



**EZEMVELO  
KZN WILDLIFE**

Conservation, Partnerships & Ecotourism



# Guideline: Biodiversity Impact Assessment in KwaZulu Natal



**Version 2**

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Compiled by Ezemvelo KZN Wildlife: EM

Available from [www.kznwildlife.com](http://www.kznwildlife.com)



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## ACRONYMS

<i>Act 70 of 70</i>	-----	Subdivision of Agricultural Land Act No. 70 of 1970
<i>DAEA&amp;RD</i>	-----	KZN Department of Agriculture, Environmental Affairs and Rural Development
<i>DAFF</i>	-----	Department of Agriculture, Forestry and Fisheries
<i>DFA</i>	-----	Development Facilitation Act No. 67 of 1995, as amended
<i>DLG&amp;TA</i>	-----	Department of Local Government and Traditional Affairs
<i>DMR</i>	-----	Department of Mineral Resources
<i>DWA</i>	-----	Department of Water Affairs
<i>DEA</i>	-----	Department of Environmental Affairs
<i>EAP</i>	-----	Environmental Assessment Practitioner
<i>Ezemvelo</i>	-----	Ezemvelo KZN Wildlife
<i>EIA</i>	-----	Environmental Impact Assessment - undertaken in terms of NEMA EIA Regulations, 2006
<i>GIS</i>	-----	Geographic Information System
<i>GPS</i>	-----	Global Positioning System
<i>I&amp;AP</i>	-----	Interested and Affected Parties
<i>IUCN</i>	-----	International Union for Conservation of Nature and Natural Resources
<i>KZN</i>	-----	KwaZulu-Natal
<i>MPRDA</i>	-----	Mineral and Petroleum Resources Development Act No. 28 of 2002
<i>NEMA</i>	-----	National Environmental Management Act No. 107 of 1998, as amended
<i>NEM:ICMA</i>	-----	National Environmental Management: Integrated Coastal Management Act No. 24 of 2008
<i>NGO</i>	-----	Non-Governmental Organisation
<i>PTB</i>	-----	Private Township Board
<i>SFRA</i>	-----	Stream flow reduction activity
<i>SANBI</i>	-----	South African National Biodiversity Institute
<i>BGIS</i>	-----	Biodiversity GIS Online database ( <a href="http://bgis.sanbi.org">http://bgis.sanbi.org</a> )

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## 1. Introduction

### 1.1. Preface

Ezemvelo KZN Wildlife (Ezemvelo) is the conservation agency mandated to conserve biodiversity both inside and outside of protected areas within the Province of KwaZulu-Natal in terms of the KwaZulu-Natal Nature Conservation Management Act, Act 9 of 1997. Chapter 4, Section 23:

*“The primary function of the Conservation Service is nature conservation inside and outside protected areas, and to this end the Nature Conservation Service must...undertake to provide support - ...*

*e) for a process to ensure comment can be made on land-use changes outside protected areas where such changes could detrimentally affect ecological process and biodiversity in the province.”*

In fulfilment of this mandate, Ezemvelo provides professional comments and recommendations on land-use change/development applications<sup>1</sup>.

In general, responses are required under regulated timeframes<sup>2</sup> and Ezemvelo has previously found it difficult to provide such comments timeously. One of the reasons for this is that the information provided in the applications does not necessarily fulfil the information requirements for a defensible biodiversity assessment due to lack of understanding of how and when biodiversity issues should be investigated and reported on.

This guideline will provide developers, applicants, environmental consultants, specialists and authorities charged with reviewing/making decisions on applications with guidance to ensure that: (i) project investigation timeframes can be more accurately determined; (ii) feasibility studies could accurately determine biodiversity related fatal flaws; and (iii) the terms of references for specialist studies and the summary reports would allow for informed and sustainable biodiversity decisions.



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<sup>1</sup> Applications handled are SFRA, EIAs, DFAs, PTBs, Act 70 of 70 Subdivisions, Mining permits and licenses, and feasibility assessments. Comments are provided to DAEA&RD, DAFF, DMR, DWA, DEA, DLG&TA, Local Government, Applicants/developers, EAPs as well as NGOs and I&APs.

<sup>2</sup> Timeframes vary depending on application type.

## 1.2. Approach

The guiding principle with regards to biodiversity conservation and sustainable development is one of no net loss of biodiversity and ecosystem processes. To achieve this principle a proactive approach to planning and biodiversity conservation must be adopted to ensure:

- ◆ The early identification and evaluation of potential biodiversity impacts that may constitute 'fatal flaws', or significant biodiversity related/management issues;
- ◆ The early identification and evaluation of conceptual alternatives which could prevent, avoid or reduce significant impacts on biodiversity, or enhance or secure opportunities for biodiversity conservation; and
- ◆ The appropriate design of mitigation through the mitigation hierarchy<sup>3</sup>.

## 1.3. Purpose of the Guideline

The aim of the guideline is to facilitate the compilation of biodiversity reports that would expedite Ezemvelo's review and assessment thereof and the relevant authorities' decision-making processes, by establishing the requirements for:

- ◆ Undertaking specialist investigations in development and land-use change processes; and
- ◆ The incorporation of specialist recommendations into relevant and practical mitigation measures, and the integration of such into Environmental Management Plans/Programmes (or other environmental management instrument) where authorisation to proceed has been granted. Conservation management plans (where required) should be incorporated into the EMPR.

## 1.4. Structure of the Guideline

### **Section 1:**

Sets the context for the development of the guideline and outlines the purpose of the guideline document.

### **Section 2:**

Outlines the baseline information requirements for undertaking biodiversity investigations and the production of specialist reports. The section is divided into two parts: (i) Generic requirements for all assessments; and (ii) Specific requirements for commonly required assessments.

### **Section 3:**

Outlines the baseline information requirements for mapping of sensitive areas and associated buffers on and adjacent to the study site. The section is divided into two parts: (i) Generic requirements for all assessments; and (ii) Specific requirements for commonly required assessments.

### **Section 4:**

Outlines the requirements for the integration of all the specialist study results into one decision-making tool, and the presentation thereof.

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<sup>3</sup> Mitigation hierarchy: Avoid, mitigate, remedy, compensate.

## 2. Terms of Reference for Biodiversity Specialist Studies

All biodiversity specialist assessments should include the baseline information requirements outlined in Section 2.1, as well as the specific requirements listed within the relevant biodiversity assessment categories outlined in Sections 2.2 – 2.7 below.

### 2.1. Requirements for all Biodiversity Specialist Studies

The following requirements are applicable for all biodiversity specialist reports and should be read in conjunction with the specific requirements set out for each biodiversity assessment category<sup>4</sup>.

- a. Assessments must be undertaken by suitably qualified specialists in that field (Suitably qualified being a specialist having expertise which is publicly recognized or otherwise verifiable<sup>5</sup>).
- b. All persons involved in the production of a report must be identified according to the role undertaken, including all persons who undertook fieldwork. The qualifications or ability of such persons to undertake this work must be detailed in the report.
- c. Reports must clearly detail the methods employed in the investigation and must clearly indicate the date(s) and number of hours spent on site, and time of day and conditions where relevant.
- d. Reports must clearly set out the findings and analysis of the investigation and must:
  - i. Identify any assumptions, uncertainties or information gaps.
  - ii. Determine the biodiversity importance of the site, including ecosystem processes (at local, regional and landscape levels). The importance of the site with regard to connectivity and corridors at the local and landscape levels must be highlighted (appropriate to the level of enquiry).
  - iii. Determine and report on the degree to which the proposed development would be likely to impact upon areas of high conservation significance, and determine how significant the impacts would be at the regional, national and global landscape levels (appropriate to the level of enquiry).
  - iv. Indicate whether the potential impacts identified can be avoided and/or mitigated. Where mitigation is possible and appropriate, detailed and practical measures to minimise or avoid the impacts must be provided.
  - v. Include recommendations for management of important biodiversity features for the purpose of enhancing and maintaining biodiversity conservation values and ecosystem services (refer to Annexure 7).
  - vi. Include a list of species identified during the study, highlighting threatened and/or endemic species, or species otherwise considered to be of conservation significance (including their condition and status), as well as medicinal, invasive and exotic species.

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<sup>4</sup> Requirements of the NEMA EIA Regulations, in terms of sections 24(5) and 44 also need to be taken into consideration.

<sup>5</sup> Registered in terms of the Natural Scientific Professions Act (2003), and have relevant collections lodged, or publications and reports, or references from such persons.

- vii. Include details of the sensitivity mapping rules (Refer to Section 3) used to compile the required sensitivity map(s). Buffer zones proposed must be motivated in terms of the current research and publications and must take cognisance of the specific buffer requirements listed in the relevant sections below. Deviations from the recommended buffers in Section 3 must be highlighted and motivated.
- e. Ecological linkages, at both the site and landscape scale (appropriate to the level of enquiry), must be identified and described.
- f. Mapping requirements:
  - i. Maps must be accurately georeferenced, and be available in shapefile format (refer to Annexure 3) where requested.
  - ii. Maps must be provided at an appropriate scale, in colour with an associated key, and superimposed on a recent aerial photograph.
  - iii. Reports must include map(s) illustrating the status quo findings of the specialist studies, and the associated buffers.
  - iv. Reports must include summary sensitivity maps (Refer to Section 3 for sensitivity mapping rules).

## 2.2. Vegetation Specialist Studies

Vegetation types must be aligned with those described on the most recent SANBI maps. These are available on the BGIS website<sup>6</sup>, or by using the data request form available in Appendix 2 for Ezemvelo vegetation maps.

- a. Surveys must take place during the summer season (beginning of November to the end of April). If the area has been burnt, the survey must be undertaken after vegetation has recovered.
- b. Surveys must encompass the site and all relevant adjacent properties (specialist to determine radius based on condition of adjacent properties and expected buffer requirements).
- c. Reports must include details of type and condition of plant communities.
- d. Report must evaluate the potential for the rehabilitation of degraded or transformed portions of the property, back to or close to its historical natural condition/state.
- e. Specific map requirements:
  - i. The location and extent of all vegetation types on the study site and survey area (even if in a poor/degraded condition) must be delineated.
  - ii. Transformed areas to be identified and broadly categorised, viz agriculture tilled, agriculture other, infrastructure, etc.
  - iii. The extent of the above various areas to be indicated in hectares or square metres.



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<sup>6</sup> <http://bgis.sanbi.org>

- iv. For the identified vegetation types, the conservation status<sup>7</sup> and ecological condition<sup>8</sup> must be indicated.

### 2.2.1. Forest Vegetation Specialist Studies



- a. Survey work should in general occur during the summer months. However, the variety of species predicted to occur on site needs to determine the survey time periods and frequency, as certain herbaceous species may only flower in late summer and autumn.
  - b. Surveys must encompass the forest edge and ecotone.
  - c. Reports must include details of type and quality of forest on and adjacent to the site, with the basis for the differentiation clearly explained and set out in the reports.
  - d. The potential for rehabilitation of any transformed portions of the forest back to or close to its historical natural (untransformed) condition/state must be evaluated.
- e. Specific map requirements:
- i. The location and extent of all forest patches and associated ecotones on the study site and survey area (even if in a poor/degraded condition) must be delineated.
  - ii. Transformed areas must be identified, delineated and broadly categorised *viz* agriculture tilled, agriculture other, infrastructure, etc.
  - iii. The extent of the above various areas to be indicated in hectares or square metres.
  - iv. The conservation status<sup>9</sup> and type and condition of the forest must be indicated.

### 2.2.2. Red List, Protected and Endemic Flora Specialist Studies

- a. Surveys must take place during the flowering season of species historically recorded on site, and/or confirmed or predicted to occur on site (surveys for certain species need not be restricted to the flowering season).
- b. The report must evaluate whether the site contains the habitat requirements and is within range for the recolonisation of species predicted to occur on the site, but which were not recorded as being present at the time of the surveys.
- c. Specific map requirements:
  - i. The location and extent of all red list, protected and endemic plant populations on the study site and survey area must be mapped, or the population extent may also be determined according to habitat preferences (Methodology for this must be included in the report).

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<sup>7</sup> Threat category: Provincial, national and global.

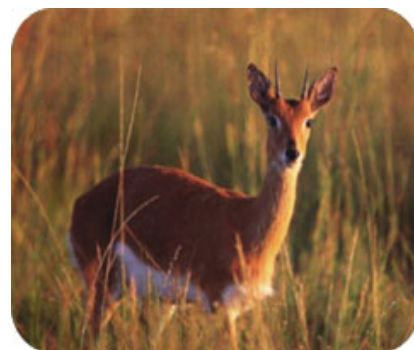
<sup>8</sup> Indicate primary (excellent, good, moderate, poor) and secondary vegetation.

<sup>9</sup> Threat category, provincial and national and global.

- ii. The conservation status<sup>10</sup> and condition of the populations must be indicated.

### 2.3. Fauna Specialist Studies

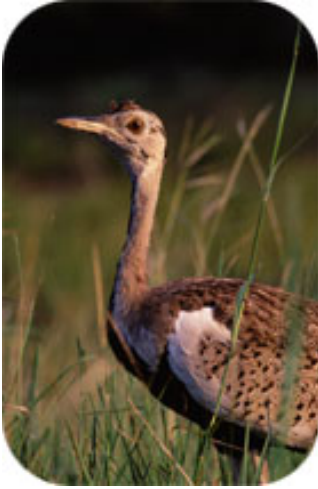
- a. Specific attention must be given to species historically recorded on site, and those confirmed or predicted to occur on site.
- b. Assessment to cover all breeding, foraging, roosting, aestivation and hibernation habitats.
- c. Surveys must encompass the site and all adjacent properties with indigenous vegetation (specialist to determine survey radius based on condition of adjacent properties and expected buffer requirements and corridors).
- d. The report must:
  - i. Differentiate between identified habitats (breeding, foraging, roosting, aestivation and hibernation).
  - ii. Provide details on the status/condition of the habitats identified during the survey.
  - iii. Provide the conservation and population status and viability of the species utilising or predicted to utilise these habitats. The rehabilitation potential must also be indicated, even if species not present.
  - iv. Evaluate whether the site contains viable habitat for the recolonisation or re-introduction of the species predicted to occur on the site (historically), but which were not recorded as being present in the surveys, as well as the rehabilitation potential if habitat is degraded (good condition, degraded, or transformed).
- e. Specific map requirements:
  - i. The location of all sitings and the location and extent of red list, protected and endemic species populations on the study site and survey area must be mapped, or the population extent may also be determined based on habitat preferences (Methodology for this must be included in the report).
  - ii. The location and extent of all known and predicted habitats (breeding, foraging, roosting aestivation and hibernation) on the study site and survey area must be mapped. The condition of these habitats must be clearly indicated (eg: Primary, degraded, transformed).



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<sup>10</sup> Red List threat category and KZN protected species

### 2.3.1. Avifauna Specialist Studies



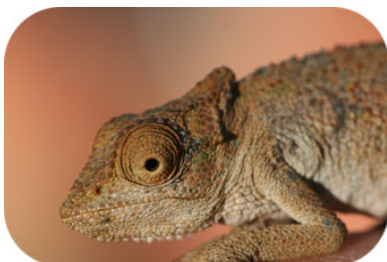
- a. Surveys for:
  - i. Terrestrial birds must be conducted in summer (winter breeding species will require surveys at that time of the year), but only once the vegetation layer has recovered sufficiently from winter fires to allow for assessment of available habitat, ie: between October and December.
  - ii. Aquatic birds must be conducted in summer.
  - iii. Species associated with rivers, must coincide with average flow conditions (i.e. not dry and not in flood) and preferably within the breeding season.
  - iv. Species associated with wetlands, must follow good summer rains i.e. once standing water is present and the vegetation has recovered sufficiently from winter fires to allow for the assessment of available habitat.
- b. Specific map requirements:
  - i. Flight paths (where appropriate).
  - ii. Breeding sites and related buffer (Rationale for buffer width to be included in the report).
  - iii. Specific threat areas (eg: collisions, electrocutions etc).

### 2.3.2. Amphibian Specialist Studies

- a. Surveys should be conducted after good summer rains have fallen within the area under investigation<sup>11</sup>. In the event of a drought period, a risk assessment must be conducted as per the precautionary principle.
- b. Where suitable foraging and aestivation habitat occurs onsite the nearest suitable breeding habitat must be identified. Potential dispersal connections between wetlands in the region will also need to be indicated.



### 2.3.3. Reptile Specialist Studies



- a. Surveys must be conducted in summer, after the vegetation on site has recovered sufficiently from winter fires to allow for assessment of available habitat. For predatory reptiles, relevant prey species must be active. Burrowing species must be surveyed after rains, nocturnal species at night (trapping must cover these periods).

<sup>11</sup> Certain species may need to be sampled for in the first half of summer.

- b. Where suitable foraging and hibernation habitat occurs on site, the nearest suitable breeding habitat must be identified. Potential dispersal connections between suitable habitat may need to be indicated.

#### 2.3.4. Invertebrate Specialist Studies

- a. Surveys must take place :
  - i. During peak activity periods i.e. in the adult stage of development of the species (unless other stages can be easily located and identified). In most cases this is during the spring/summer months, usually after the first spring rains. For assemblage surveys, during the overall peak flight period for the invertebrates of the area.
  - ii. In some cases, especially for ground-living species, visual search surveys earlier in spring before the vegetation shows appreciable growth are acceptable, as searches carried out in late summer when the grass is long can be very difficult.
- b. Given the nature of invertebrates and the influence of the environment, surveys should be carried out over a period of 4 weeks to ensure a comprehensive invertebrate survey. The 4 week period can occur continuously or at weekly visits for monitoring or for accommodating ideal weather conditions and moon phases. The minimum 4 week period can be deviated from depending on the size of the survey site, but this must be justified by the specialist in the report.



#### 2.4. Wetland Specialist Studies

- a. All wetlands on and adjacent to the study site must be identified and delineated as per the Department of Water Affairs' guideline<sup>12</sup>.
- b. Status quo assessment to include:
  - i. Physical factors influencing the wetland functions and processes (Landscape position, topography, geology and soils, slope and aspect, hydrological connectivity, seasonal hydrological regime).
  - ii. The biophysical characteristics of the wetland and associated habitat.
- c. All identified wetlands to be assessed in terms of health and functionality (hydrological, ecological and ecosystem services) as per the Wet Assess Guidelines<sup>13</sup> or an equivalent guideline. Where wetlands are transformed, the assessment needs to include potential levels of functionality that could be expected with iterative levels of rehabilitation.
- d. Identification and assessment of potential land-use/development impacts on the supporting hydrology for the wetlands and threatened or protected species. This assessment must include potential impacts of runoff, stormwater

<sup>12</sup> Department of Water Affairs and Forestry, A Practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones.

<sup>13</sup> Wetland – Eco Services (Kotze *et al* 2005) guidelines.

infrastructure and management, impermeable surfaces, pollution sources (including effluent outlets).

- e. Specific map requirements:
  - i. Hydrological zones of the wetland (i.e the permanent, seasonal and temporary zones).
  - ii. Associated habitat requirements.
  - iii. Buffers, as per sensitivity mapping section.



## 2.5. Riverine and Riparian Specialist Studies

- a. The riparian zone must be delineated as per the Department of Water Affairs and Forestry guideline<sup>14</sup> (now the DWA).
- b. The riparian vegetation assessment must be undertaken as per the vegetation biodiversity study guidelines (Refer to section 2.2).
- c. An assessment of the current ecological state of the watercourse, based on the River Health Programme biomonitoring protocol and classification must be undertaken.
- d. Ecological processes and connectivity at the landscape level must be investigated and reported on.



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<sup>14</sup> Department of Water Affairs and Forestry, A Practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones.

- e. An assessment of the potential impacts of the proposed project on hydrogeomorphology, including the downstream effect on important habitats and integrity of the system must be undertaken, with specific reference to increased pollution/ nutrient loads, and altered stormwater runoff.
- f. Specific map requirements:
  - i. The pre-development and calculated post-development floodlines and riparian zone must be mapped. The date that the floodline was determined must be included.

## 2.6. Coastal Specialist Studies

The coastal sections must be read in the context of a required phased retreat approach.<sup>15</sup> The study must include/evaluate the following issues:

- a. The Geology of the Coastal Environment. Any available surf zone bathymetry should also be mentioned.
- b. The Geomorphology:
  - i. Assess whether the coast is eroding or prograding (changes in the short-, medium- and long- term must be accounted for).
  - ii. Highwater mark (HWM) delineation (changes in the short-, medium- and long- term must be accounted for).
  - iii. Climate Change and related sea-level rise impacts.
  - iv. Sediment budget.



- v. Floodplains of estuaries and wetlands (within a 100m zone) must be delineated.
- vi. Biophysical nature of coastline.
- vii. Identification of prevailing climatic conditions.
- c. Erosion Potential: Presence of erosion hotspots and locations of ongoing erosion.
- d. Aspect and impacts on geological and ecological processes.
- e. Height above sea level (asl) (The storm beach and extreme storm activity must be delineated).
- f. Beach dynamics (beach width, slope and variation). Reference should be made to historical information (e.g. photography where applicable), as to the general dynamics associated with the beach. Note should be made of the prevalence of scarp and seasonal variations of beach profile as well as grain size.
- g. Nature of Land Use and developmental nature of coastline.
- h. Number of Psammoseres: The evaluation must identify and consider the number of psammoseres associated with the frontal dune systems. Description and width of such zones to be provided as well as identification of botanical associates. A

<sup>15</sup> Best International Practice in the face of sea-level rise and changing coastal dynamics is a phased retreat away from the shoreline.

preliminary species list and identification of dominant associations within vegetated dune environment is required.

- i. Ecological Significance.
- j. A description of dune systems; including cliff and headland systems (where applicable).
- k. Identification of fauna within dune environment and above high water mark.
- l. An assessment by the specialist(s) which covers at a minimum the following:
  - i. Stormwater, beach access, sewer/effluent disposal and infrastructure, road access.
  - ii. The potential for rehabilitation of any transformed portions of the dunes back to or close to its historical natural condition/state.
  - iii. In terms of ICMA, whether coastal public property, the coastal protection zone or coastal access land will be affected, and if so, the extent to which the proposed development or activity is consistent with the purpose for establishing and protecting those areas.
  - iv. In terms of ICMA, consistency with the coastal management programmes and coastal management objectives applicable in the area.
  - v. In terms of ICMA, the cumulative effect on the coastal environment of the proposed activity's impact together with those of existing activities.
- m. Specific map requirements:
  - i. The setback line (as per the sensitivity mapping rules outlined in Section 3.6b).
  - ii. Contour lines with the 10 metre contour line highlighted.
  - iii. High Water Mark.
  - iv. Setback line as gazetted in terms of NEM:ICMA.
  - v. The Development Setback line, as gazetted in terms of the EIA Regulations (as amended).
  - vi. Rate of coastal retreat/progradation. A minimum of a 25 year erosion line must be provided based on available rates of regression or progradation of the dune.
  - vii. Identification of geomorphological features and dynamic zones.
  - viii. Storm impacts on beach (identified or predicted).
  - ix. Inland sediment sources (where applicable).

## **2.7. Estuarine Specialist Studies**

The estuarine environment should be delineated according to the following procedure<sup>16</sup>, which is based on the categorization of the estuary under consideration as (i) an estuarine bay, (ii) an estuarine lake, (iii), a river mouth, or (iv) a permanently (predominantly) open or a Temporarily Open/Closed Estuary.

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<sup>16</sup> Chapter 4 - Ezemvelo KZN Wildlife. 2009. Biodiversity Management Guidelines for Ecosystems in KwaZulu-Natal. Report 01/09, QEP, Pietermaritzburg.

- i. **Estuarine Bays** – the high water spring tide level is the appropriate measure to delineate an estuarine bay. However, these systems frequently have supportive environments such as *Phragmites* reed beds, papyrus swamps, freshwater (*Barringtonia*) swamps and other types of wetlands, which should be included within the estuarine boundaries as they provide important support services that assist in the maintenance of estuarine function (e.g. water quantity and water quality), and the increase biodiversity value. Appropriate buffers to these environments would need to be recommended by a wetland specialist.
- ii. **Estuarine Lakes** – these systems in KZN occur on the flat Mozambique coastal plain which results in a much larger ecotonal footprint than might appear from the water surface area of these systems. As for the estuarine bays, the support systems (wetlands, swamps, intertidal reaches) are critical environments sustaining the estuarine function. It is therefore recommended that any adjoining wetland be included within the estuarine boundaries. Appropriate buffers to these environments would need to be recommended by a wetland specialist.
- iii. **River mouths** – these systems are usually open and as large rivers within the KZN context are subject to extreme flood events. For these reasons it is proposed that the 1:100 year floodline is taken as the core estuarine area and any supportive wetlands outside of this are included in the estuarine delineation. Appropriate buffers to these environments would need to be recommended by a specialist.
- iv. **Permanently (predominantly) open and Temporarily Open/Closed Estuaries** – in both these categories close for varying lengths of time. This makes a strong case for using the extent of backflooding as the delineated estuarine area. Systems that are prevented from backflooding lose the benefits of this productive phase and floodplain functions and have substantially smaller estuarine areas resulting in reduced habitat diversity, availability and carrying capacity. The 5m amsl contour has been found to be a highly appropriate boundary measure for the estuarine systems of KZN, as this boundary allows for the highest water levels during natural mouth closure events and provides a small (<0.5m) buffer to this boundary.

- a. The assessment should identify the key physical processes that characterise the estuary and drive its biological responses to environmental influences (natural and anthropomorphic).
- b. An assessment of the current ecological condition/status of the estuary should consider:
  - i. The physico-chemical condition.
  - ii. Expected biota; and
  - iii. Historical impacts upon the estuary (including existing structures, land reclamation, altered freshwater inputs, sedimentation and pollution).
- c. Important freshwater and terrestrial support habitats must be identified (in addition to those included in the delineation of the core estuarine habitat, see above), where these have an ecological linkage to the estuary or an influence upon the ecological integrity of the core estuarine habitat, with an emphasis on habitat ecotones.
- d. The report should identify and assess the significance of the potential impact of the proposed activity/development upon the estuary, with specific reference to anticipated impacts upon:
  - i. Important physical processes or ecosystem drivers (a. above); and
  - ii. Altered ecological condition (b. above)
- e. The report must highlight:

- i. Any potential loss of core estuarine habitat or support habitats;
  - ii. Potential modification of estuary mouth dynamics (including any potential increase in the demand for artificial mouth manipulations);
  - iii. Increased accessibility of sensitive or vulnerable habitats and associated disturbance impacts; and
  - iv. Potential new sources of pollution to the estuary as a result of the proposed activity or development.
  - v. In terms of ICMA, consistency with the objectives of the estuarine management plan for the area (Should such exist).
- f. The report should consider the significance of the potential impacts upon the provincial estuarine resource as a whole, with specific reference to:
- i. Rarity of the estuary type (refer to Annexure 4);
  - ii. Conservation status of the estuary;
  - iii. Rehabilitation potential;
  - iv. The presence or absence of similar habitats in neighbouring estuaries, or in the same aquatic bioregion.
- g. Specific mapping requirements:  
The sensitivity mapping must indicate:
- i. Core estuarine habitat;
  - ii. Freshwater and terrestrial support habitats (c. above);
- h. An appropriate estuary buffer zone.



### 3. Sensitivity Mapping Rules for Biodiversity Assessments

The objective of the sensitivity mapping component of the study is to determine the location and extent of all ecologically sensitive areas. The outcomes of the sensitivity mapping will allow for accurate and comparative analyses of impacts of the proposed activities on sensitive areas and the proposed activity, and inform decisions regarding proposed land-use layout or route alignment<sup>17</sup>.

All biodiversity specialist assessments should include the generic requirements outlined in Section 3.1, as well as the specific requirements listed within the relevant biodiversity assessment categories outlined in Sections 3.2 – 3.7 below.

#### 3.1. Requirements for all Sensitivity Mapping

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<sup>17</sup> An activity is generally considered compatible with the biodiversity sensitivities of the site if all sensitive areas are avoided and are incorporated into an open space system that is managed for the purposes of improving and maintaining biodiversity conservation value and ecosystem services.

- 3.1.1. Ecological linkages/corridors and their associated buffers, at both the site and landscape scale, must be delineated and designated sensitive.
- 3.1.2. Levels of sensitivity must be determined by the specialist and must be based on the following categories; low, medium or high. The methodology for determining levels of sensitivity must be included with the map.

**3.2. Vegetation Sensitivity Mapping**

- a. Areas to be designated as sensitive as per the table below (S = Sensitive, N = Not Sensitive).

**Table 1: Vegetation Sensitivity Mapping Categories**

Condition	Near Threatened	Vulnerable	Endangered	Critically Endangered
Excellent	S	S	S	S
Good	S	S	S	S
Moderate	N	N	S	S
Poor	N	N	S	S
Secondary	N	N	N	S



**3.2.1. Forest Sensitivity Mapping**

- a. Areas to be designated as sensitive:
  - i. All indigenous forest regardless of condition.
  - ii. The corridors (site and survey areas) that allow for optimum connectivity between forests patches.
  - iii. Buffers as determined in (b) below.
- b. Buffer determination:



While a buffer zone of 40 (forty) metres from the edge of the forest has been applied, this standard buffer may not always take the forest and development type into account, and has been inappropriate in some instances.

The determination of an appropriate and site specific buffer depends on a number of factors, and the final buffer needs to be determined utilising the guide provided below. It should be noted that the guideline is

iterative and uses a scaled approach, with the criterion motivating the greatest buffer prevailing<sup>18</sup>.

**Table 2: Forest Buffers**

Buffer scaling	Minimum distance from ecotone
<p><b>Forest is uniformly secondary or uniformly represents recent succession from grassland, woodland or scrub.</b></p> <p>Forest of this type will comprise younger trees, with pioneer and common species conspicuous. Species diversity will be low and rare or unusual species will be absent.</p>	20 metres
<p><b>Critically Endangered, Endangered or Vulnerable forest types</b></p>	100 metres
<p><b>Old Growth Forest</b> (Mature forest, not recently having succeeded from grassland, woodland or scrub. Has a diverse species composition, pioneer species will not be conspicuous, and rare or unusual species may additionally be present).  Old growth forest more than 5 hectares in extent or part of a mosaic of more than 5 hectares.</p>	100 metres
<p><b>Ecotone criterion</b></p> <p>Ecotones add considerably to the overall diversity of a forest, including its ability to maintain fauna. When compared to those in the forest interior, not only may different species occur, but these are often shorter-lived or more successional species.</p>	Buffer should at least equal the depth of ecotone and must allow for management options necessary to maintain the ecotone, including controlled burning.
<p><b>Shading</b> No unnatural shading onto ecotone or natural forest.</p>	Calculation on a case by case basis.
<p><b>Activities creating ecological risk by storing or discharging pollutants or contaminants, or possibly accidentally discharging the same</b></p> <p>Use of herbicides, pesticides, fertilizers, bulk storage of fuels and hazardous chemicals; discharge into atmosphere of pollutants including particulate matter<sup>19</sup> which attaches to surrounding vegetation.</p>	200 metres, but with increase if these impacts cannot be adequately mitigated at this distance.
<p><b>Activities likely to cause long term permanent or irreversible severe impacts</b></p> <p>Some activities may so degrade land that they may cause persistent, permanent or irreversible impacts, such as where the site of the activity will remain a long-term centre of alien plant infestation and spread, or pollution.</p>	200 metres, but with increase if these impacts cannot be adequately reduced at this distance.
<p><b>Erosion</b> (Forests are particularly vulnerable to erosion due to sparse ground cover caused by high shade conditions. Buffers should be large enough to prevent increased overland flows into forest and its ecotone, due to surrounding land transformation).  Activities captured by this criterion will tend to extensively harden surfaces proximate to forest, such but not limited to some residential developments.</p>	Increased runoff to percolate to groundwater outside buffer. Engineered storm water solutions to remain outside buffer. Slopes and less permeable soils will tend to increase buffer.
<p><b>Hydrological Impacts</b></p> <p>This criterion is most critical for wetland forest types.</p>	Size of buffer, and areas to be excluded from transforming activity with potential to change hydrology, should be assessed by a hydrologist. Buffering of subcatchments must also be considered where necessary, such as establishing

<sup>18</sup> Buffers must be able to accommodate dynamic processes. Although a buffer cannot accommodate inexorable expansion, it is important that it accommodates processes approximating natural contraction and expansion. A buffer should be designed to accommodate effective management of the forest edge and its ecotone.

<sup>19</sup> Refer to pollutants described under the National Ambient Air Quality Standards (GN. 1210, 24/12/2009)

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Buffer scaling	Minimum distance from ecotone
	plantations around forest.
<p><b>High intensity edge effects/disturbance along the forest edge</b></p> <p>Categories including the following:-</p>	<p>Buffers should be set at a minimum of 100 metres.</p>
<p>1. High noise Some public, infrastructural (roads, dams, airstrips), commercial and industrial developments.</p>	
<p>2. Frequent activity, including traffic Most public, infrastructural (roads, airstrips), commercial and industrial developments.</p>	
<p>3. Transfer of dust from dirt roads to surrounding vegetation Wherever dirt roads are established.</p>	
<p>4. Periodic or recurrent physical disturbance to the ground and surrounding vegetation, including burning of adjacent transformed area outside of natural frequencies Cultivation involving ploughing, sugar cane farming, harvesting of planted trees (plantations), mining, linear activities which will require periodic disturbance of ground or clearing of vegetation (pipelines and transmission lines).</p>	
<p>5. Activities which have high potential to spread alien species into forest and the ecotone.</p>	
<p>6. Activities which may result in trampling or grazing in the forest and ecotone, i.e. Livestock farming.</p>	
<p>7. Activities which establish large populations adjacent to forest which will likely result in heavy impacts from opening up of paths, illegal harvesting of timber and medicinal products, frequent burning, hunting, infiltration of forest by domestic animals especially dogs, which cannot be controlled by collective arrangements such as Homeowners Association or Body Corporate rules.</p>	<p>100 metres, but with increase if these impacts cannot be adequately reduced at this distance.</p>
<p><b>Activities adjacent to forest which will likely generate some ongoing moderate <i>ad hoc</i> negative impacts</b> For example dumping of refuse; establishment or escape of alien plants including invasive garden ornamentals, or clearing beyond original footprint areas, where this cannot be controlled by an institution of collective arrangements such as Homeowners Association or Body Corporate rules.</p>	<p>60 metres but with increase if these impacts cannot be adequately reduced at this distance.</p>

### 3.2.2. Red List, Endemic and Protected Plant Sensitivity Mapping

- a. Areas to be designated as sensitive:
  - i. Plant populations and required buffers, beginning from the outer edge of the population.
  - ii. The corridors (site and survey areas) that allow for optimum connectivity between population patches.
  - iii. Buffers as determined in (b) below.
- b. Buffer determination:
  - i. Specialist to determine appropriate buffer to ensure the integrity and persistence of the population.



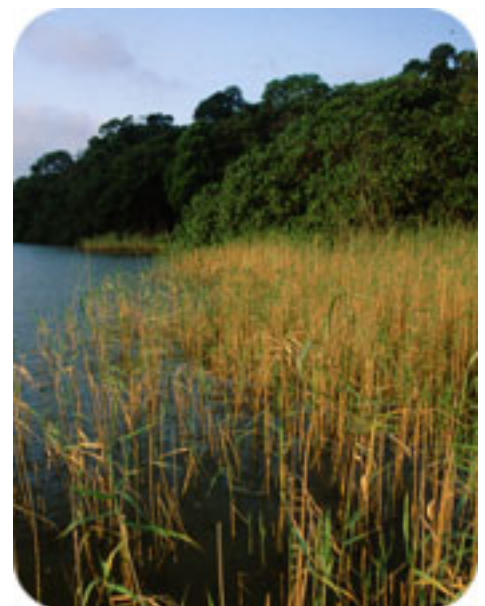
### 3.3. Red List, Endemic and Protected Fauna Sensitivity Mapping



- a. Areas to be designated as sensitive:
  - i. Confirmed populations of species (breeding, foraging, roosting, aestivation & hibernation) and required buffers. Rationale for proposed buffers should be made adequately clear.
  - ii. Suitable and viable habitat (breeding, foraging, roosting etc.) for these species together with appropriate buffers and corridors.
- b. Buffer determination:
  - i. Specialist to determine appropriate buffer to ensure the integrity and persistence of the species or population.

### 3.4. Wetland Sensitivity Mapping

- a. Areas to be designated as sensitive:
  - i. The wetland and its buffer.
- b. Buffer determination:
  - i. The wetland buffer is to be delineated from the outer edge of the wetland temporary zone.
  - ii. A standard wetland buffer width of 30 (thirty) metres has been applied to wetlands in the province, often irrespective of site specific conditions and development type. This approach has been widely acknowledged as problematic. The determination of an ecological buffer should be based on a number of site specific factors. The



following biophysical factors and the interactions between them are the criteria against which buffers must be calculated and motivated, as presented in Table 3. It is to be noted that the criterion motivating the widest buffer must prevail and be utilised.

**Table 3: Criterion for determining width of wetland buffers**

Biophysical Factors	Comment
Slope	Generally the steeper the slopes the wider the buffer.
Soil type (erosion and drainage)	Generally the more erodible the soil the wider the buffer.
Rainfall Intensity	
Vegetation cover	Good basal cover of indigenous vegetation may allow for reduction in buffers.
Land use/ Development type	Generally the higher the impact the wider the buffer.
o Pollution potential	Buffer must ensure all pollution impacts are removed prior to wetland, and if "Habitat Criterion" is applicable, prior to require habitat area.
o Impermeable surfaces & runoff and recharge impacts	Buffer must ensure runoff is of pre transformation quality and quantity.  Buffer must allow for adequate groundwater recharge. In generally the more impermeable surface area the wider the buffer.
o Noise	
o Sedimentation	Buffer must ensure sediment is removed prior to the wetland.
o Introduction of invasive species	Buffer must ensure such impacts are filtered out prior to wetland or habitat area.
o Firebreaks	If firebreaks are required to protect property then potential for increased buffers need to be assessed or firebreaks occur outside the calculated buffer.
Wetland type & functionality - current and potential if rehabilitated  <i>Streamflow regulation, erosion control, water quality, carbon storage, maintenance of biodiversity etc</i>	Buffer must ensure the persistence of hydrological and ecological functionality and provision of ecosystem services provided by the wetland.
Significance of wetland in terms of local, regional and provincial functionality, connectivity and movement of species	Generally the higher the conservation value onsite or in terms of connectivity, the wider the buffer.
Habitat for threatened or protected species (potential and confirmed)	Buffer must include the land required for maintenance of said flora or fauna species, which includes consideration of breeding, foraging, roosting, aestivation, hibernation requirements, population size, genetic heterozygosity, connectivity, minimisation of edge affects.

### 3.5. Riverine (Perennial / Non-Perennial) Sensitivity Mapping



- a Areas to be designated as sensitive:
  - i. Area below 1:100 year floodline, riparian zones and buffer zone.
- b Buffer determination:
  - i. 20m from the 1:100 year floodline for rivers/streams.
  - ii. 30m from the edge of the riparian zone for rivers/streams.

- iii. 20m from edge of drainage lines.

**3.6. Coastal Sensitivity Mapping**

a Areas to be designated as sensitive:

- i. Area below setback line(s).

b Setback determination<sup>20</sup>:

The setback must be calculated utilising the table below and the decision trees and graph in Annexure 1:

- i. Complete the "Outcomes" section of the Table using the results from the 7 decision trees and the table for the ecological significance (Annexure 1).
- ii. Complete the "Level of significance" section of the Table using the results from left side of the graph (Annexure 1).
- iii. Complete the "Proposed setbacks" section of the Table using the results from the right side of the graph (Annexure 1).
- iv. The final set back line is determined by utilising the proposed set back value of greatest extent.



**Table 4: Coastal setback calculation**

	Outcome	Level of significance	Proposed set back
Rock type and Stability			
Geomorphology and beach dynamics			
Erosion Potential			
Aspects			
Height asl			
Development Nature			
No. Psammoseres			
Ecological significance.			
<b>Final setback line</b>			

**3.7. Estuarine Sensitivity Mapping**

a The mapping must indicate the following as sensitive, in subscribing to the principle of no net loss :

- i. The core estuarine habitat;
- ii. Freshwater and terrestrial support habitats; and

<sup>20</sup> This setback is to be used in the interim until the official setback line for the province is established by the MEC in terms of the ICMA.

- iii. The proposed estuary buffer zone.
- b Buffer determination:
- i. The estuary should be treated as a single ecosystem, with each habitat within the estuarine environment being intimately connected with every other habitat, i.e. the buffer zone should consider the estuary holistically.
  - ii. The width and character of the buffer zone should be purposed to protect the physico-chemical processes that characterize and drive the biological responses of the ecosystem. This is to ensure the resilience of the estuary over time in terms of functionality, biodiversity conservation value, and ecosystem goods and services for the whole diversity of habitats present in the system.
  - iii. The buffer should reflect the natural limitations of the ecosystem, i.e. the estuary's carrying capacity, as this has a direct influence on the long-term resilience of the system.
  - iv. Where related freshwater and terrestrial support habitats are identified outside of the core estuarine area, the appropriate buffer zone should be determined according to the sensitivity mapping rules for these specific habitat types (described elsewhere in this document). The biodiversity and functional value that these may add to the core estuarine area must be recognized.



#### 4. Integration of Biodiversity Specialist Assessments into Application Reports

The presentation of summarised specialist biodiversity assessments for informed and defensible decision-making by authorities and stakeholders, should include the following:

- a. Specialist studies, in their entirety, attached as appendices to the submission.
- b. A composite sensitivity map collating the sensitivity mapping products from each specialist study. The highest sensitivity value identified for each area should be depicted. The map must be signed by all relevant specialists (where this is not possible, individual maps signed by the relevant specialist may be submitted provided that they are of the same scale as the composite sensitivity map).
- c. The composite sensitivity map should be in colour (with a key), and include the location and size (in hectares) of all sensitive areas.

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- d. A separate map of the proposed project footprint (including all development structures, stormwater structures, service infrastructure, hard and soft landscaping, access roads, construction/installation work areas, etc.) superimposed upon the sensitivity map.
- e. Photographs of all the biophysical characteristics of the site, including major vegetation units and sensitive features. All photographs must be dated (ddmmyy) and referenced in terms of location and direction against a separate map/aerial image.
- f. Assessment of the potential biodiversity impacts of the proposed development based on the findings, assessments and recommendations for mitigation in all the specialist studies conducted for each feasible/reasonable alternative. Should the EAP disagree with or deviate from any of the findings, assessments and/or recommendations of the specialist studies the points in question must be highlighted and discussed.
- g. A description of residual negative impacts on significant biodiversity and ecosystem services.
- h. An explicit and defensible statement on the preferred alternative/option.
- i. If it is concluded that the development is feasible from an environmental, social and economic point of view, an Environmental Management Plan/ Program which incorporates all the mitigation measures from the specialist studies, must be compiled and included in the documentation.



## 5. References

- Ezemvelo KZN Wildlife. 2009.** Biodiversity Management Guidelines for Ecosystems in KwaZulu-Natal. Report 01/09, QEP, Pietermaritzburg.
- GDACE. 2008.** Gauteng Department of Agriculture, Conservation and Environment's requirements for Biodiversity Assessments, Version 2 March 2008 (Ed Pfab, M).
- Graham, M. & de Winnaar, G. Undated.** Developing Guidelines to Determine Appropriate Buffers for the Protection of Freshwater Wetlands from various Land Use Impacts in Kwazulu-Natal.
- Sustainable Development Projects cc & AS Consulting. March 2008.** Minimum Requirements Guideline for Biodiversity Impact Assessments Relating to Area Between Chart Datum High Water Mark and 100m Landward.
- Styles, D. undated.** Guidelines for Biodiversity Assessments, Mitigation for Development Impacts and Determination of Buffers for Forests In KwaZulu-Natal.

Annexures

Annexure 1: CALCULATION OF COASTAL SET BACK LINE

Figure 1: Decision Tree 1 – Rock type (coastal setback calculation)

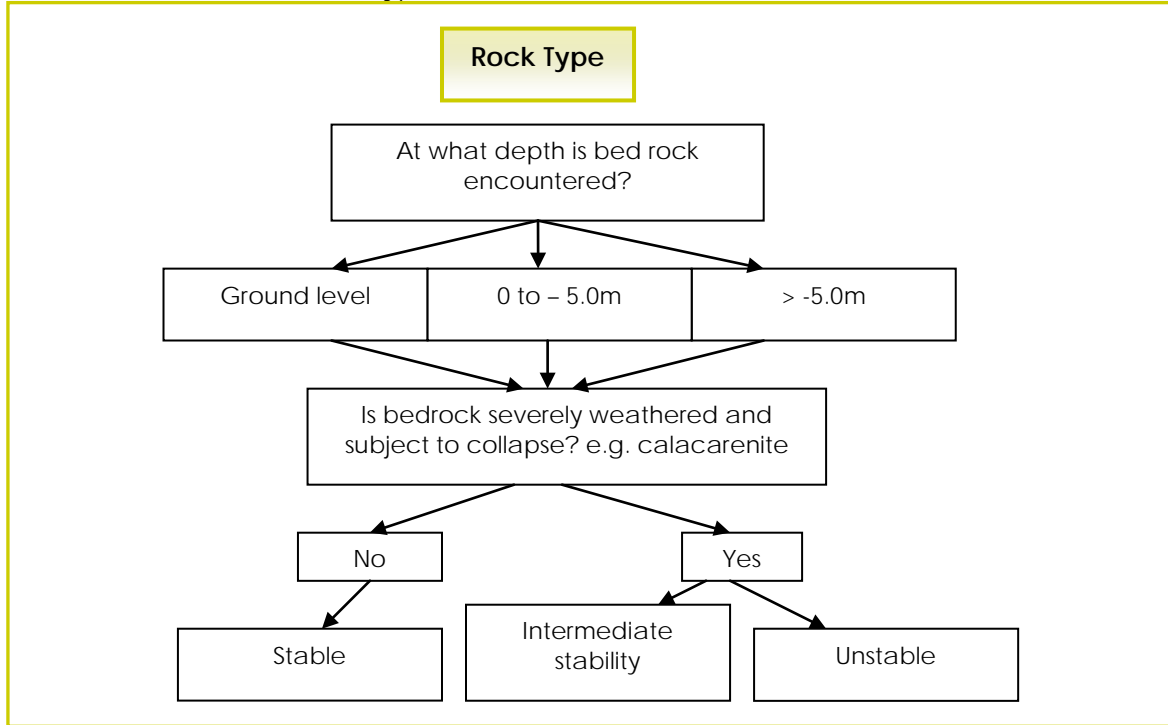


Figure 2: Decision Tree 2 – Geomorphology & Beach Dynamics (coastal setback calculation)

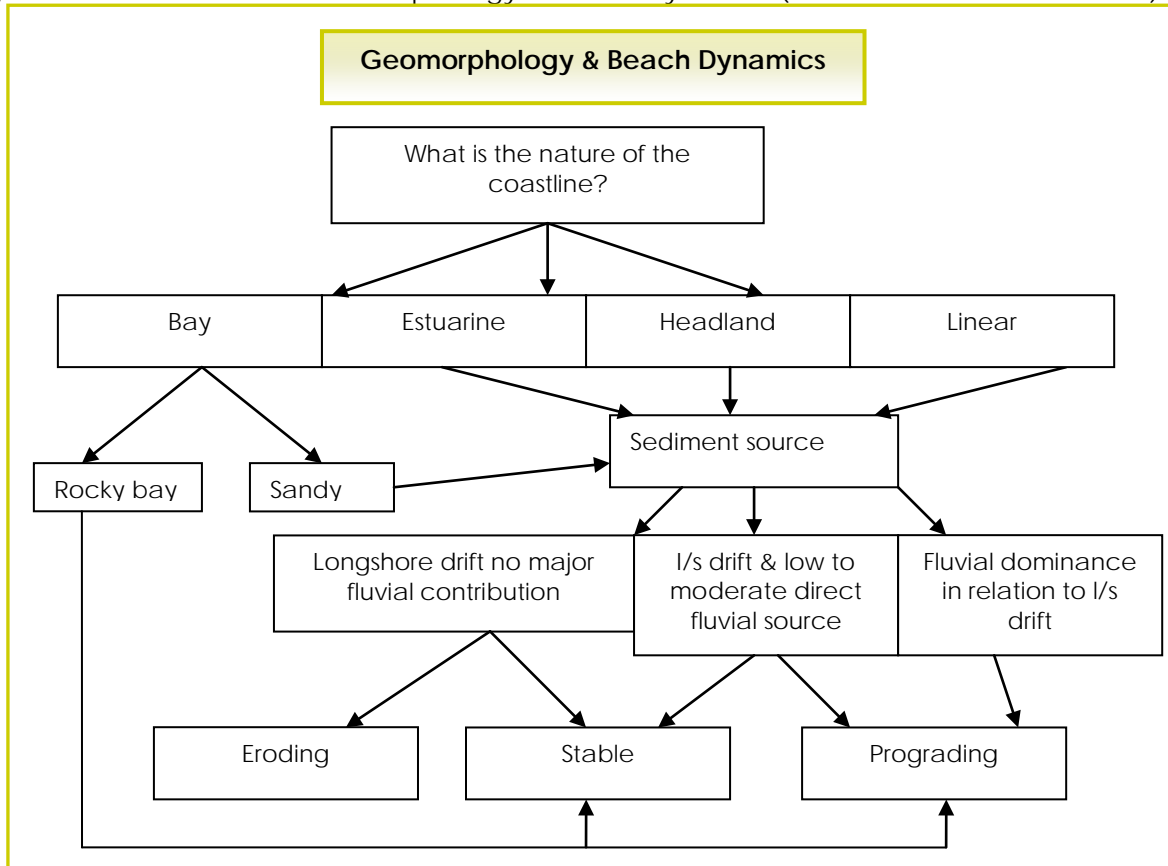


Figure 3: Decision Tree 3 – Erosion Potential (coastal setback calculation)

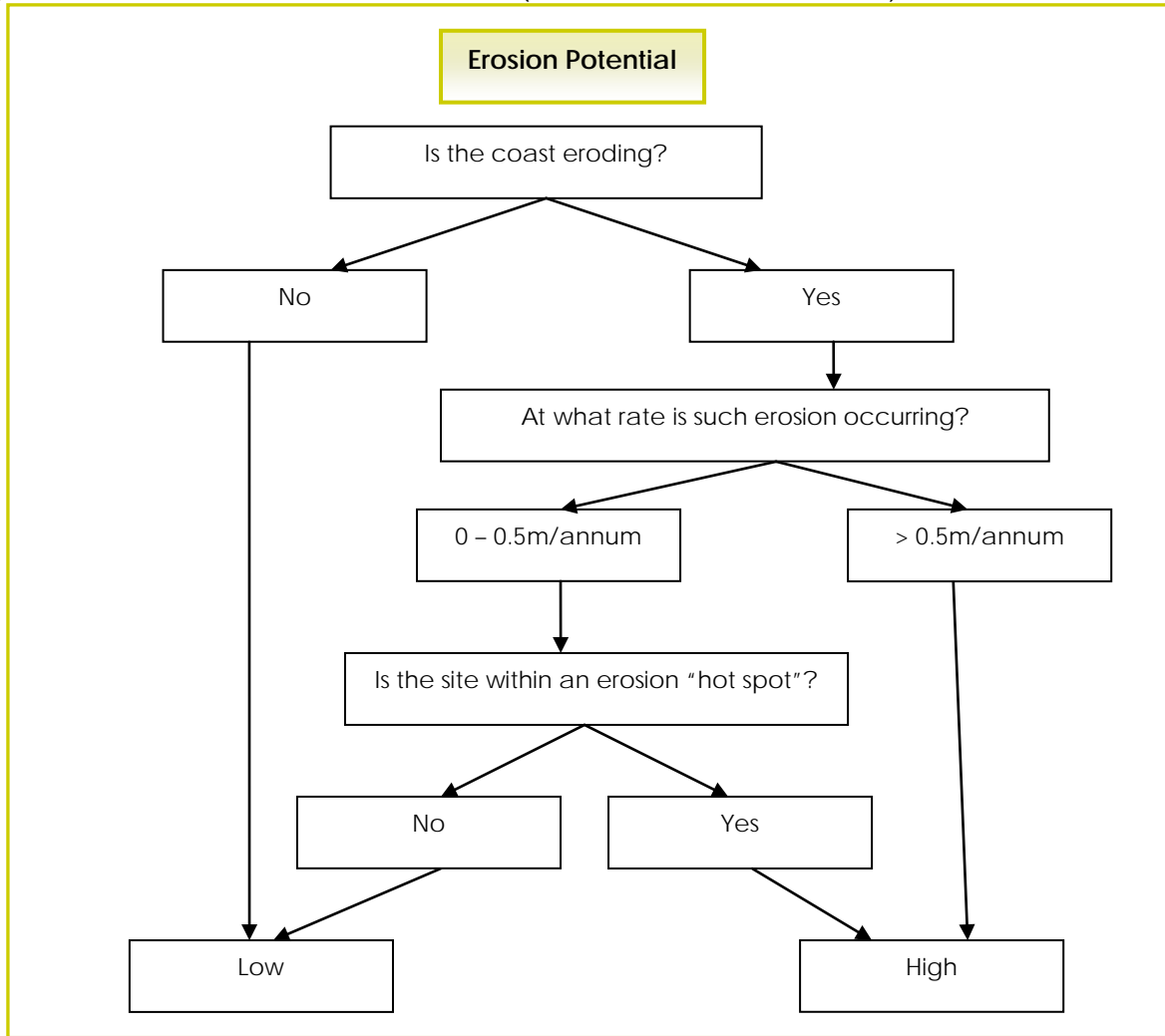


Figure 4: Decision Tree 4 – Aspect (coastal setback calculation)

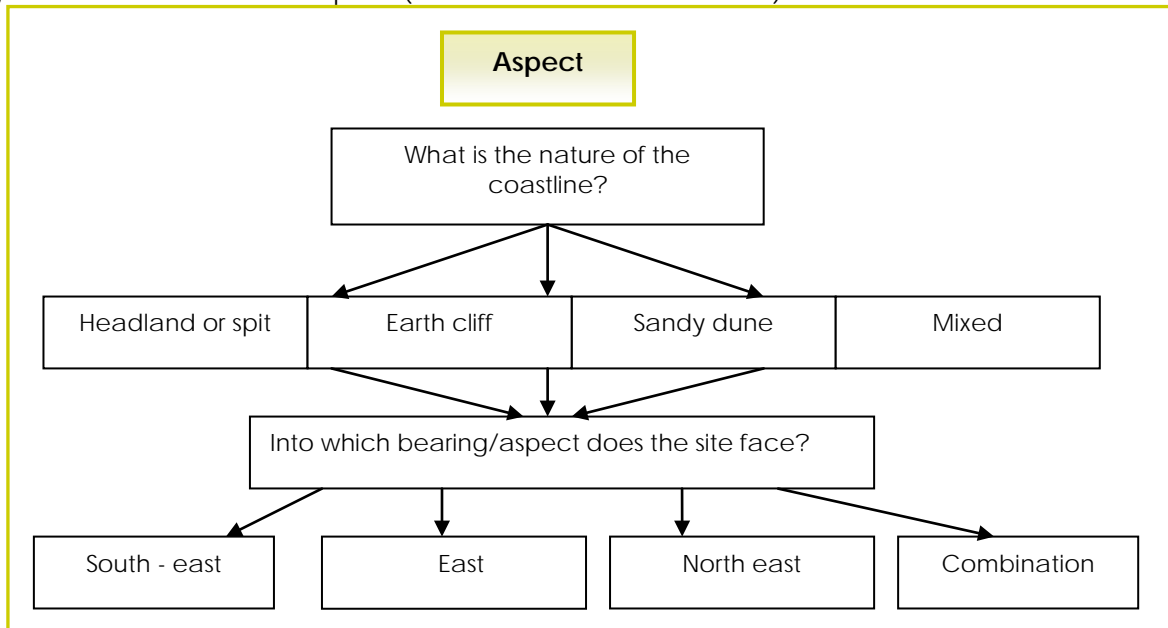


Figure 5: Decision Tree 5 – Height above sea level (coastal setback calculation)

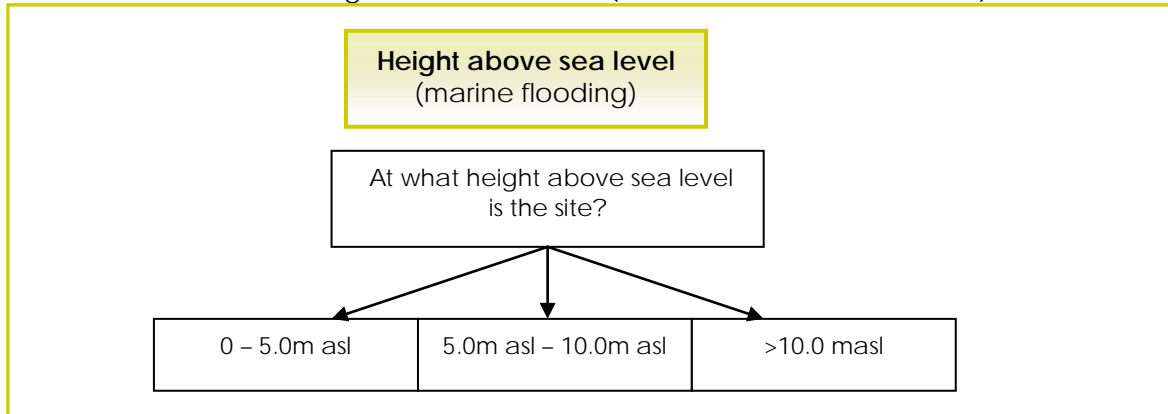


Figure 6: Decision Tree 6 – Development Nature of Coastline (coastal setback calculation)

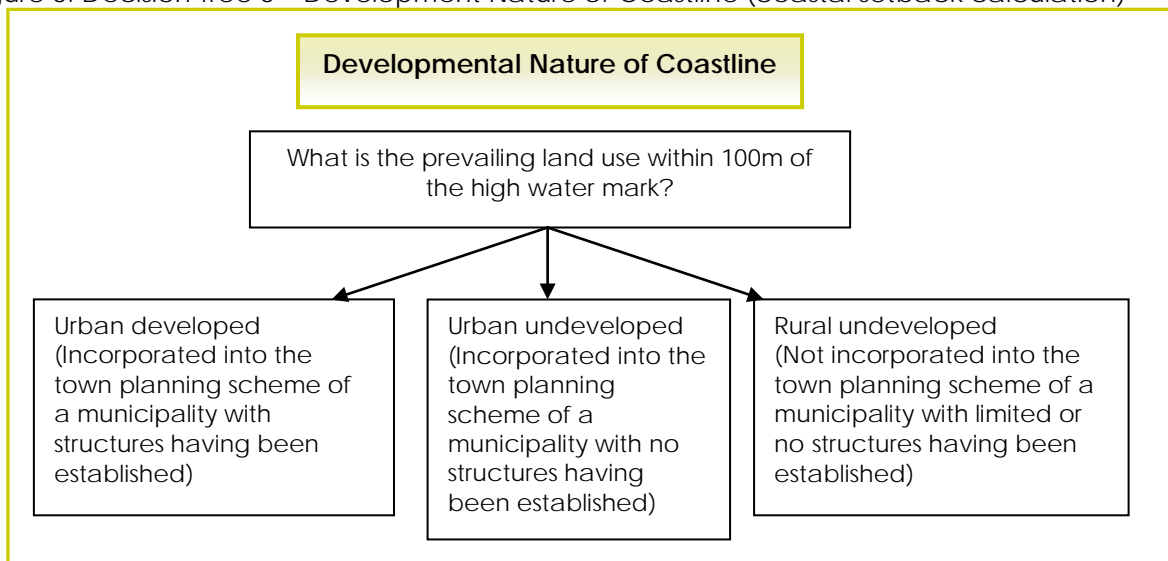
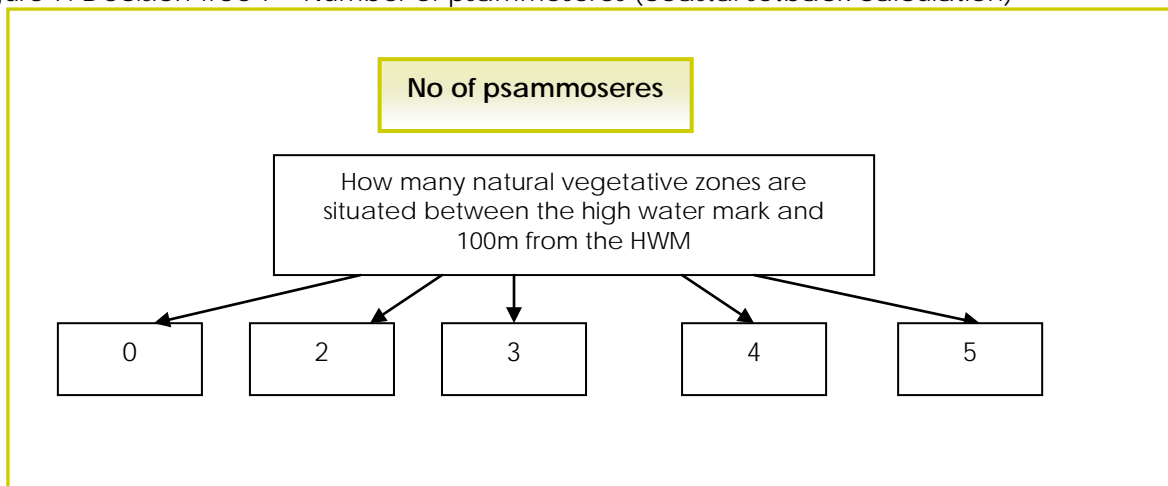


Figure 7: Decision Tree 7 – Number of psammoseres (coastal setback calculation)



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**Ecological Attribute Table:**

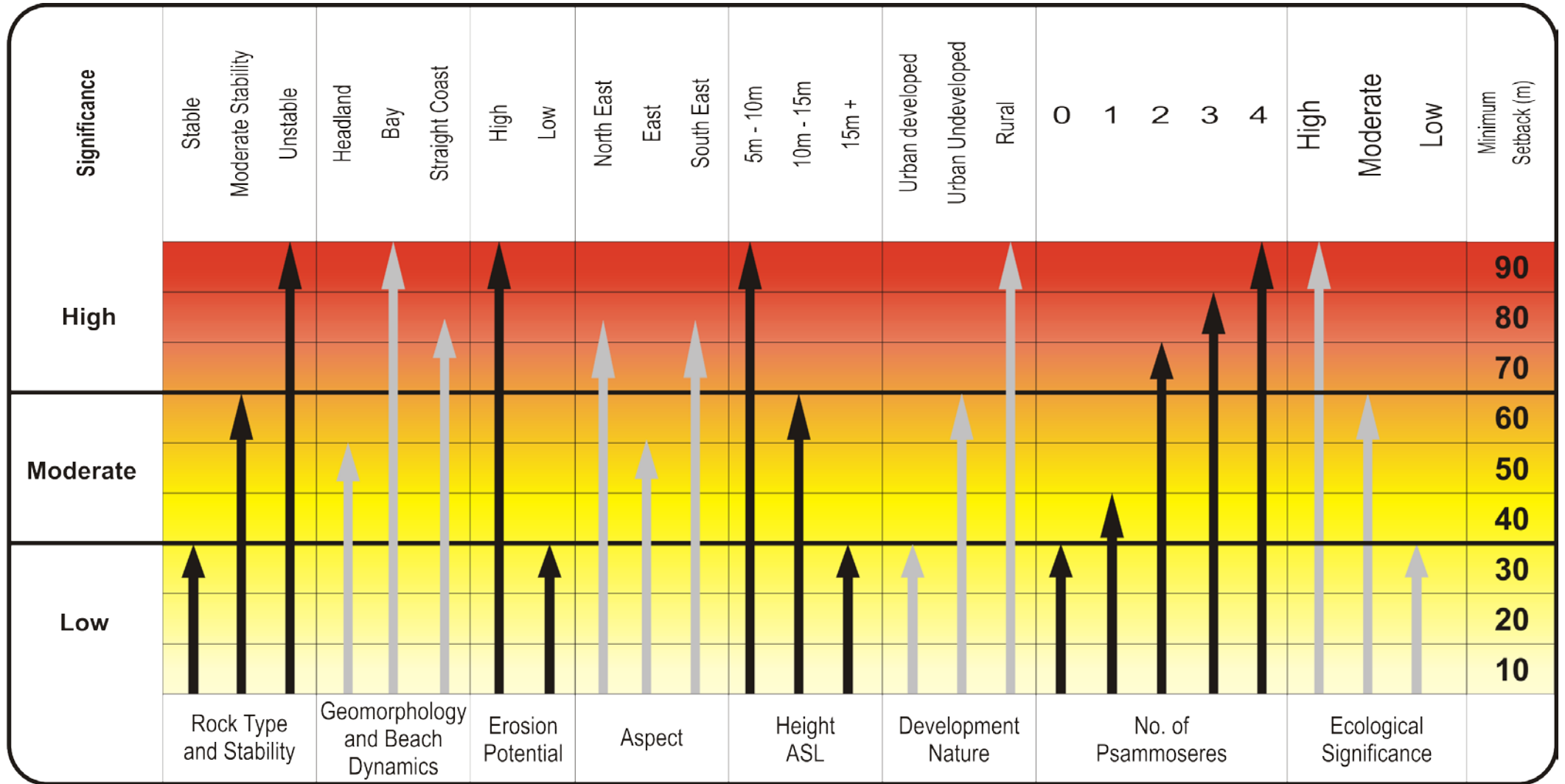
If dunes are present on site use the values under the "Dunes" column and if cliffs are present on site use the values under the "Cliff" column. Values used are based on presence or absence of features and are thus for absence are "0" and presence value given in row, e.g. "2". An addition of all identified attributes will reveal the significance of the site, which is then converted to percentage.

**Ecological Significance:** Low = < 33%; Moderate = 34% - 66%; High > 66%.

**Table 5: Ecological attributes (coastal setback calculation)**

Ecological Attribute	Dune	Present	Cliff	Present
The nature of the coastline: Dune or Cliff	2		3	
Hummock dune present	2		3	
Primary dune present	1		2	
Primary and Secondary dune present	3		3	
Vegetated dunes	2		3	
Dune slack present	2		3	
Dune slack dry	2		3	
Dune slack moist	3		3	
Dune slack vegetated	3		3	
Dune slack unvegetated	2		3	
Rocky cliff			2	
Earth cliff			3	
Cliff < 5m			2	
Cliff > 5m			3	
Cliff within splash zone			3	
Cliff has seep evidence			3	
Cliff exhibits hygrophilous vegetation			3	
Cliff exhibits moist halophytic vegetation			3	
Evidence of faunal refugia	3		3	
Salt Marsh associated with site	3		3	
RDB species associated with site	3		3	
Rare species associated with site	2		2	
Natural continuum hwm to >100m leeward	3		3	
Total Highest Score	36		65	
Actual Score				
Percentage Score				

Figure 8: Graph for Coastal Erosion set back line (coastal setback calculation)



## **Annexure 2: SPECIES DATA REQUESTS**

Requests for species data may be submitted to [database@kznwildlife.com](mailto:database@kznwildlife.com) and should preferably be accompanied by either a shapefile, or co-ordinates, of the proposed site.

There are two data sets which can be queried. Firstly, the SEA (Strategic Environmental Assessment, 2000); this project modeled the distribution of a selection of 255 red-data or KZN Endemic plants and animals. The resulting spreadsheet lists those species which have the potential to occur on the site. Secondly, the Species Database, which will provide a list of species that have been collected in the area. Please note that neither dataset provides a comprehensive species list.

The Conservation Plan Irreplaceability map is also available, in shapefile format, on request. This layer can be queried (Using ArcView) to produce an irreplaceability value for the site, and list any special conservation features which may occur in the planning unit.

The data request form is attached below.



## BIODIVERSITY DATA REQUEST FORM

SUBMIT TO:
Biodiversity Data Manager Ezemvelo KZN Wildlife P.O. Box 13053 CASCADES 3202
Email: database@kznwildlife.com
Fax: 033 - 845 1226

FROM:	Date:
Name & Address:	
Email:	
Phone:	
Fax:	

It is requested that the following data set be authorised for distribution:

**General Description\*** (eg Environmental Atlas, area of coverage or site -give coordinates):

.....  
 .....  
 .....  
 .....

**Specifications\*** (eg software format) : .....

.....  
 .....

**Purpose \*** (what will the data be used for, nature of final product)

.....  
 .....

Date for final completion of product .....

\* Adequate information given here will prevent unnecessary delays due to the Ezemvelo having to call for further information.

### Conditions

Recipients will need to undertake:

- 1 to use the data set only in accordance with the conditions specified;
- 2 to acknowledge the source of the data set as Ezemvelo KZN Wildlife (Ezemvelo) in any documentation derived from or associated with the use of these data;
- 3 to provide Ezemvelo with a free copy of any products generated in whole or in part from the data provided by Ezemvelo;
- 4 not to hold Ezemvelo liable for the quality or accuracy of the data supplied and to indemnify and hold harmless Ezemvelo, its members, officers, employees and agents against all claims, losses, legal proceedings or costs arising for whatever reason from use or dissemination of the data supplied.
- 5 not to distribute data obtained to third parties.
- 6 to adhere to any further conditions that may be applied:.....
- 7 .....

### Costs (can be waived for registered projects)

1. Retrieval of information from databases - R50 per 15 minutes or part thereof.
2. Work involving professional services other than retrieval from Ezemvelo databases will be negotiated.

Name of person requesting data set: .....Order Number:.....

Name of person receiving data set: .....Signature:.....

By signing this form signatory accepts conditions as stated.

### Annexure 3: SHAPEFILE STANDARDS

Ezemvelo KZN Wildlife requires that a shapefile be supplied on disc with an application for land use change. This should depict the property and the proposed footprint of the application. The shapefile must be in the geographic (decimal degrees) coordinate system in the WGS84 datum, in other words, not projected e.g. to Transverse Mercator.

The following mandatory metadata fields must accompany the shapefile being submitted:

- ☐ Date of file completion and date of source data.
- ☐ State if the data was derived using a GPS or derived off a map (if the latter, supply the map name/source and datum).
- ☐ Accuracy of data/resolution (ie 1:50000 or 1:30000 etc).
- ☐ Data Source/Capturer.
- ☐ Methodology used in its completion/lineage.
- ☐ If the data was electronically captured/extracted from an alternative electronic source, the metadata for this and older sources must also be included (ie the date and source of the data).
- ☐ The EIA reference number for the project for which this data was supplied.
- ☐ The name of the project for which the data was commissioned/captured and reference to the report (which specialist report etc).

The following are optional requirements if applicable:

- ☐ Sensitivity of the data (should/can this be public knowledge or not).
- ☐ Who owns the copyright for the data.
- ☐ Lifespan of the data (When is the next revision due).

#### **Please note:**

It is essential that the shapefile contain at least the following three files having the same prefix, but different extensions:

- ☐ shp – the file that stores the feature geometry (or the shape of the feature).
- ☐ shx – the file that stores the index of the feature geometry.
- ☐ dbf – the dBASE file that stores the attribute information of features.

When shapefiles are created using ESRI's ArcGIS software, a file with the following extension must also be included: \*.prj – the file that stores the coordinate system information.

Before the shapefile is supplied, please open this file (i.e. with Notepad), or check the shapefile's properties in ArcCatalogue, and make sure that the coordinate system is set to geographic, WGS84.

Optional extensions to include may be any of the following:

- ☐ \*.xml – the file that stores metadata (information about the data). For programs which do not produce an XML metadata file, the additional metadata indicated below can be provided as a text document.
- ☐ \*.sbn and \*.sbx – the files that store the spatial index of the features.
- ☐ \*.fbn and \*.fbx – the files that store the spatial index of the features for shapefiles that are read-only.
- ☐ \*.ain and \*.aih – the files that store the attribute index of the active fields in a table or a theme's attribute table.

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The collection of files should be treated as one file and should never be separated, or else the shapefile will be rendered unusable. Preferably, house them all within a single zip file.

**NB:** Please note that a file with any of the following extensions is not a shapefile: .apr, .aep, .axl, .mxd. These are examples of map documents (commonly referred to as project files) created by different ESRI GIS software. Map document files only contain references to data stored on your hard disk and do not contain the data physically. Such a file cannot be opened without the accompanying shapefiles. Ezemvelo only requires the shapefile, and not the map document.

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