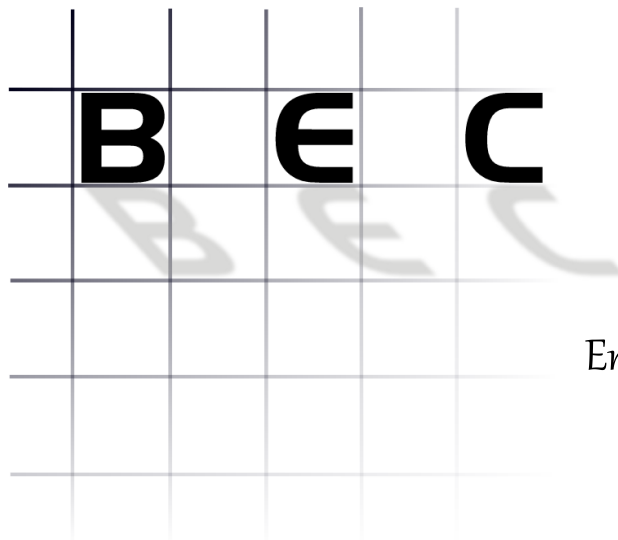


Terrestrial Biodiversity Scoping Assessment for the proposed Ash Dam
for Hendrina Power Station,
Mpumalanga Province

compiled by



Bathusi
Environmental
Consulting

May 2011

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I PROJECT DETAILS

Client: Lidwala Consulting Engineers
Report name: Strategic Terrestrial Biodiversity Scoping Assessment for the proposed ash dam for Hendrina Power Station, Mpumalanga Province.
Report type: Terrestrial Biodiversity Scoping Assessment Report
BEC Project number: LDW - HAD – 2011/16
Authority Reference: N/A
Compiled by: Riaan A. J. Robbeson (Pr.Sci.Nat.), Bathusi Environmental Consulting

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III SPECIALIST INVESTIGATORS

The Natural Scientific Professions Act of 2003 aims to 'provide for the establishment of the South African Council of Natural Scientific Professions (SACNASP), and for the registration of professional, candidate and certified natural scientists; and to provide for matters connected therewith'.

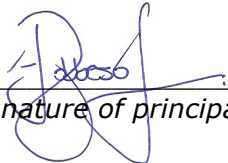
Quoting the Natural Scientific Professions Act of 2003: 'Only a registered person may practice in a consulting capacity' (20(1) – pg 14).

Floristic Investigator:	Riaan Robbeson (Pr.Sci.Nat.)
Qualification:	M.Sc. (Botany), UP
Affiliation:	South African Council for Natural Scientific Professions
Fields of Expertise:	Botanical Scientist & Ecological Scientist
Registration Number:	400005/03
Affiliation:	Grassland Society of Southern Africa
Membership Status:	Professional Member
Membership Number:	667.08/08
Investigator:	Dewald Kamffer (Pr.Sci.Nat.)
Qualification:	M.Sc. (Conservation Biology), UP
Affiliation:	South African Council for Natural Scientific Professions
Fields of expertise:	Ecological Scientist & Zoological Scientist
Registration number:	400204/05

IV DECLARATION OF INDEPENDENCE

All specialist investigators, project investigators and members of companies employed for the purpose of conducting this biodiversity investigation declare that:

- we act as independent ecologists compiling this report
- we consider ourselves bound to the rules and ethics of the South African Council for Natural Scientific Professions;
- at the time of completing this report, we did not have any interest, hidden or otherwise, in the proposed development or activity as outlined in this document, other than financial compensation for work performed in a professional capacity in terms of the Environmental Impacts Assessment Regulations, 2005;
- we will not be affected in any manner by the outcome of the environmental process of which this report forms part of, other than being part of the general public;
- we do not have any influence over decisions made by the governing authorities;
- undertake to disclose, to the competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2005;
- will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
- we do not necessarily object to or endorse the proposed development, but aim to present facts and recommendations based on scientific data and relevant professional experience; and
- should we consider ourselves to be in conflict with any of the above declarations, we shall formally submit a Notice of Withdrawal to all relevant parties and register as an Interested and Affected Party.



Signature of principal ecologist:

Bathusi Environmental Consulting cc (CK1999/052182/23)

Name of company:

4th May 2011

Date:

V SURVEY DETAILS

A site brief investigation of the proposed sites was conducted on the 20th April 2011.

VI LEGISLATION

Compliance with provincial, national and international legislative aspects is strongly advised during the planning, assessment, authorisation and execution of this particular project. Legislative aspects taken cognisance of during the compilation of this report included the following, but may not necessarily be limited to the following:

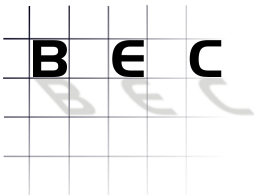
Table 1: Legislative guidance for this project	
Biodiversity Act (No. 10 of 2004)	To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith.
Conservation of Agricultural Resources Act 43 of 1983	The conservation of soil, water resources and vegetation is promoted. Management plans to eradicate weeds and invader plants must be established to benefit the integrity of indigenous life.
Constitution of the Republic of South Africa (Act 108 of 1996)	The Bill of Rights, in the Constitution of South Africa (No. 108 of 1996), states that everyone has a right to a non-threatening environment and requires that reasonable measures are applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in NEMA and given further expression.
Convention on Biological Diversity, 1995	International legally binding treaty with three main goals; conserve biological diversity (or biodiversity); ensure sustainable use of its components and the fair and equitable sharing of benefits arising from genetic resources.
Convention on International Trade in Endangered Species of Wild Life and Fauna	International agreement between governments, drafted as a result of a resolution adopted in 1963 at a meeting of members of the International Union for Conservation of Nature (IUCN). Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival and it accords varying degrees of protection to more than 33,000 species of animals and plants.
Environmental Conservation Act (No. 73 of 1989)	To provide for the effective protection and controlled utilization of the environment and for matters incidental thereto.
National Environmental Management Act (No. 107 of 1998)	Requires adherence to the principles of Integrated Environmental Management (IEM) in order to ensure sustainable development, which, in turn, aims to ensure that environmental consequences of development proposals be understood and adequately considered during all stages of the project cycle and that negative aspects be resolved or mitigated and positive aspects enhanced.
National Environmental Management Act (No 10 of 2004)	Restriction of activities involving alien species, restricted activities involving certain alien species totally prohibited and duty care relating to listed invasive species.

Table 1: Legislative guidance for this project

<p>National Forest Act, 1998 (No 84 of 1998)</p>	<p>Cutting, disturbing, damaging or destroying any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7(4) or section 23; or an exemption from the provisions of the subsection published by the Minister in the Gazette. The sections include protected tree species, a particular tree, a group of trees or particular woodland to be a protected tree, group of trees, woodland or species. In terms of section 15, no person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.</p>
<p>National Spatial Biodiversity Assessment</p>	<p>The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.</p>
<p>Protected Areas Act (No. 57 of 2003)</p>	<p>To provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.</p>
<p>Protected Species – Provincial Authorities</p>	<p>Provincial ordinances were developed to protect particular plant species within specific provinces. The protection of these species is enforced through permitting requirements associated with provincial lists of protected species. Permits are administered by the provincial departments responsible for environmental affairs.</p>

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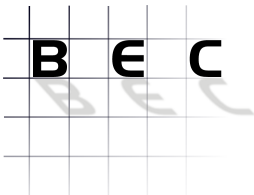


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Only biophysical attributes that have a direct bearing on the sensitivity of the site alternatives are highlighted in this assessment. Furthermore, a detailed wetland ecological report is compiled for the purpose of this EIA and only an overview of the presence of areas of surface water is presented in this report since it also relates to terrestrial biodiversity on a local and regional scale. Suffice to highlight the presence of numerous areas of surface water, in the form of small pans, riparian areas and seepages in and around the proposed sites. Where possible, the existing database was updated to reflect previous information gaps.

The region comprises extensive transformed habitat that resulted from agriculture and mining, rendering remaining habitat fragmented and isolated and ultimately relatively sensitive. Little natural grassland habitat remains in the area, the majority present around streams and rivers where ploughing is not possible or soils are poor in nutrients. At this stage of the process it is assumed that the category of natural grassland is representative of the regional vegetation types and in a good condition. Although unlikely to hold true for most of the study area, an assessment of the actual ecological status of grasslands within the study area is beyond the scope of this report, but will be assessed during the EIA phase.

The only MCBP category of note within the site alternatives is 'Least Concern, generally conforming to the remaining natural grassland, as depicted in the land cover database as well as wetland and surface water habitats. These areas are generally regarded as moderately sensitive, mainly as a result of the extensive habitat transformation of the general region and the small portions of remaining natural habitat. No area of restriction is identified within any of the proposed site alternatives in terms of the MCBP classification database.

The SANBI database indicates the known presence of only 38 plant species within this particular ¼ degree grid (2629BA). This low diversity is the result of poor floristic knowledge of the area and is not a reflection of a poor habitat and floristic diversity. No floristic species of conservation importance is known to occur in this region, according to the SANBI database. However, all areas of natural grassland habitat and wetland habitat, in particular, are regarded suitable for the potential presence of flora species of conservation importance.

Schedules 11 and 12 of Mpumalanga Nature Conservation Act No. 10 of 1998 have reference for protected and Red Data plant species. Schedule 13 of Mpumalanga Nature Conservation Act No. 10 of 1998 has reference in terms of alien and invasive plant species.

A total of 11 Red Data fauna species are regarded moderately likely to occur in the immediate area, considering the type and distribution of habitat types. In particular, wetland related habitat is regarded significant for the potential presence of Red Data fauna species and most of the moderately likely species utilises wetland habitat extensively. The study area is ultimately characterised by a matrix of transformed

faunal habitat (maize field etc.) with scattered portions of untransformed grassland and wetland habitats, but little of the original ecological characteristics remain within the larger region.

Schedules 1 to 8 of Mpumalanga Nature Conservation Act No. 10 of 1998 have reference.

Habitat types, and preliminary habitat sensitivities, that were visually identified within the proposed site alternatives include the following:

- Agricultural fields –No attributes of natural habitat remains within these areas and a low ecological sensitivity is ascribed to these parts. It is also unlikely that these areas will recover to a natural state;
- Natural grasslands –A moderate to high sensitivity (depending on the actual status) is normally ascribed to these parts, mainly as a result of the severe fragmentation and isolation of remaining fragments;
- Wetlands – A high sensitivity is ascribed to these parts; and
- Transformed habitat – No attributes of natural habitat remains within these areas and a low ecological sensitivity is ascribed to these parts. It is also unlikely that these areas will recover to a natural state.

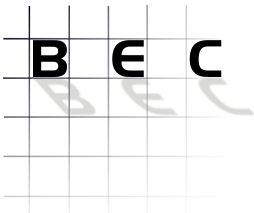
Preference of the proposed sites for the development is as follows:

- Site A – PREFERRED/ ACCEPTABLE;
- Site B – PREFERRED/ ACCEPTABLE;
- Site C – ACCEPTABLE/ NOT PREFERRED;
- Site D – ACCEPTABLE/ NOT PREFERRED; and
- Site E - PREFERRED/ ACCEPTABLE.

It should be noted that each of the site alternatives have strong and weak selection points for the proposed development. The presence of small and isolated sensitive habitat within the boundaries of some of the sites, compared to the presence of larger, sensitive habitat within the immediate surrounds of other sites ultimately renders the difference between the various site alternatives relatively small. While the loss of some small areas of sensitive habitat could be debated as a significant impact, impacts of the proposed development on surrounding areas of sensitive habitat could potentially be of similar significant nature. These impacts could however potentially be mitigated in order to render the likelihood of occurrence relatively low.

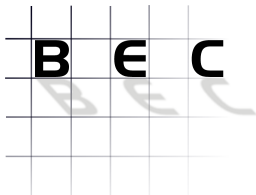
It is ultimately concluded that sites comprising some sensitive parts (Sites B, D, E) are regarded slightly lower in suitability for the proposed development, compared to sites that comprises mostly of low sensitivity habitat, but with sensitive habitat in the immediate surrounds (Sites A, C).

Ten impacts were identified that are of relevance to any development in a natural environment. Not all of these impacts might occur, or the extent of impact might be limited; the relevance of these impacts is therefore determined in Section 11.2 prior to being implemented in the Impact Assessment.



Impacts were placed in three categories, namely:

- **Direct impacts:**
 - Destruction of threatened and protected flora species;
 - Direct impacts on threatened fauna species;
 - Destruction of sensitive/ pristine habitat types;
 - Direct impacts on common fauna species;
- **Indirect Impacts:**
 - Floristic species changes subsequent to development;
 - Faunal interactions with structures, servitudes and personnel;
 - Impacts on surrounding habitat/ species;
- **Cumulative Impacts:**
 - Impacts on SA's conservation obligations & targets (VEGMAP vegetation types);
 - Increase in local and regional fragmentation/ isolation of habitat; and
 - Increase in environmental degradation.



Objectives of this Terrestrial Biodiversity Scoping Assessment are to identify macro habitat characteristics of the proposed project alternatives and to evaluate each alternative in terms of suitability for the proposed project by means of identifying likely impacts. The findings of this study are based on a brief site investigation of the site alternatives as well as a desk-top assessment.

The Terms of Reference for this terrestrial scoping assessment are as follows:

- Incorporate available data of the study area into the assessment, including existing scientific reports, regional conservation information and databases;
- Conduct a high level photo analysis of the proposed area in order to identify preliminary habitat variations;
- Provide broad descriptions of the terrestrial environment (ecological habitat types) of the proposed sites as perceived from aerial images and the brief site investigation;
- Compile a preliminary sensitivity assessment of identified habitat types;
- Provide a description of ecological attributes present within the proposed sites that are regarded to be important on a local and/ or regional scale;
- Provide a basic description of impacts (direct, indirect and cumulative impacts) on the terrestrial environment that may result from the proposed project and activities associated with the project;
- Provide a statement regarding the potential significance of the identified impacts and issues as it relates to each of the proposed sites;
- Provide a comparative evaluation of the proposed sites in terms of sensitivity and suitability for the proposed project;
- Map all relevant aspects;
- Provide recommendations regarding the methodology to be adopted in assessing potentially significant impacts in the EIA phase; and
- Present all results in a suitable format.

Destructive activities in a natural environment require vigilance to ensure that the biological and cultural heritage of future generations is not adversely affected by activities of today. Concern is growing about the consequences of biodiversity losses, for ecosystem functioning, for the provision of ecosystem services and for human well being.

Why is Biodiversity Conservation Important? Biodiversity sustains life on earth. An estimated 40 percent of the global economy is based on biological products and processes. Biodiversity has allowed massive increases in the production of food and other natural materials, which in turn have fed the (uncontrolled) growth and development of human societies. Biodiversity is also the basis of innumerable environmental services that keep us

and the natural environment alive, from the provision of clean water and watershed services to the recycling of nutrients and pollination.

Current pressures on and losses of biodiversity are unfortunately threatening to undermine the functionality of natural ecological processes and adaptive responses of the environment. The last few decades have witnessed brutal increases in the rate at which biodiversity is being altered by humanity. With uncontrolled growth of human population, consumption needs have increased exponentially as well as the drive to extract more economically valuable resources at ever faster rates. Natural habitats that harbour some of the world's most valuable biodiversity are being lost at increasingly faster and over progressively wider areas, while managed lands are undergoing increasing simplification. Adopting 'biodiversity friendly' practices remains challenging within the entire developmental sphere, especially for smaller companies and peripheral players. This is partly because governments, while perhaps committed on paper to biodiversity, have found it difficult to create the right incentives and apply the necessary regulations in a way that could encourage all players to conserve biodiversity.

Humanity faces the challenge of supporting the needs of growing populations from a rapidly shrinking natural resource base. Achieving a balance while doing this will require a better understanding and recognition of conservation and development imperatives and this is only a step towards more strategic and integrated approach to land use planning and management that helps societies make better-informed decisions. Evidence illustrate how management tools, rehabilitation and restoration processes, together with improved scientific knowledge, can help conserve biodiversity; also highlighting that mutual benefits can result from stronger collaboration between the mining and conservation sectors. Good practice, collaboration and innovative thinking can advance biodiversity conservation worldwide while ensuring that the minerals and products that society needs are produced responsibly.

In 1992, the Convention of Biological Diversity, a landmark convention, was signed by more than 90 % of all members of the United Nations. The enactment of the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004), together with the abovementioned treaty, focuses on the preservation of all biological diversity in its totality, including genetic variability, natural populations, communities, ecosystems up to the scale of landscapes. Hence, the local and global focus changed to the sustainable utilisation of biological diversity.

Eskom has appointed Lidwala Consulting Engineers as the independent Environmental Assessment Practitioner (EAP), to undertake the necessary environmental studies to identify and assess all potential environmental impacts associated with the proposed project. Bathusi Environmental Consultants (BEC) has been appointed as independent ecological specialists to conduct a strategic biodiversity impact evaluation of the terrestrial biological environment that will be affected by this proposed development.

Although care was taken to ensure a proper assessment of the study area and the immediate surrounds within the time allowed, the detailed assessment of site alternatives and biological attributes that might be present in these areas is not an objective of this particular phase of the study. Results presented in this report are based on a brief, snapshot investigation of the study area and an assessment of available desk-top data and not on the detailed long-term investigation of all environmental attributes and the varying degrees of biological diversity that may be present in the study area. No concrete conclusions may therefore be drawn with regards to biological diversity or conservation strategies as far as this study area is concerned. Results of this assessment represent only a preliminary investigation and the study area will ultimately be subjected to detailed biodiversity investigations during subsequent phases.

It is emphasised that information, as presented in this document, only have bearing on the site as indicated on accompanying maps. This information cannot be applied to any other area, however similar in appearance or any other aspect, without proper investigation.

Lastly, additional information may come to light during a later stage of the process or development. This company, the consultants and/or specialist investigators do not accept any responsibility for conclusions, suggestions, limitations and recommendations made in good faith, based on the information presented to them, obtained from the surveys or requests made to them at the time of this report.

Hendrina Power Station currently uses a wet ashing system for the disposal of ash and currently has five ash dams of which two are in operation and three are not in use. Dams 1 and 4 has reached their full capacity a, Dam 2 has stability issues and Dams 3 and 5 will reach full capacity within 5 years. The power station is expected to ash approximately 64.8 million m³ until its life span in 2035. Hendrina Power Station has therefore proposed to extent its ashing facilities and associated infrastructure to allow the station to continue ashing in an environmentally responsible way for the life of the station, which is related to the high ash content in the coal and an urgent need to extend the station life.

Lidwala Environmental & Planning Services was appointed as independent Environmental Assessment Practitioners (EAP) to conduct the required investigations and assessments for the process. Bathusi Environmental Consultants was appointed to conduct the relevant terrestrial biodiversity investigations. Riaan A. J. Robbeson has conducted the floristic assessment while Dewald Kamffer (Ecocheck) has conducted the faunal assessments.

6 APPROACH TO THIS SCOPING ASSESSMENT

In order to present an objective opinion of the terrestrial biodiversity sensitivity of the study area and how this relates to the suitability/ unsuitability of any area within the site in terms of the proposed development, all opinions and statements presented in this document are based on the following aspects, namely:

- A desk-top assessment of all available biological and biophysical data;
- Augmentation of existing knowledge by means of basic site observations;
- Specialist interpretation of available data, or known sensitivities of certain regional attributes; and
- A GIS based sensitivity analysis.

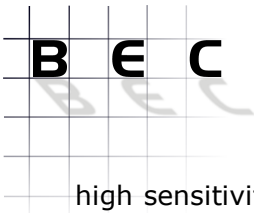
In order to assess the proposed site alternatives, which will ultimately be assessed in more detail during the EIA phase of the project, a total of 5 sites were selected during the screening phase of the project.

6.1 BACKGROUND INFORMATION

The objective of this biodiversity scoping assessment is to establish a reference point for the biophysical and biological sensitivities of the study area by means of the Ecosystem Approach or Landscape Ecology. The Ecosystem Approach is advocated by the Convention on Biological Diversity. It recognizes that people and biodiversity are part of the broader ecosystems on which they depend, and that it should thus be assessed in an integrated way. Principles of the Ecosystem Approach include the following:

- The objectives of ecosystem management are a matter of societal choice;
- Ecosystem managers should consider the effects of their activities on adjacent and other systems;
- Conservation of ecosystem structure and functioning, to maintain ecosystem services, should be a priority target;
- Ecosystems must be managed within the limits of their functioning;
- The approach must be undertaken at appropriate spatial and temporal scales;
- Objectives for ecosystem management should be set for the long-term;
- Management must recognise that change is inevitable;
- The approach should seek an appropriate balance between, and integration of, conservation and use of biodiversity;
- All forms of relevant information should be considered; and
- All relevant sectors of society and scientific disciplines should be involved.

For the purpose of this particular study a local/ regional scale was selected as suitable in terms of the size of the study area. The approach of Landscape Ecology includes the assessment of biophysical and societal causes, consequences of landscape heterogeneity and factors that causes disturbance to these attributes. In laymen's terms it implies that if sensitive habitat types/ ecosystems (frequently associated with biodiversity elements of



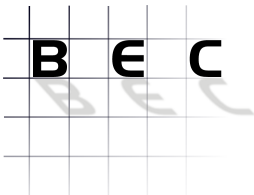
high sensitivity or conservation importance) are protected, species that are highly sensitive to changes in the environment will ultimately be protected. Species conservation is therefore largely replaced by the concept of habitat conservation. This approach is regarded effective since the protection of sensitive ecosystems will ultimately filter down to species level.

It is inevitable that the Landscape Ecology Approach will not function effectively in all cases since extremely localised and small areas of sensitivity do occur scattered in the study area, which can not always be captured on available databases or might have been missed during the site investigations. In addition to the compilation of basic species lists and the identification and description of localised ecological habitat it was also regarded important to identify areas of sensitivity on a local scale and, where possible, communities or species that are considered sensitive in terms of impacts that are likely to result from the proposed development.

6.2 SENSITIVITY CATEGORIES

Subsequent to the preliminary delineation of ecological habitat types on available aerial images, a sensitivity value is ascribed to each habitat type, based on a selection of criteria that contributes to the ecological sensitivity or conservation potential of the particular habitat type. Site preference is placed in four categories, namely:

- PREFERRED** – the site and immediate surrounds are regarded to comprise of low sensitivity habitat and potential impacts are unlikely to result in significant and/or severe impacts on terrestrial biodiversity attributes;
- ACCEPTABLE** – the site and immediate surrounds comprises limited areas of sensitivity and, although impacts on terrestrial biodiversity attributes are expected to occur, these impacts are regarded manageable;
- NOT PREFERRED** – the site and immediate surrounds comprises extensive areas of sensitive habitat types. Impacts associated with the proposed development are expected to result in significant and severe impacts on the terrestrial environment. The implementation of significant mitigation measures are expected to result in limited protection for these environments; and
- NO-GO** – aspects of high sensitivity are known to be present within the proposed area. Severe and significant impacts are expected to result in irreversible and permanent impacts on the area as well as sensitive biodiversity attributes. Mitigation of potential impacts are not expected to be successful in limiting impacts.



7 BIOPHYSICAL ATTRIBUTES

Basic descriptions of biophysical attributes of the region were compiled in the screening assessment and the reader is referred to the relevant document for further reading. Only biophysical attributes that have a direct bearing on the sensitivity of the respective site alternatives will be highlighted in this assessment.

The regional setting of the proposed site alternatives is indicated in Figure 1. Google Earth images of the respective sites are presented in Figures 2 – 6.

7.1 SURFACE WATER

A detailed wetland ecological report is compiled for the purpose of this EIA and only an overview of the presence of areas of surface water is presented in this report since it also relates to terrestrial biodiversity on a local and regional scale. For detailed information pertaining to the wetland ecology of the respective sites, the reader is referred to the particular report. An indication of the presence of areas of surface water is presented in Figure 7.

7.1.1 *Site A*

No surface water is present on this site, but areas of surface water is however present in the immediate vicinity of the site (<500m).

7.1.2 *Site B*

Surface water is present in the northern section of this site, as well as in the immediate vicinity of the site.

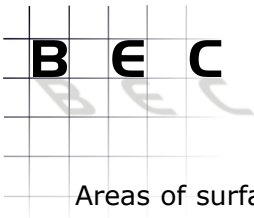
7.1.3 *Site C*

No surface water is present on this site and limited areas of surface water is present in the immediate vicinity of the site (<500m).

7.1.4 *Site D*

Areas of surface water are present in the southern and western sections of this site.

7.1.5 *Site E*



Areas of surface water are present in the south-eastern section of this site in the form of an endorheic pan as well as ponds and dams that are associated with mining activities.

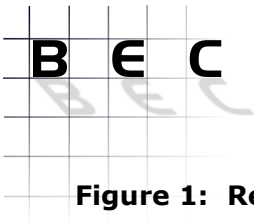


Figure 1: Regional setting of the study area

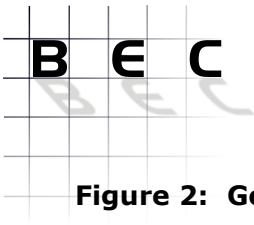


Figure 2: Google Earth image of Site 1

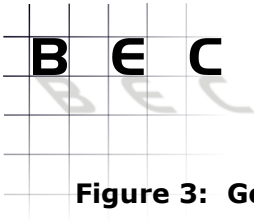


Figure 3: Google Earth image of Site 2

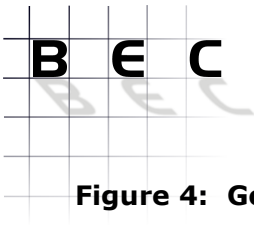


Figure 4: Google Earth image of Site 3

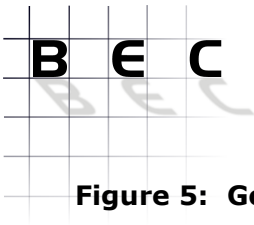


Figure 5: Google Earth image of Site 4

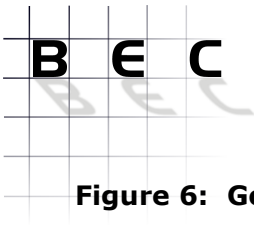


Figure 6: Google Earth image of Site 5

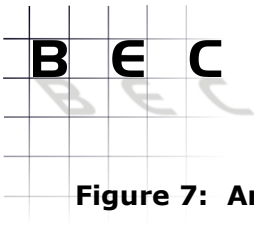


Figure 7: Areas of surface water

7.2 LAND COVER AND LAND USE

Land cover categories are presented in Figure 8. For the purpose of this assessment, land cover are loosely categorised into classes that represent natural habitat and land use categories that contribute to habitat degradation and transformation on a local or regional scale. Areas that are characterised by high levels of transformation and habitat degradation is generally accepted as being suitable for development purposes as it is unlikely that biodiversity attributes of sensitivities will be present or affected by development. Conversely, areas that are characterised by extensive untransformed and pristine habitat are generally not regarded suitable options for development purposes. The status of natural habitat does however have bearing on the suitability of a site.

The region comprises extensive transformed habitat that resulted from agriculture and mining, rendering remaining habitat fragmented and isolated and ultimately relatively sensitive. Little natural grassland habitat remains in the area, the majority being around streams and rivers where ploughing is not possible or soils are poor in nutrients. One of the shortfalls of the ENPAT database is that it does not reflect the current status of natural habitat within the study area. At this stage of the process it is therefore assumed that all areas indicated to comprise of natural grassland is representative of the regional vegetation types and are in a good condition. While this assumption is unlikely to hold true for most of the study area, an assessment of the actual ecological status of grasslands within the study area is beyond the scope of this report and will only be compiled during the EIA phase.

7.2.1 *Site A*

Comprises mostly transformed habitat (agricultural) with a small portion of remaining natural grassland.

7.2.2 *Site B*

Comprises mostly agricultural fields with a small portion of remaining natural grassland.

7.2.3 *Site C*

Comprised of agricultural fields with no remaining natural grassland.

7.2.4 *Site D*

Comprises mostly agricultural fields in addition to mining areas and small portions of remaining natural grassland.

Comprised entirely of transformed habitat (agricultural, mining and residential areas).

Figure 8: Land Cover & Land Use of the general region

7.3 REGIONAL VEGETATION - VEGMAP

Terrestrial grassland patches that are captured within the respective site alternatives represent the Eastern Highveld Grassland. This vegetation type is Endangered and only small fractions are conserved in statutory reserves. Some 44% is transformed by cultivation, plantations, mines, urbanisation and by building of dams. Cultivation may have had a more extensive impact than which is currently indicated by land cover data. The vegetation is short dense grassland dominated by *Aristida*, *Digitaria*, *Eragrostis*, *Themeda* and *Tristachya* species. Small rocky outcrops are scattered across the landscape. Wiry grasses and woody species are associated with these outcrops. These include species such as *Acacia caffra*, *Celtis africana*, *Diospyros lycioides*, *Parinari capensis*, *Protea caffra* and *Searsia magalimontanum* (Mucina & Rutherford, 2006). The Endangered status of this vegetation type warrants a medium-high environmental sensitivity. Small portions of the Eastern Temperate Freshwater Wetlands vegetation type are located within the study area.

7.4 MBCP CATEGORIES

Classification of the Terrestrial Biodiversity Classification categories (Figure 9) in the study area is as follows:

- Highly Significant areas - protection needed, very limited choice for meeting targets;
- Important and Necessary areas - protection needed, greater choice in meeting targets;
- Areas of Least Concern – natural areas with most choices, including for development;
- Areas with No Natural Habitat Remaining – transformed areas that make no contribution to meeting targets.

The only category of note within the site alternatives is 'Least Concern, generally conforming to the remaining natural grassland, as depicted in the land cover database as well as wetland and surface water habitats. These areas are generally regarded as moderately sensitive, mainly as a result of the extensive habitat transformation of the general region and the small portions of remaining natural habitat.

No area of restriction is identified within any of the proposed site alternatives in terms of the MBCP classification database.

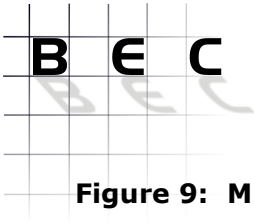


Figure 9: MBCP Categories of the site alternatives

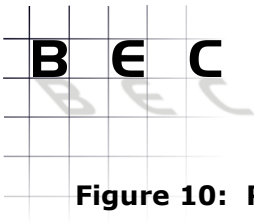


Figure 10: Restrictions in terms of Mining Development

The SANBI database indicates the known presence of only 38 plant species within this particular ¼ degree grid (2629BA). This low diversity is the result of poor floristic knowledge of the area and is not a reflection of a poor habitat and floristic diversity.

The following plant species are known to occur in the region of the study area (SANBI Database):

Table 2: PRECIS data for 2629BA

Species	Family	Threat	Growth
<i>Ceratiosicyos laevis</i>	Achariaceae	LC	Climber, shrub
<i>Alepidea peduncularis</i>	Apiaceae	DDT	Herb
<i>Asclepias gibba</i>	Apocynaceae	LC	Herb
<i>Aponogeton junceus</i>	Aponogetonaceae	LC	Geophyte
<i>Schkuhria pinnata</i>	Asteraceae		Herb
<i>Bryum dichotomum</i>	Bryaceae		Bryophyte
<i>Cyperus difformis</i>	Cyperaceae	LC	Cyperoid
<i>Cyperus laevigatus</i>	Cyperaceae	LC	Cyperoid
<i>Cyperus marginatus</i>	Cyperaceae	LC	Cyperoid
<i>Fimbristylis complanata</i>	Cyperaceae	LC	Cyperoid
<i>Isolepis costata</i>	Cyperaceae	LC	Cyperoid
<i>Isolepis setacea</i>	Cyperaceae	LC	Cyperoid
<i>Kyllinga pulchella</i>	Cyperaceae	LC	Cyperoid
<i>Pycreus macranthus</i>	Cyperaceae	LC	Cyperoid
<i>Pycreus nitidus</i>	Cyperaceae	LC	Cyperoid
<i>Pycreus rehmannianus</i>	Cyperaceae	LC	Cyperoid
<i>Eriocaulon abyssinicum</i>	Eriocaulaceae	LC	Herb
<i>Acalypha angustata</i>	Euphorbiaceae	LC	Dwarf shrub
<i>Lespedeza cuneata</i>	Fabaceae		Dwarf shrub
<i>Trifolium africanum</i> var. <i>africanum</i>	Fabaceae	LC	Herb
<i>Pelargonium pseudofumarioides</i>	Geraniaceae	LC	Herb
<i>Eucomis autumnalis</i> subsp. <i>clavata</i>	Hyacinthaceae		Geophyte
<i>Juncus dregeanus</i> subsp. <i>dregeanus</i>	Juncaceae	LC	Helophyte
<i>Linum thunbergii</i>	Linaceae	LC	Herb
<i>Mossia intervallaris</i>	Mesembryanthemaceae	LC	Succulent
<i>Alloteropsis semialata</i> subsp. <i>eckloniana</i>	Poaceae	LC	Graminoid
<i>Andropogon eucomus</i>	Poaceae	LC	Graminoid
<i>Digitaria ternata</i>	Poaceae	LC	Graminoid
<i>Eragrostis curvula</i>	Poaceae	LC	Graminoid
<i>Eragrostis mexicana</i> subsp. <i>virescens</i>	Poaceae		Graminoid
<i>Eragrostis patentissima</i>	Poaceae	LC	Graminoid
<i>Hyparrhenia hirta</i>	Poaceae	LC	Graminoid
<i>Panicum schinzii</i>	Poaceae	LC	Graminoid
<i>Sporobolus albicans</i>	Poaceae	LC	Graminoid
<i>Riccia cavernosa</i>	Ricciaceae		Bryophyte
<i>Riccia natalensis</i>	Ricciaceae		Bryophyte

Table 2: PRECIS data for 2629BA

Species	Family	Threat	Growth
<i>Riccia rosea</i>	Ricciaceae		Bryophyte
<i>Riccia stricta</i>	Ricciaceae		Bryophyte

8.2 PLANT SPECIES OF CONSERVATION IMPORTANCE

No floristic species of conservation importance is known to occur in this region, according to the SANBI database. However, all areas of natural grassland habitat and wetland habitat, in particular, are regarded suitable for the potential presence of flora species of conservation importance.

Schedules 11 and 12 of Mpumalanga Nature Conservation Act No. 10 of 1998 have reference.

8.3 WEEDS & INVASIVE SPECIES

Schedule 13 of Mpumalanga Nature Conservation Act No. 10 of 1998 has reference. This will be assessed in detail during the EIA phase of the investigation.

9 REGIONAL FAUNAL ATTRIBUTES

The following Red Data fauna species (with estimated probabilities for the proposed site alternatives) are known to occur in the Mpumalanga Province (excluding avifauna):

Table 3: Red Data fauna species for Mpumalanga

Biological Name	English Name	STATUS	Probability
Butterflies			
<i>Aloeides barbara</i>	Barbara's Copper	VU	low
<i>Aloeides nubilus</i>	Cloud Copper	VU	low
<i>Aloeides rossouwi</i>	Rossouw's Copper	EN	low
<i>Chrysoritis aureus</i>	Golden Opal	NT	low
<i>Chrysoritis phosphor</i>	Scarce Scarlet	VU	low
<i>Lepidochrysops jefferyi</i>	Jeffery's Blue	VU	low
<i>Lepidochrysops swanepoeli</i>	Swanepoel's Blue	VU	low
<i>Metisella meninx</i>	Marsh Sylph	VU	moderate
<i>Pseudonympha swanepoeli</i>	Swanepoel's Brown	VU	low
Amphibians			
<i>Breviceps sopranus</i>	Whistling Rain Frog	DD	low
<i>Hemismus guttatus</i>	Spotted Shovel-nosed Frog	VU	low
<i>Strongylopus wageri</i>	Plain Stream Frog	NT	low
Reptiles			
<i>Cordylus giganteus</i>	Giant Girdled Lizard	VU	low
<i>Homoroselaps dorsalis</i>	Striped Harlequin Snake	NT	low
<i>Kinixys natalensis</i>	Natal Hinge-back Tortoise	NT	low

Table 3: Red Data fauna species for Mpumalanga

Biological Name	English Name	STATUS	Probability
<i>Lamprophis fuscus</i>	Yellow-bellied House Snake	NT	low
<i>Lamprophis swazicus</i>	Swazi Rock Snake	NT	low
<i>Tetradactylus breyeri</i>	Breyer's Long-tailed Seps	VU	low
Mammals			
<i>Acinonyx jubatus</i>	Cheetah	VU	low
<i>Amblysomus hottentotus</i>	Hottentot's Golden Mole	DD	low
<i>Amblysomus robustus</i>	Robust Golden Mole	EN	low
<i>Amblysomus septentrionalis</i>	Higveld Golden Mole	NT	low
<i>Atelerix frontalis</i>	South African Hedgehog	NT	low
<i>Canis adustus</i>	Side-striped Jackal	NT	low
<i>Cercopithecus mitis</i>	Samango Monkey	VU	low
<i>Cercopithecus mitis labiatus</i>	Samango Monkey	EN	low
<i>Chrysoxalax villosus</i>	Rough-haired Golden Mole	CR	low
<i>Cloeotis percivali</i>	Short-eared Trident Bat	CR	low
<i>Crocidura cyanea</i>	Reddish-grey Musk Shrew	DD	moderate
<i>Crocidura flavescens</i>	Greater Musk Shrew	DD	low
<i>Crocidura fuscomurina</i>	Tiny Musk Shrew	DD	low
<i>Crocidura hirta</i>	Lesser Red Musk Shrew	DD	low
<i>Crocidura maquassiensis</i>	Maquassie Musk Shrew	VU	low
<i>Crocidura mariquensis</i>	Swamp Musk Shrew	DD	moderate
<i>Crocidura silacea</i>	Lesser Grey-brown Musk Shrew	DD	low
<i>Crocota crocuta</i>	Spotted Hyaena	NT	low
<i>Damaliscus lunatus lunatus</i>	Tsessebe	EN	low
<i>Dasymys incomtus</i>	Water Rat	NT	moderate
<i>Diceros bicornis minor</i>	Black Rhinoceros	VU	low
<i>Elephantulus brachyrhynchus</i>	Short-snouted Elephant-shrew	DD	low
<i>Epomophorus gambianus crypturus</i>	Gambian Epauletted Fruit Bat	DD	low
<i>Grammomys dolichurus</i>	Woodland Mouse	DD	low
<i>Graphiurus platyops</i>	Rock Dormouse	DD	low
<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed Bat	DD	low
<i>Hippotragus equinus</i>	Roan Antelope	VU	low
<i>Hippotragus niger niger</i>	Sable Antelope	VU	low
<i>Hyaena brunnea</i>	Brown Hyaena	NT	low
<i>Kerivoula lanosa</i>	Lesser Woolly Bat	NT	low
<i>Lemniscomys rosalia</i>	Single-striped Mouse	DD	moderate
<i>Leptailurus serval</i>	Serval	NT	moderate
<i>Lutra maculicollis</i>	Spotted-necked Otter	NT	low
<i>Lycaon pictus</i>	African Wild Dog	EN	low
<i>Manis temminckii</i>	Pangolin	VU	low
<i>Mellivora capensis</i>	Honey Badger	NT	low
<i>Miniopterus fraterculus</i>	Lesser Long-fingered Bat	NT	low
<i>Miniopterus schreibersii</i>	Schreiber's Long-fingered Bat	NT	moderate
<i>Myosorex cafer</i>	Dark-footed Forest Shrew	DD	low
<i>Myosorex varius</i>	Forest Shrew	DD	moderate
<i>Myotis bocagei</i>	Rufous Hairy Bat	DD	low
<i>Myotis tricolor</i>	Temminck's Hairy Bat	NT	moderate
<i>Myotis welwitschii</i>	Welwitsch's Hairy Bat	NT	low
<i>Mystromys albicaudatus</i>	White-tailed Rat	EN	low
<i>Neamblysomus juliane</i>	Juliana's Golden Mole	VU	low

Table 3: Red Data fauna species for Mpumalanga

Biological Name	English Name	STATUS	Probability
<i>Otomys slogetti</i>	Sloggett's Rat	DD	low
<i>Ourebia ourebi</i>	Oribi	EN	low
<i>Panthera leo</i>	Lion	VU	low
<i>Paracynictis selousi</i>	Selous' Mongoose	DD	low
<i>Pipistrellus anchietae</i>	Anchieta's Pipistrelle	NT	low
<i>Pipistrellus rusticus</i>	Rusty Bat	NT	low
<i>Poecilogale albinucha</i>	African Weasel	DD	moderate
<i>Raphicerus sharpei</i>	Sharp's Grysbok	NT	low
<i>Rhinolophus blasii</i>	Peak-saddle Horseshoe Bat	VU	low
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	NT	moderate
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	NT	low
<i>Rhinolophus fumigatus</i>	Ruppel's Horseshoe Bat	NT	low
<i>Rhinolophus hildebrandtii</i>	Hildebrandt's Horseshoe Bat	NT	low
<i>Rhinolophus landeri</i>	Lander's Horseshoe Bat	NT	low
<i>Rhynchogale melleri</i>	Meller's Mongoose	DD	low
<i>Suncus infinitesimus</i>	Least Dwarf Shrew	DD	low
<i>Suncus lixus</i>	Greater Dwarf Shrew	DD	low
<i>Suncus varilla</i>	Lesser Dwarf Shrew	DD	low
<i>Tatera leucogaster</i>	Bushveld Gerbil	DD	low

A total of 11 Red Data fauna species exhibit a moderate likelihood of occurring in the region, considering the type and distribution of habitat types. In particular, wetland related habitat is regarded significant for the potential presence of Red Data fauna species and most of the moderately likely species utilises wetland habitat extensively.

The study area is ultimately characterised by a matrix of transformed faunal habitat (maize field etc.) with scattered portions of untransformed grassland and wetland habitats, but little of the original ecological characteristics remain within the larger region.

Schedules 1 to 8 of Mpumalanga Nature Conservation Act No. 10 of 1998 have reference.

10 PRELIMINARY MACRO HABITAT TYPES

Habitat types that were identified within the proposed site alternatives include the following:

- Agricultural fields – comprises areas that are currently actively cultivated (mainly maize). Edges are generally characterised by a composition of weeds, invasive forbs and poor quality grasses and herbs. The faunal component of these areas might be relative diverse, but mostly comprises animals that utilises these areas on an infrequent basis or because of the unnatural food source that is presented by agriculture during parts of the year. The composition of animals in these areas are entirely different to that of natural grassland habitat;
- Natural grasslands – Fragmented and isolated areas of natural grassland comprise grassland attributes of moderate sensitivity. These areas are frequently also associated with wetland habitat of the region. The species composition of these

areas provides indication of the natural status of the grassland remnants. A diverse composition that is typical of the Eastern Highveld Grassland vegetation type comprises an admixture of forbs (particularly geophytes) and grasses. It should be noted that, at this stage of the process, no distinction is yet made between prime grassland and areas where a poor quality is prevalent;

- Wetlands – all areas of wetland related habitat. For a detailed delineation and description, the reader is referred to the relevant document that is compiled for this aspect; and
- Transformed habitat – all areas where development has resulted in the decimation of natural habitat. Species generally associated with these areas comprises plants that are used for garden purposes, windbreaks or species associated with habitat transformation.

11 MACRO HABITAT SENSITIVITIES

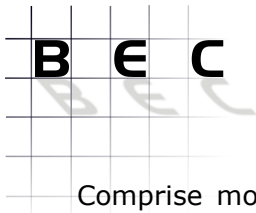
- Agricultural fields –No attributes of natural habitat remains within these areas and a low ecological sensitivity is ascribed to these parts. It is also unlikely that these areas will recover to a natural state;
- Natural grasslands –A moderate to high sensitivity (depending on the actual status) is normally ascribed to these parts, mainly as a result of the severe fragmentation and isolation of remaining fragments;
- Wetlands – A high sensitivity is ascribed to these parts; and
- Transformed habitat – No attributes of natural habitat remains within these areas and a low ecological sensitivity is ascribed to these parts. It is also unlikely that these areas will recover to a natural state.

12 DISCUSSION

In order to present an opinion on the suitability of a site for the proposed development, the following is taken into account:

- Presence/ absence of natural and sensitive habitat types within the boundaries of the site;
- Perceived ecological status;
- Known regional/ local sensitivities;
- Areas/ habitat of sensitivity within the immediate surrounds that might also be affected; and
- Habitat types that might be affected by infrastructure, pipelines and access roads that will be required for the proposed development.

12.1.1 Site A



Comprise mostly agricultural fields with mining activity to the west. Extensive grassland and riparian habitat located to the east and north of this site is a concern, but could potentially be protected by means of strict mitigation measures. The suitability of this site for the proposed development is therefore regarded medium.

12.1.2 *Site B*

Although this site comprises extensive agricultural fields, some parts are characterised by wetland habitat that was not previously captured on the database and only observed during the brief site investigation. As a result of the presence of these scattered wetlands, the suitability of the site for the proposed development is regarded medium, also considering the distance to the power station.

12.1.3 *Site C*

This site comprises exclusively of agricultural fields and no habitat of sensitivity is present within the proposed boundaries. A riparian habitat is located to the east of the site and this habitat will need to be crossed by the required pipeline infrastructure. In addition, extensive natural grassland and riparian wetland is present to the south and east of this site, rendering the suitability of this site for the proposed development is regarded as medium-low.

12.1.4 *Site D*

Similar to Site A, this site comprises extensive agricultural areas, but grassland and riparian habitat is located to the immediate east and west of the site. The perceived ecological status of the wetland areas to the west was estimated to be relative low as a result of mining activities. Ultimately, the suitability of the site for the proposed development is regarded as medium, mainly as a result of the presence of extensive areas of natural grassland habitat located to the east of the site.

12.1.5 *Site E*

The presence of wetland and grassland habitat that was not captured in the existing database, within this site was confirmed during the site investigation. The position of this site in close proximity to the power station implies that no sensitive habitat needs to be crossed by the required infrastructure. Surrounding habitat is similarly low in sensitivity. The suitability of the site for the proposed development is regarded as medium. This site is furthermore entirely isolated by means of road infrastructure and mining development.

Preference of the proposed sites for the development is estimated as follows:

Site Name	Site Preference Ranking
Site A	PREFERRED/ ACCEPTABLE
Site B	PREFERRED/ ACCEPTABLE
Site C	PREFERRED/ ACCEPTABLE
Site D	ACCEPTABLE/ NOT PREFERRED
Site E	ACCEPTABLE/ NOT PREFERRED

It should be noted that each of the site alternatives have strong and weak selection points for the proposed development. The presence of small and isolated sensitive habitat within the boundaries of some of the sites, compared to the presence of larger, sensitive habitat within the immediate surrounds of other sites ultimately renders the difference between the various site alternatives relatively small. While the loss of some small areas of sensitive habitat could be debated as a significant impact, impacts of the proposed development on surrounding areas of sensitive habitat could potentially be of similar significant nature. These impacts could however potentially be mitigated in order to render the likelihood of occurrence relatively low.

It is ultimately concluded that sites comprising some sensitive parts (Sites B, D, E) are regarded slightly lower in suitability for the proposed development, compared to sites that comprises mostly of low sensitivity habitat, but with sensitive habitat in the immediate surrounds (Sites A, C).

No impacts were identified that could lead to a beneficial effect on the ecological environment since the proposed development is largely destructive as it involves the decimation of natural habitat.

Impacts resulting from the construction and operation of an ash dam have permanent and severe physical impacts on biota or the habitat in which they occur. Direct impacts, such as habitat destruction and modifications, are regarded immediate, long-term and of high significance. These impacts are mostly measurable and fairly easy to assess as the effects thereof is immediately visible and can be determined to an acceptable level of certainty. In contrast, indirect impacts are not immediately evident and can consequently not be measured immediately. A measure of estimation is therefore necessary in order to evaluate these impacts. Lastly, impacts of a cumulative nature places direct and indirect impacts of this projects into a regional and national context, particularly in view of similar or resultant developments and activities.

Ten impacts were identified that are of relevance to any development in a natural environment. Not all of these impacts might occur, or the extent of impact might be limited; the relevance of these impacts is therefore determined in Section 11.2 prior to being implemented in the Impact Assessment.

Impacts were placed in three categories, namely:

- **Direct impacts:**
 - Destruction of threatened and protected flora species;
 - Direct impacts on threatened fauna species;
 - Destruction of sensitive/ pristine habitat types;
 - Direct impacts on common fauna species;
- **Indirect Impacts:**
 - Floristic species changes subsequent to development;
 - Faunal interactions with structures, servitudes and personnel;
 - Impacts on surrounding habitat/ species;
- **Cumulative Impacts:**
 - Impacts on SA's conservation obligations & targets (VEGMAP vegetation types);
 - Increase in local and regional fragmentation/ isolation of habitat; and
 - Increase in environmental degradation.

Other, more subtle impacts on biological components, such as changes in local, regional and global climate, effects of noise pollution on fauna species, increase in acid rain and ground water deterioration are impacts that cannot be quantified to an acceptable level of certainty and is mostly subjective in nature as either little literature is available on the topic or contradictory information exist.

The nature and extent of these impacts will be assessed in the EIA phase of the project.

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