



111 H ARRINGTON STREET, CAPE TOWN,
8001
PO BOX 4637, CAPE TOWN, 8000
TEL: 021 462 4502 FX: 021 462 4509

MINIMUM STANDARDS: PALAEOLOGICAL COMPONENT OF HERITAGE IMPACT ASSESSMENT REPORTS

TABLE OF CONTENTS

I GENERAL INFORMATION	1
1. WHAT ARE PALAEOLOGICAL IMPACT ASSESSMENTS?	1
2. HOW DO PALAEOLOGICAL IMPACT ASSESSMENTS FIT INTO PLANNING?	2
3. STAGES OF ASSESSMENT	3
4. REQUIREMENTS FOR PERMITS	6
5. PIAs AND THE NATIONAL INVENTORY	6
II. MINIMUM STANDARDS	8
1. PALAEOLOGICAL DESKTOP STUDIES	8
2. PHASE 1 PALAEOLOGICAL IMPACT ASSESSMENT STUDIES	9
3. PHASE 2 PERMIT MITIGATION REPORTS	13

I. GENERAL INFORMATION

1. WHAT ARE PALAEOLOGICAL IMPACT ASSESSMENTS?

The National Heritage Resources Act (Act 25 of 1999) (NHRA) requires that all heritage resources, that is all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance, are protected. The Republic of South Africa (RSA) has a remarkably rich fossil record that stretches back in time for some 3.5 billion years and must be protected for its scientific value. Fossil heritage of national and international significance is found within all provinces of the RSA.

Palaeontology is the scientific study of any fossilised remains or fossil trace of animals or plants which lived in the geological past and fossils are the remains of ancient life - including animals, plants, fungi, single-celled organisms, microbes and organic residues - that are preserved within rocks, as well as traces of their activity (*e.g.* fossil footprints and burrows).

South Africa's unique and non-renewable palaeontological heritage is protected in terms of the NHRA. According to this act, palaeontological resources may not be excavated, damaged, destroyed or otherwise impacted by any development without prior assessment and without a permit from the relevant heritage resources authority.

The main aim of the assessment process is to document resources in the development area and identify both the negative and positive impacts that the development brings to the receiving environment. Equally important is the identification of mitigation measures to enhance the positive impacts and minimise the negative ones. A Palaeontological

Impact Assessment (PIA) therefore identifies palaeontological resources in the area to be developed and makes recommendations for protection or mitigation of these resources.

Where possible, scientifically significant palaeontological resources should be conserved, but where this is not feasible, the loss of fossil material and associated information can be mitigated or minimised through a process of recording and collection. This may be extensive depending on the significance of the resource. As part of this assessment process, excavated materials must be properly curated and stored. Experience has shown that early assessment and mitigation minimise the negative effects of development and in the long term often save the developer considerable delays and related costs.

2. HOW DO PALAEOLOGICAL IMPACT ASSESSMENTS FIT INTO PLANNING?

As the nation develops and landscapes are modified, heritage resources, including palaeontological resources, are threatened. As such, both the environmental and heritage legislations require that development activities must be preceded by an assessment of the impact undertaken by qualified professionals. Palaeontological Impact Assessments (PIAs) are specialist reports that form part of the wider heritage component of:

- Heritage Impact Assessments (HIAs) called for in terms of Section 38 of the National Heritage Resources Act, Act No. 25, 1999 by a heritage resources authority.
- Environmental Impact Assessment (EIA) or Environmental Management Plans (EMP) process as required in terms of other legislation listed in s. 38(8) of the NHRA.

The palaeontological component discussed here therefore forms only a section of the heritage resources that the law protects from non-permitted activities, including development. HIAs are intended to ensure that all heritage resources are protected, and where it is not possible to preserve them *in situ*, appropriate mitigation measures are applied. A HIA is a comprehensive study that comprises palaeontological, archaeological, built environment, living heritage, etc specialist studies. Palaeontologists must acknowledge this and ensure that they collaborate with other heritage practitioners. Where palaeontologists are engaged for the entire HIA, they must refer heritage components for which they do not have expertise to appropriate specialists. Where they are engaged specifically for the palaeontology, they must draw the attention of environmental consultants and developers to the need for assessment of other aspects of heritage.

The standards and procedures discussed here are guidelines as to how to conduct and report PIAs and specialists undertaking such studies must adhere to them.

The process of assessment (detailed discussion under 3.1) for the palaeontological (PIA) specialist components of heritage impact assessments involves:

A **Scoping stage** in line with regulation 28 of the National Environmental Management Act (No. 107 of 1998) (NEMA) Regulations on Environmental Impact Assessment. This involves an initial assessment where the specialist evaluates the scope of the project (based, for example, on Background Information Documents (BIDs)) and advises on the form and extent of the assessment process. At this stage the palaeontologist may also decide to compile a **Letter of Recommendation for Exemption from further Palaeontological Studies**. This letter will state that there is little or no likelihood that any significant fossil resources will be impacted by the development. This letter should

present a *reasoned* case for exemption, supported by consultation of the relevant geological maps and key literature.

Palaeontological Desktop Study – the palaeontologist will investigate available resources (geological maps, scientific literature, previous impact assessment reports, institutional fossil collections, satellite images or aerial photos, *etc*) to inform an assessment of fossil heritage and/or exposure of potentially fossiliferous rocks within the study area. A Desktop study will conclude whether a further field assessment is warranted or not. Where further studies are required, the desktop study would normally be an integral part of a Phase 1 Palaeontological Impact Assessment.

Phase 1 Palaeontological Impact Assessment - generally warranted where rock units of high palaeontological sensitivity are concerned, levels of bedrock exposure within the study area are adequate, large-scale projects with high potential heritage impact are planned and where the distribution and nature of fossil remains in the proposed project area is unknown. The Phase 1 should identify the rock units and significant fossil heritage resources present, or by inference likely to be present, within the study area, assess the palaeontological significance of these rock units, fossil sites or other fossil heritage, comment on the impact of the development on palaeontological heritage resources and make recommendations for their mitigation or conservation, or for any further specialist studies that are required in order to adequately assess the nature, distribution and conservation value of palaeontological resources within the study area.

Phase 2 Palaeontological Mitigation – involves planning the protection of significant fossil sites, rock units or other palaeontological resources and/or excavation, recording and sampling of fossil heritage that might be lost during development, together with pertinent geological data. The mitigation may take place before and / or during the construction phase of development. The specialist will require a Phase 2 mitigation permit from the relevant Heritage Resources Authority before Phase 2 may be implemented.

'Phase 3' Palaeontological Site Conservation and Management Plan – this may be required in cases where the site is so important that development will not be allowed, or where development is to co-exist with the resource. Developers may be required to enhance the value of the sites retained on their properties with appropriate interpretive material or displays as a way of promoting access of such resources to the public.

3. STAGES OF ASSESSMENT

The assessment reports will be assessed by the relevant heritage resources authority, and depending on which piece of legislation triggered the study, a response will be given in the form of a Comment or Decision. In the case of PIAs that are part of EIAs or EMPs, the heritage resources authority will issue a comment that will be forwarded to the consultant or developer, to the relevant government departments and to the heritage practitioners and, where feasible, to all three.

The stages of assessment may include:

1. A **Scoping** report – this is the first stage of assessment and it should be undertaken to identify which type of study may be necessary for the project. A scoping report should include:
 - a. Details of the property to be developed and the type of development activities.³⁸ (1 or 8));
 - b. Terms of reference for the report, including the legislative requirements for it;

- c. Review of the available literature and geological maps of the area

The report should then inform whether further studies are necessary for this project or whether a letter of exemption could be granted. In this instance the letter of recommendation of exemption should:

- a. include what informs the exemption;
- b. justify why the project should be exempted from further studies.

2. A **Desktop Palaeontological Assessment** involves a background study and it will include:

- a. Details of the property to be developed and the type of development activities(s.38 (1 or 8));
- b. Location of the rock units that are found and estimated depths at which they may be found;
- c. Assessment of the sensitivity and importance of geological unit in terms of their palaeontological significance.
- d. Description of the characteristics of each rock unit and known palaeontological resources;
- e. Assessment of the potential impact of the development on the palaeontological resources;
- f. Any need for further studies

The report is intended to inform the client about the legislative protection of heritage resources and their significance and to make appropriate recommendations. It is essential that it also provides the heritage authority with sufficient information about the identified resources to enable the agency to assess with confidence:

- a. Whether or not it has objections to a development;
- b. What the conditions are upon which such development might proceed;
- c.

3. A **Phase 1 Palaeontological Impact Assessment** involves a background study and a field survey of the proposed development and includes:

- a. Details of the property to be developed and the type of development activities (s.38 (1 or 8));
- b. Location of the rock units that are found and estimated depths at which they may be found;
- c. Assessment of the sensitivity and importance of geological units in terms of their palaeontological significance.
- d. Description of the characteristics of each rock unit and known palaeontological resources;
- e. Assessment of the potential impact of the development on the palaeontological resources;
- f.
- g. Recommendations for conservation, if any;
- h. Any need for sampling or collection of material as part of a Phase 2 study and guidance to the developer on legislative requirements (permitting) for this activity.

The report is intended to inform the client about the legislative protection of heritage resources and their significance and to make appropriate recommendations. It is essential

that it also provides the heritage authority with sufficient information about the identified resources to enable the authority to assess with confidence:

- a. Whether or not it has objections to a development;
- b. What the conditions are upon which such development might proceed;
- c. Which areas or project components may require permits for destruction;
- d. Which areas or project components may require permits for mitigation and what this mitigation should comprise;
- e. Whether palaeontological resources, rock units or areas must be conserved (e.g. no-go areas) and what alternatives can be proposed that may re-locate the development in such a way as to conserve other sites, for example, by incorporating them in a wilderness area, or under a parking space; and what measures should/could be put in place to protect the area that should be conserved.

4. Phase 2 Palaeontological Mitigation

If from Phase 1 it is evident that fossil heritage of scientific or cultural significance is threatened by the proposed development, the palaeontologist will normally recommend Phase 2 Palaeontological Mitigation. The purpose of the Phase 2 process is to obtain a general idea of, the scientific significance, geological context, age and broader meaning of the fossil heritage that is to be lost as well as to collect and store a sample that can be consulted at a later date for research, education and promotion of our scientific or cultural heritage at large. Fossils may be collected from the surface, or there might be excavation of representative samples together with recording of pertinent geological data. The heritage resources authority will require a permit application for any disturbance of fossils of significance.

Should further fossil material be discovered during the course of the development (e.g. during bedrock excavations), this must be safeguarded, where feasible *in situ*, and reported to a palaeontologist or to the heritage resources authority. In situations where the area is considered palaeontologically sensitive (e.g. Karoo Supergroup Formations, ancient marine deposits in the interior or along the coast) the palaeontologist might need to monitor all newly excavated bedrock.

The developer needs to give the palaeontologist sufficient time to assess and document the finds and, if necessary, to rescue a representative sample.

When Phase 2 palaeontological impact studies are recommended, permission for the development to proceed can be given only once the heritage resources authority has received and approved a Phase 2 report and is satisfied that (a) the palaeontological resources under threat have been adequately recorded and sampled, and (b) adequate measures are in place to mitigate negative impacts and promote positive impacts of the development on fossil heritage, including, where necessary, *in situ* conservation of heritage of high significance (See Phase 3 below). Careful planning, including early consultation with palaeontologists and heritage management authorities, can minimize the impact of palaeontological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

This process allows the rescue of information and balances the requirements of developers and the conservation and protection of palaeontological resources as is required by the NHRA.

5. Phase 3 Palaeontological Site Conservation and Management Plan

On occasion, a Phase 2 mitigation process may be followed by a Phase 3 programme involving the modification or conservation of the palaeontological resource (or parts of it) or its incorporation into the development itself as a site museum or display. When sites are of public interest the development of interpretative material is recommended and adds value to the development. A Palaeontological Site Conservation and Management Plan is usually required for sites that are to be retained to ensure that arrangements are made for their long term maintenance and management, ensuring that their value and significance are preserved. Such plans would normally be drawn up by a suitably qualified professional palaeontologist in consultation with the heritage management authority and developer / land owner(s) concerned as required by the law.

4. REQUIREMENTS FOR PERMITS

There are three points during development at which SAHRA or the relevant heritage resources authority may be approached for permission to disturb a fossil site during the impact assessment process.

1. **'Mitigation Permits'**: these are generally issued for excavation or collection of samples and to assess sites that will be impacted by the development. These are issued to the specialist as part of the Phase 2 study and after assessment of the Phase 1 report.
2. **'Destruction Permits'**: (only applicable where palaeontological resources of medium to low significance had been reported in Phase 1 and necessary mitigation has already taken place). After rescue, a destruction permit must also be applied for palaeontological resources from medium to low significance.

and/or

3. **'Interpretation Permits'**: These are generally issued to the developer after assessment of the Phase 2 report (but are usually filled in by the palaeontologist). 'Interpretation Permits' refer to situations where the addition of boardwalks or notice boards may impact on the resources and the permitting process allows for the proposed actions to be discussed and possibly modified to better protecting the site(s).

The specialist should explain the process to the developer and must apply for the permit. Permission from the owner must be obtained and this is better done at the beginning of the process.

5. PIAs AND THE NATIONAL INVENTORY

Phase 1 and Phase 2 PIAs are very often the last opportunity we will ever have to record the fossil heritage within the study area. These records are immensely important to our understanding of the past and as such they form an important part of our National Estate. SAHRA is building up a national archive of these reports on the South African Heritage Resources Information System (SAHRIS) and specialists are requested to ensure that SAHRA receives electronic copies of all reports.

It is important that the quality of these reports is high, that they characterize the known inferred fossil heritage within the study area meaningfully and reflect best practice in terms of the identification, recording, assessment, interpretation and management of our palaeontological heritage.

II. MINIMUM STANDARDS

1. PALAEOLOGICAL DESKTOP STUDIES

Every Palaeontological Desktop Study should include:

A. Title Page with:

- a. A title that identifies this report. It should give the name and geographical location of the project, including property or farm name, magisterial district, and province;
- b. Author(s) surname(s) and details, company name or institution, and contact details;
- c. Developer and/or consultant's name (the organisation which or person who commissioned the report), postal address, telephone number and e-mail address;
- d. Date of the report (day, month and year).

B. Executive Summary including:

- a. Outline of the development project;
- b. An outline of the geology and palaeontology of the study area;
- c. A brief summary of the findings;
- d. The recommendations;
- e. Any stakeholders or people responsible for decisions and actions.

C. Table of Contents

D. Background Information on the Project with:

- a. Whether the report is part of the environmental impact assessment process under the NEMA or an EMP_Plan under the Mineral and Petroleum Resources Development Act (MPRDA) and whether it is also part of a HIA.
- b. Outline of development (e.g. low cost housing project, mining) including location map and, where available, a site plan;
- c. Whether re-zoning and/or subdivision of land is involved;
- d. Name of developer and consultant who commissioned study;
- e. Terms of Reference;
- f. Legislative requirements.

E. Description of the Property or Affected Environment, its geological setting and fossil heritage resources, with:

Details of the study area including:

- a) Full **Location Data** for Province, Magisterial District/Local Authority and property (e.g. farm/Erf) name and number, etc;
- b) **Location Map(s)/ orthophotos** of the general area. These must include the map name and number (e.g. 3318DC Bellville). Maps should include at least a 1:250 000 map showing at least one sizeable town for geographical context,

and more detailed maps (e.g. 1: 50 000 or 1: 10 000) where appropriate for the scale of the study. Large scale colour satellite photos with scale are also applicable. The location of the development on the map should be clear. Ideally an A4 map should be provided.

F. Description of the Geological Setting

- a. A **description of the rock units** (groups, formations, etc) represented within the study area with their estimated age and (in the case of sediments) depositional setting. A schematic or previously measured stratigraphic column of the rock units present is also very useful;
- b. Ideally a horizontal topographic cross section within the geological structure beneath the study area (extending down to the maximum depth of excavation) and a vertical profile of the intended development is also very useful;
- c. A **1: 250 000 or larger scale geological map** indicating the boundaries of the study area should be included. The map name and number should be specified (e.g. 3324 Port Elizabeth) and a key to the relevant geological units provided.

G. Background to the Palaeontology of the area,

This background is required in part to anticipate or predict the kinds of palaeontological resources that might occur within the study area, and in part to gauge the regional significance of findings made during the current assessment.

- a. Summary of the palaeontological record of the main rock units present; both in general and more specifically for the study area, based on scientific publications, the author's experience and previous palaeontological impact assessment reports for the study region;
- b. Reference to fossil databases and collections at museums, universities, geological surveys or other institutions..

2. PHASE 1 PALAEOLOGICAL IMPACT ASSESSMENT STUDIES

Every Phase 1 Palaeontological Impact Assessment Report should include:

A. Title Page with:

- a. A title that identifies this report. It should give the name and geographical location of the site(s) and/or project, including property or farm name, magisterial district, and province;
- b. Author(s) surname(s) and details, company name or institution, and contact details;
- c. Developer and/or consultant's name (the organisation which or person who commissioned the report), postal address, telephone number and e-mail address;
- d. Date of report (day, month and year).

B. Executive Summary including:

- a. Outline of the development project;
- b. An outline of the geology and palaeontology of the study area;
- c. A brief summary of the findings;
- d. The recommendations;

- e. Any stakeholders or people responsible for decisions and actions.

C. Table of Contents.

D. Background Information on the Project with:

- a. Whether the report is part of the environmental impact assessment process under the NEMA or an EMP_Plan under the Mineral and Petroleum Resources Development Act (MPRDA) and whether it is also part of a HIA.
- b. Outline of development (e.g. low cost housing project, mining) including location map and, where available, a site plan;
- c. Whether re-zoning and/or subdivision of land is involved;
- d. Name of developer and consultant who commissioned study;
- e. Terms of Reference;
- f. Legislative requirements.

E. Description of the Property or Affected Environment, its geological setting and fossil heritage resources, with:

Details of the study area including:

- a) Full **Location Data** for Province, Magisterial District/Local Authority and property (e.g. farm/Erf) name and number, etc;
- b) **Location Map(s)/ orthophotos** of the general area. These must include the map name and number (e.g. 3318DC Bellville). Maps should include at least a 1:250 000 map showing at least one sizeable town for geographical context, and more detailed maps (e.g. 1: 50 000 or 1: 10 000) where appropriate for the scale of the study. Large scale colour satellite photos with scale are also applicable. The location of the development on the map should be clear. Ideally an A4 map should be provided.

F. Description of the Geological Setting

- a. A **description of the rock units** (groups, formations, etc) represented within the study area with their estimated age and (in the case of sediments) depositional setting. A schematic and where possible a measured stratigraphic column of the rock units present is also very useful;
- b. Ideally a horizontal topographic cross section within the study area (extending down to the maximum depth of excavation) showing the lithology and structure of the bedrock and a vertical profile of the intended development is also very useful;
- c. A **1: 250 000 or larger scale geological map** indicating the boundaries of the study area should be included. The map name and number should be specified (e.g. 3324 Port Elizabeth) and a key to the relevant geological units provided.

G. Background to the Palaeontology of the area with,

This background is required in part to anticipate or predict the kinds of palaeontological resources that might occur within the study area, and in part to gauge the regional significance of findings made during the current assessment.

- a. Summary of the palaeontological record of the main rock units present, both in general and more specifically for the study area, based on scientific publications,

the author's experience and previous palaeontological impact assessment reports for the study region;

- b. Reference to fossil databases and collections at museums, universities, geological surveys or other institutions.

H. Description of the methodology used with assumptions and limitations including:

- a. How and when the field survey was undertaken;
- b. What the restrictions to the field study were (e.g. lack of fresh bedrock exposure, physical impediments to access such as vleis, steep cliffs);
- c. How the data were acquired and details of research equipment (e.g. GPS).

I. Description of significant fossil occurrences identified and mapped within, or in the region of, the study area:

- a. Details of the location and distribution of all significant fossil sites or key fossiliferous rock units (e.g. beds, formations) including:
 - 1. Map / aerial photograph / satellite image of the study area with the location of significant fossil occurrences or rock units clearly marked on it. It should be clear how this fossil site map relates to topographic and geological maps of the study area elsewhere in the report.
 - 2. GPS readings with the model and datum used (WGS 84 is considered the most useful). If co-ordinates are read off the 1:50 000 map or satellite images, please indicate this.
- b. An adequate description of each fossil site, fossil assemblage or fossiliferous rock units of special palaeontological significance. Relevant data here include geographic and stratigraphic position, geological structures (eg faults, folds and dips) and sedimentological context (associated rock types / lithology, sedimentary structures, depositional processes), fossil taxa present and their relative abundance, preservational style, and taphonomic information. Descriptions should be supplemented with good quality photographs with an adequate scale (e.g. metric ruler, geological hammer; please no coins, pens, pocket knives, hats, fingers, mugs, etc.) and an informative caption.
- c. Threats or sources of risk and their possible impact on heritage resources (e.g. earth moving, sealing-in by development, vehicle traffic, or human disturbance).

J. Field Rating (Recommended grading or field significance) of the site:

While **grading** is actually the **responsibility of the heritage resources authorities**, reports should include **Field Ratings** of all palaeontological resources. While grading of archaeological resources may be guided by s. 7(1) of NHRA, grading of palaeontological resources may use the sensitivity of rock formations and units classifying them into **high, medium** and **low** significance according to their scientific value.

K. Statement of Significance (Heritage Value) assessing the palaeontological heritage value of relevant sites, fossil assemblages or other palaeontological resources in terms of the legislation (NHRA, section 3 (3) listed below) or any other relevant criteria, with reasons. For example:

- a. its potential (expressed as low, medium or high) to yield information that will contribute to a scientific understanding of South Africa's palaeontological heritage;

- b. special scientific status of a site or area in terms of previous research (e.g. stratotype section of a geological formation, type area for a fossil assemblage zone, locality of type material of fossil taxon);
- c. its importance to the community or general public (e.g. ecotourism or educational resource, cultural significance);
- d. its possession of uncommon, rare or threatened aspects of South Africa's palaeontological heritage.

L. Recommendations including:

- a. An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- b. Proposals for **protection or mitigation** relating to:
 - 1. Possible alternatives in the development that might allow the protection and conservation of palaeontological heritage resources; or
 - 2. The need for mitigation of adverse impacts; or
 - 3. The need to conserve certain sites or areas (e.g. no-go areas) because of their high heritage value.
- c. An **indication of what should be done** for each of the significant palaeontological resources identified within the study area. It should be made clear **who is responsible** for the recommended actions (e.g. ECO, professional palaeontologist, developer) and **at what stage** of the development the action should take place (e.g. before construction starts, once a site plan is available, during bedrock excavation).
- d. If the site or resource is of Low Significance the recommendation may be that no further action is necessary and the resource may be damaged or destroyed.
- e. If the site or resource is of Medium Significance the recommendation may be for a measure of mitigation after which the site or resource may be destroyed with a permit from the heritage authority. Before destruction the site must be mapped and documented. Palaeontological mitigation usually involves a requirement to document the fossil resource (including mapping, data on its sedimentary context) as well as to collect or excavate an appropriate sample of the fossils that will allow adequate characterization of the site or fossil assemblage. Note that the palaeontologist involved will require a permit for the collection of fossil material as well as a written undertaking from an approved heritage institution to store and curate all collected fossils. They will also have to submit a Phase 2 permit mitigation report to the responsible heritage authorities (see Phase 2 section 7).
- f. If the fossil site or resource is of High Significance the recommendation may be that it be documented, formally graded and conserved (perhaps with provision of boardwalks, fencing, signage, displays, guides etc) and formally protected (either by being listed on the Heritage Register or being declared as a Provincial or National Heritage Site).
- g. If sites are to be protected a Conservation Management Plan should be required. For mini-plans, where few resources are incorporated into developments, this must include an indication of who is responsible for maintenance and how this process will be monitored.

M. Conclusions: should summarise critical issues and recommendations in the report.

N. Bibliography detailing citations in the text of the report. Remember that all sources should be adequately acknowledged (including the web).

O. Appendices if any (e.g. glossary of technical terms, GPS coordinates of fossil localities, etc).

General Comments

- a. Take into account:
 1. That specialists are expected to assess the whole palaeontological background of the area where the development is proposed. If this is not possible, the specialist must indicate why only part of the rock units to be affected were investigated.
 2. The relative significance of sites identified in relation to current knowledge of sites in the general area.
- b. Indicate the location of any significant extra documentation or photographic material not included in the report itself.
- c. Provide information and recommendations to the client including the scope of the heritage legislation that applies; the need to apply for permits in good time before disturbing fossil heritage in any way; and the need for approval of the heritage authority before the destruction of sites that have been recorded.
- d. Give the Heritage Resources Authority enough information to assess with confidence whether those recommendations should be approved or modified and whether to issue permission for destruction of sites.
- e. Indicate whether an assessment of other heritage components (archaeology, built environment, living heritage) are being commissioned by the developer.
- f. Make it clear to the developer that the final decisions rest with the heritage authority and that permission is required for destruction.

3. PHASE 2 PERMIT MITIGATION REPORTS

Every Palaeontological Phase 2 Permit Report should include:

A. Title Page with:

- a. A **Title** that identifies this report. It should give the name and geographical location of the site(s) where Phase 2 occurred, including property or farm name, magisterial district and province;
- b. **Author(s) surname(s)** and details, company name or institution, and contact details;
- c. **Developer and/or consultant's** name (the organisation which or person who commissioned the report), postal address, telephone number, and e-mail address;
- d. **Date of report** (day, month and year).
- e. **Permit Number (NB).**

B. Executive Summary including:

- a. The purpose of the work;
- b. A brief summary of the findings;
- c. The recommendations for the future of the site.
- d. Stakeholders.

C. Table of Contents.

D. Background Information on the Project with:

- a. Outline of development (e.g. low cost housing project, mining) including location map and, where appropriate, a site plan;

- b. Name of developer and consultant who commissioned study;
- c. Terms of Reference;
- d. Legislative requirements.

E. Description of the Property or Affected Environment, its geological setting and fossil heritage resources, with:

Details of the study area including:

1. Full **Location Data** for Province, Magisterial District/Local Authority and property (e.g. farm/erf) name and number, etc;
2. **Location Map(s)/ orthophotos** of the general area. These must include the map name and number (e.g. 3318DC Bellville). Maps should include at least a 1:250 000 map showing at least one sizeable town for geographical context, and more detailed maps (e.g. 1: 50 000 or 1: 10 000) where appropriate for the scale of the study. Large scale colour satellite photos with scale are applicable. The location of the development on the map should be clear. Ideally an A4 map should be provided.

F. Description of the Geological Setting

- a. A **description of the rock units** (groups, formations, etc) represented within the study area with their estimated age and (in the case of sediments) depositional setting. A schematic or measured stratigraphic column of the rock units present is also very useful;
- b. Ideally a horizontal cross section within the study area (extending down to the maximum depth of excavation) and a vertical profile of the intended development is also very useful;
- c. A **1: 250 000 or larger scale geological map** indicating the boundaries of the study area should be included. The map name and number should be specified (e.g. 3324 Port Elizabeth) and a key to the relevant geological units provided.

G. Background to the Palaeontology of the area

This background is required in part to anticipate or predict the kinds of palaeontological resources that might occur within the study area, and in part to gauge the regional significance of findings made during the current assessment.

with:

- a. Summary of the palaeontological record of the main rock units present, both in general and more specifically for the study area, based on scientific publications, the author's experience and previous palaeontological impact assessment reports for the study region;
- b. Reference to fossil databases and collections at museums, universities, geological surveys or other institutions.

H. Description of the Work Done:

- a. Site description.
- b. Methodology used (including number of people and their responsibilities) and when the work was done.
- c. A written assessment of the work done including discussion of:
 - i. fossils excavated and removed or recorded; but not collected- this includes *ex situ* (loose) fossils observed but not collected and *in situ* (embedded)

- fossils observed but not excavated;
- ii. geological context.
- d. Conclusions reached regarding the fossil material, its position significant information of palaeontological significance such as taphonomic pathways and genesis of the site.
- e. Suitable illustrations including:
 - i. A detailed site plan on which location of excavated and/or observed fossils are marked;
 - ii. Table(s) showing categories of fossils etc, excavated or removed and data collected
 - iii. Stratigraphic position, geological setting and field number of recorded fossils;
 - iv. Accurate scaled sections of the stratigraphy, where appropriate;
 - v. Photographs with a metric system scale and a caption. Include a contextual photo and in the caption the viewing direction.
- f. Name of the Repository, that is, the institution storing and curating the collected fossils along with their field notes and records.

I. Description of Fossil assemblages recorded or collected

- a. number of different taxa, fossil abundance, preservational style, stratigraphic and sedimentological context and taphonomy;
- b. significance to scientific research.

J. Recommendations including:

- a. Possible declaration as a heritage site;
- b. Conservation requirements for the site, e.g. fences boardwalks, etc (and the need for a permit);
- c. The need for a Site Management Plan;
- d. Plans for the need for interpretation and signage at the sites;
- e. Whether or not further mitigation or permit applications (e.g. destruction permit) are necessary
- f. Any other recommendations pertaining the site;

Conclusions. This should include a summary of the main findings of the Phase 2 collection and/or excavation, recommendations and critical issues discussed in the report.

K.

L. Bibliography detailing citations in the text of the report including previous studies and publications.

M. Appendices if any, e.g. letter from the institution curating material and copy of the permit application.

General Comments

- a. Remember that the objectives of Phase 2 Mitigations include:
 - 1. Rescue of representative fossil material from the study area to allow us to record the nature of each locality and establish its age before it is destroyed and to

- make samples accessible for future research;
 - 2. Interpreting the evidence recovered to allow for education of the public and promotion of palaeontological heritage (which may form part of a Phase 3 project).
- b. Every permit holder must submit to the relevant Heritage Authority:
1. Annual '**Interim**' or progress Phase 2 permit report(s) which should be as comprehensive as possible and must:
 - reflect the full details about the location of the site and its setting;
 - the palaeontological background;
 - a description of the work done (with photos, maps and diagrams); and
 - results to date.
 2. '**Final** Phase 2 permit report' including the above data and full details of the excavation, collection, removal, analysis and interpretation of the material and possible research to be conducted on it.
- c. Researchers are requested to remember that electronic copies of all publications, reports and theses relating to material acquired in terms of a permit (even if the work is done by other researchers and students and even if the final report is in) should be sent to the relevant heritage authority for assessment and archiving.

