METHOD

LEGISLATION

Heritage sites in Southern Africa are protected by the National Heritage Resources Act (No. 25 of 1999), and KZN Heritage Act of 1997 and 2008.

Heritages sites can be broadly viewed as:

1. Archaeological, palaeontological and metereological sites
2. Graves older than 60 years in age, or those of important people, or victims of apartheid struggle years (including mass graves)
3. Rock art sites
4. Cultural landscapes
5. Living Heritage
6. (In)Tangible sites related to oral history
7. Battlefields
8. Built structures older than 60 years

A need for a heritage survey may be requested for the following activities:

1. construction of a road exceeding 300 m in length
2. wall exceeding 300 m in length
3. power line exceeding 300 m in length
4. pipeline exceeding 300 m in length
5. canal exceeding 300 m in length
6. other similar form of linear development
7. barrier exceeding 300 m in length
8. construction of a bridge exceeding 50 m in length
9. similar structure exceeding 50 m in length
10. any development exceeding 5 000 m²
11. other activity which will change the character of an area of land, or water exceeding 10 000 m2 in extent
12. involving three or more existing erven or subdivisions thereof

13. any development, or other activity involving three or more existing erven or subdivisions
14. any development, or other activity involving three or more existing erven or subdivisions which have been consolidated within the past five years
15. any development, or other activity the costs of which will exceed a sum set in terms of regulations
16. Rezoning of a site exceeding 10 000 m²

Brief assessment of the study area

A Brief assessment of the study area indicates that the following types of heritage sites could occur:

1. Rock art sites
2. 2nd Anglo-Boer War sites
3. Late Iron Age and Historical Period settlements (stone walling and graves)
4. Early, Middle and Late Stone Age sites, with a possibility of overhangs and shelters
5. Historical buildings
6. Historical transport routes
7. Historical tree borders
8. Sites related to oral history and living heritage

Assessment

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult Umlando's database. This database has been built up over several years and includes, and is not exclusive or complete:

- Previous heritage surveys (pre-2013)
- archaeological sites
- palaeontological sites

- listed provincial and national monuments
- listed historical cemeteries
- Listed general heritage sites
- Sites from 1st edition topographical maps
- Sites from 1st edition aerial photographs (when available)

Consulting with the relevant authorities will also cover known battlefields and historical sites. We also consult with an historical architect, a palaeontologist, and an historian where necessary. The more recent addition of SAHRIS allows one to see if an area has recorded sites or has been surveyed. SAHRIS also allows for a brief palaeontological assessment.

The desktop study will use various historical maps (1st edition topographical and aerial photographs) that can pinpoint human settlements that occurred in study area before increased urbanisation and commercial industry. In this case we have the 1937 aerial photographs and 1942 topographical maps to indicate older buildings and human settlements. This is important as the maps will indicate the potential for human graves, regardless of the current land use. These older maps are also useful for showing previous water table levels.

The initial archaeological survey (i.e. fieldwork) consists of a foot survey where the selected area is covered. The survey results will define the significance of each recorded site, as well as a management plan. If the archaeological visibility is poor then I survey in transects and concentrate on exposed areas, molehills and aardvark (or similar) holes where artefacts, middens etc. may have been exposed. Previous experience allows one to determine where sites are more likely to occur.

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, especially pottery. Sites of medium significance have diagnostic artefacts and these are 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. We attempt to recover as many artefacts from these sites by means of systematic sampling, as opposed to sampling diagnostic artefacts only.

A management plan for each site will be given as well as a general management plan for the area. This will include a heritage audit.

Defining significance

Archaeological 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, i.e. a site that has the first diagnostic material of its kind?
   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.

I use SAHRAs grading system for grading heritage sites in addition to my significance grading. This is as follows:

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

PALAEONTOLOGY METHOD

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, 2009) (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) 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 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.

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).