table 1.

CONCLUSION

The development site applicable to the application for the proposed development of the development of the Beachwood Resort and Estate Development in the Ethekwini Metropolitan Municipality, Kwazulu-Natal Provinc, is underlain by Quaternary aged red sand of the Berea Formation, Maputuland Group and Quaternary aged sand dunes.

No significant fossils are expected before deep excavation (>1.5m) are done and if fossils are recorded during excavations, it will contribute significantly to our knowledge of the Palaeontological Heritage of the KwaZulu-Natal Province.

It is recommended that:

- The EAP and ECO must be informed of the fact that a High Palaeontological Sensitivity is allocated to the western edge of the study area. A Phase 1 PIA document is needed for this part of the project, but can only be assessed **after clearing** of the site for development have started.
- Recommendations contained in the Desktop assessment must be used to compile a “Chance Find Protocol” document that needs to be included

in the EMPr of the project for approval by AMAFA. The CFP must be ready for inclusion in the EMPr of the project, before the final EIA application can be presented to the Competent Authority responsible to the ROD of this EIA process. If fossils are observed during construction the HIA specialist and Palaeontologist must be informed to take immediate and appropriate action to preserve a representative sample of the fossils.

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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.

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