SPECIALIST REPORT

ECOLOGICAL INVESTIGATION FOR CLEARING OF INDIGENOUS VEGETATION FOR TOWNSHIP ESTABLISHMENT ON PORTIONS 85 & 86 OF THE FARM FRIEDENHEIM 282JT, CITY OF MBOMBELA

DRAFT REPORT

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Specialist declaration

I, Danie van der Walt, declare that -

- I act as an independent specialist in this application;
- I have performed the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity;
- I have expertise in conducting the specialist report relevant to this application, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the relevant environmental legislation, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in this project;
- I undertake to disclose to the applicant and the authorities all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct.

L.D. VAN DER WALT

Date: 2020-03-02

1. Introduction

1.1 Background and objectives

The applicant plans to establish a mixed use township on the property, specifically for the lower income group. The project area is approximately 30Ha in extent. Environmental authorization of regulated activities is required before commencement of the activity. As part of the EIA process a biodiversity assessment was recommended by the environmental consultant and Afrika Enviro & biology was appointed to do this assessment. The terms are as follows:

- Biodiversity and habitat assessment;
- Sensitivity and habitat delineation;
- Recommendations.

The site was investigated on 2019-08-21 and 2020-02-29.

1.2 Specialist report requirements

With reference to Appendix 6 of the EIA regulations (2014) the specialist declaration is included on page 2 of this report and details and the specialist's curriculum vitae are included with Appendix 1.

2. Methods and Reporting

2.1 Assumptions, uncertainties and limitations

The results and recommendations of the report are based on the actual site status. Assumptions that are made and uncertainties that are encountered are indicated in the report (where applicable). As indicated under the relevant sections in the report consultation of authorities' data bases forms part of this report. However, the scope of work for this specialist report does not include public participation.

The author is confident that the results obtained by the present study are of significance to make conclusions and recommendations regarding the subjects that were investigated. The faunal survey was not a comprehensive specialist survey but rather an overview of the available habitats and their potential to be utilized by fauna. No nocturnal surveys were conducted.

2.2 General

The author relied on aerial images and ortho photos to remotely assess the site before the actual on site investigation in order to get familiarized with the different features and vegetation communities (habitats) present within the affected areas. The information thus gathered was used for selecting survey sites and to identify possible sensitive areas. Problematic, as well as potential sensitive areas were identified during the site assessment and these were thoroughly investigated as explained in the following two sections. All literature and other references used to support findings and to assist in making conclusions are listed.

2.3 **Vegetation & habitats**

Floral diversity was determined by completing survey transects and sample sites along all the different habitats within the physiographic zones represented in the study area (Deal *et al*. 1989a). In order to attain scientifically reliable results, obviously distinct vegetation communities were surveyed by selecting representative sites in each homogenous unit (Mathews *et al.* 1992). The vegetation units of Mucina & Rutherford (2006) are used as reference but where necessary communities are described according to a unit's diagnostic floral features and/or topographical setting or other biophysical features (or a combination of several descriptive features). By combining the available literature with the survey results, stratification of vegetation communities was possible.

The survey transects and sites in the affected areas were also intensively searched for important species and the potential for Red Data Listed (RDL) and other important species were established and cross referenced with PRECIS Data for the relevant quarter degree grid/s as obtained from the SANBI data base (POSA). The aim was to identify distinct vegetation types and to establish their integrity and representation in the study area.

2.4 **Terrestrial Fauna**

The fauna investigation is based on a desktop study verified by cross reference with available habitats of the study area, so as to establish the faunal potential of a particular site. Selected survey sites were well searched for fauna and habitats were identified during the vegetation surveys so as to establish the faunal potential of a particular area. By method of elimination (based on available habitats and the taxon's biology and known distribution), lists of faunal representation for the study area was assembled.

2.5 **Watercourse delineation & buffer zones**

It is important to differentiate between wetlands and riparian habitats. Riparian zones are not wetlands, however, depending on the ecosystem structure; wetlands can also be classified as riparian zones if they are located in this zone (e.g. valley bottom wetlands). Although these distinct ecosystems will be interactive where they occur in close proximity it is important not to confuse their hydrology and ecofunctions. For these reasons the results are reported in separate sections under specific headings. These delineations are performed according to *"A practical field procedure for identification and delineation of wetlands and riparian areas"* as amended and published by the Department of Water Affairs and Forestry (2005); (Henceforth referred to as DWAF Guidelines (2005).Aerial photographs and land surveys were used to determine the different features and potential wetland and riparian areas of the study area. Vegetation diversity and assemblages were determined by completing survey transects along all the different vegetation communities identified in the riparian areas.

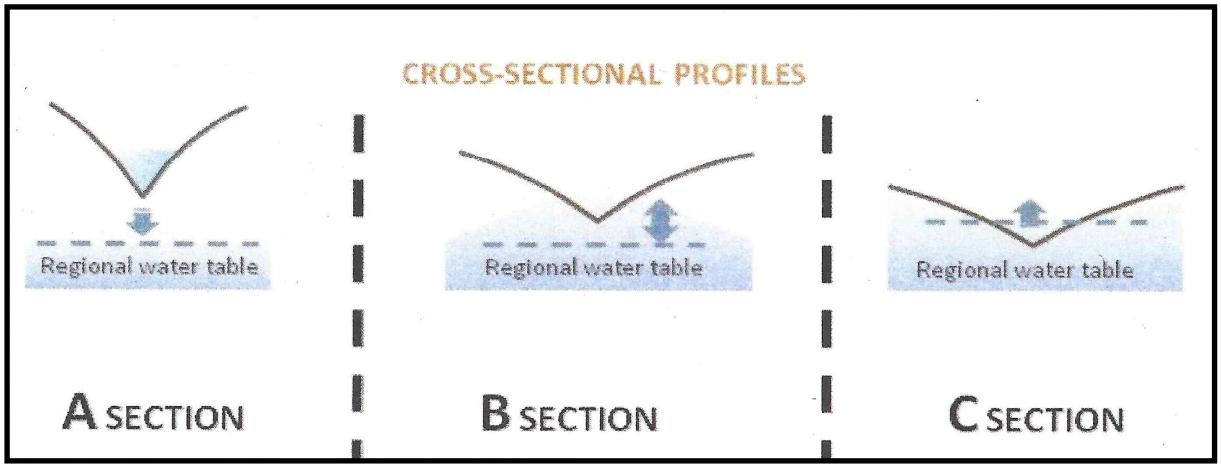
The relevance of buffer zones is treated in the following sections.

> **Definition:** Aquatic Impact Buffer Zone: A zone of vegetated land designed and managed so that sediment and pollutant transport carried from source areas via diffuse surface runoff is reduced to acceptable levels.

The Water Research Commission report: *Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries* (Macfarlane et al, 2014) was used to calculate an efficient buffer zone to protect watercourses (if present) on site. This method is designed for site-based assessments and includes a more detailed evaluation of risks and consideration of site-specific factors that can affect buffer requirements. Such an approach is designed to inform any detailed development planning and provide an appropriate level of information for authorization purposes. In short the methodology is as follows:

Step	Task	Scope
1	Define objectives and scope to determine the most appropriate level of assessment	**Desktop assessment:** This assessment is designed to characterize risks at a desktop level in order to red-flag land located adjacent to water resources that should potentially be set aside and managed to limit impacts on water resources. **Site-based assessment:** This assessment is designed for site-based assessments and includes a more detailed evaluation of risks and consideration of site-specific factors that can affect buffer requirements.
2	Map and categorize water resources	the assessor is required to generate a map delineating the boundaries of the water resources potentially affected by proposed developments within the study area1
2.1	Classify the watercourse	E.g. Wetland, spring or river and subcaregories: Ephemeral drainage line and type of channel (albeit with or without active channel).
2.2	Map the line from which aquatic impact buffer zones will be delineated (Edge of active channel)	• Rivers and streams – the outer edge of the active channel; • Wetlands – the edge of the temporary zone.
2.3	Identify water resource type	Desktop: Level3: Sub-system / landscape unit. Site based: Level 4: Hydromorphic unit.
3	Management objectives	Use appropriate references and methods (below) to formulate management objectives for the watercourse.
3.1	Determine the Present Ecological State	Desktop or site based assessment depending on requirements from regulating authority.
3.2	Determine the Importance and sensitivity	In order to determine the overall importance and sensitivity of a water resource, the ecological, social and economic importance should be considered.
4	Risk assessment of water resources	Undertake a risk assessment to assess the potential impacts of planned activities on water resources.
5	Risk assessment for protection of biodiversity	Assess risks posed by proposed development on biodiversity and identify management zones
6	Delineate and demarcate recommended setback requirements	Finalize and delineate setback requirements on a layout plan and in the field. In doing so, it is also important to ensure that setback requirements also cater for a range of other potentially important management, functional and legal requirements.
7	Document management measures necessary to maintain the effectiveness of setback areas	Key aspects of the setback requirements will include: • An aquatic impact buffer zone; • Possible core habitat requirements; • Possible corridor requirements; • Any additional aspects requiring consideration to ensure effective management of setback areas.

It is important to understand that these buffer zone guidelines do not apply to ephemeral drainage features that lack active channel characteristics. As such, it is essential to differentiate between a stream (albeit ephemeral) with a clear "active channel" and ephemeral drainage features that lack such characteristics. This differentiation should be based on the classification of river channels outlined in the DWAF delineation guideline for wetlands and riparian areas (DWAF, 2005). The channel network is divided into three types of channel, which are referred to as A Section, B Section, or C Section channels as shown in the figure below:



The essential difference between the "A", "B" and "C" sections is their position relative to the zone of saturation in the riparian area. The figure shows two levels of the water table; the one marked "wet" depicts the highest level that the water table would reach in a wet period when recharge of the zone of saturation has taken place, while the one marked "dry" depicts the level of the water table at its lowest after a dry period. The zone of saturation must be in contact with the channel network for base flow to take place at any point in the channel and the classification separates the channel sections that do not have base flow (A Sections) from those that sometimes have base flow (B Sections) and those that always have base flow (C Sections). "A" Section watercourses are regarded as the least sensitive from a water yield and contaminant risk perspective as they typically only carry water after storm events. As such, these buffer zone guidelines do not apply to "A" Sections of watercourses. It is nonetheless appropriate to take practical measures to limit the risk of diffuse source pollutants entering such sections. This could include the maintenance of a reduced vegetated buffer, based on expert opinion, around such features.

2.6 **Ecological importance and sensitivity rating of habitats**

By considering the results of all the above investigations, the authors allocate a qualitative sensitivity rating to the habitats that were identified, based upon its ecological importance and biodiversity value. A qualitative method was chosen at the first stage of assessment instead of a quantitative method in order simplify the procedure of assessment. This method of assessment is based on the criteria used

by DWAF for *river ecoclassification* (Kleynhans *et al*., 2009) and *a technique for assessing wetland health* (Macfarlane *et al*., 2005. In order to simplify the decision making process, a scale of *Very Low, Low, Medium*, *High* and *Very High* is used, based upon biodiversity value and ecological functions (Table 1.1). This method is used as a first level of expressing the sensitivity of a specific component and is not used in comparative assessments of alternatives where a quantitative approach will be more appropriate.

Table 1.1 Criteria used for sensitivity rating of habitats

Ecological Importance/Biodiversity Value	**Sensitivity Rating**
Terrestrial and Riparian Communities	
Natural communities (habitats and ecosystems) that are regarded as pristine or largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged and the community is regarded as very important for the maintenance of biodiversity and rare and important taxa are present (e.g. occurrence of RDL, Endemic and/or Protected species). The local area is an important ecological support area and any external impacts will have a significant negative effect on its status.	*Very High*
Natural communities (habitats and ecosystems) which are regarded as ecologically important and sensitive and important for the maintenance of biodiversity. It may be linked to other important communities and provide an important refuge/corridor for biodiversity (fauna and flora). This rating can also be allocated due to the presence of one or more unique qualities (e.g. occurrence of RDL, Endemic and/or Protected species). The presence of unnatural impacts is low and can be managed.	*High*
Natural communities which have a limited ecological function and a limited function for maintaining biodiversity. This may be due to homogenous habitat conditions and/or the negative effects of external impacts. External impacts can be managed and mitigated to reduce the significance of their magnitude.	*Medium*
Communities which have been significantly modified or transformed with the result that little natural flora remain andremaining habitat is degraded and fragmented. Ecological importance as well as biodiversity value is low. External impacts will not have a significant impact on its status.	*Low*
Total loss of natural habitat has occurred. Ecological functions have been lost.	*Very Low*

This method is used as a first level of expressing the sensitivity of a specific component and is not used in comparative assessments of alternatives where a quantitative approach will be more appropriate. Furthermore, it should be noted that the above method is used only at this (first) level for the sensitivity rating of wetlands in this report. A wetland ecological status and integrity assessment is based on quantative variables and is not covered under the terms and scope of work for this report and this report is not intended to replace or contradict the findings and recommendations of specialist wetland assessments.

3. Background Information

3.1 **Biophysical description of the study area**

The general study area consists of mountainous bushveld typical of the eastern Lowveld Escarpment foothills, specifically to the west of the Crocodile Poort Mountains. The most serious transformation of the natural environment consists of cultivation of crops and formal and informal settlements which have transformed significant areas of natural land in the past few years.

The general geology of the area consists of granite and gneiss, mostly of the Nelspruit suite, forming hills with large boulders. Soils are shallow, coarse lithosols, comprised of Glenrosa or Mispah soil types.

A typical Lowveld climate prevails with seasonal summer-rainfall, warm temperatures and dry winters. MAP ranging between 550mm and 800mm (increasing with altitude). Frost is infrequent.

3.2 **Ecology & biodiversity**

Nationally, the site is situated within the Lowveld Sour Bushveld (A9) veld type according to Acocks (1988), or Sour Lowveld Bushveld according to Low & Rebelo (1998) and Schmidt *et al* (2002). However, these classifications are very broad and may include several sub veld types of importance. The more detailed vegetation classification system of Mucina & Rutherford (2006) is used to classify the veld unit on a regional scale into two distinct units:

Unit 1) **Pretoriuskop Sour Bushveld** is found mainly to the east of Hazyview and around Pretoriuskop (KNP) in Mpumalanga Province. The topography consists of plains and gentle slopes with intermittent drainage lines. The vegetation structure is open savannah with few low shrubs and a well-developed grass component. Pretoriuskop Sour Bushveld is rated as Least Threatened as almost 40% is conserved within the Kruger National Park according to the National Spatial Biodiversity Assessment (Driver *et al*, 2004) on a regional level. Applicable to the southern section of the site.

Unit 2) **Legogote Sour Bushveld**. This ecosystem is found in Mpumalanga and Limpopo Provinces along the eastern foothills of the northeastern escarpment. Characteristic trees and shrubs are *Parinari curatellifolia* and *Bauhinia galpinii*. It may form a dense woodland with diverse shrubs to transitional forest where *Sterculia murex* and *Combretum molle* is commonly found. This veld type is not well protected (1% formally protected) and already 50% is transformed and as such is rated as Endangered (having lost more than 40% of its original extent). Applicable to the northern section of the site.

3.3 **Conservation & Importance**

The Mpumalanga Biodiversity Sector Plan (MBSP); (MTPA, 2014) ratings for the terrestrial and freshwater ecology of the project area are projected in Appendix 2.

Moderately / Heavily modified: (Terrestrial / Freshwater ecology):

This classification is relevant to the open fileds and fallow landson the property. The old lands on the properties are classified modified land. MTPA objectives for these areas are quoted as follows: Such areas offer the most flexibility regarding potential land-uses, but these should be managed in a biodiversity-sensitive manner, aiming to maximize ecological functionality and authorization is still required for high impact land uses.

Other Natural Areas (Terrestrial ecology):

This classification is relevant to the naturally vegetated areas and drainage lines on the property. These areas are not required to meet biodiversity targets, and so are not identified as a priority in the MBSP. They do, however, retain much of their natural character. The biodiversity in these non-priority landscapes may still be of value and contribute to maintenance of viable species populations and natural ecosystem functioning and Other Natural Areas may provide essential ecological infrastructure and ecosystem services. ONAs offer the greatest flexibility in terms of management objectives and permissible land-uses, and are generally recommended (along with Modified Areas) as the sites for higher-impact land uses. *Primary objectives:* An overall management objective should be to minimize habitat and species loss and ensure ecosystem functionality through strategic landscape planning. This classification is relevant to aquatic ecological importance of the northern section of the property.

Freshwater ecology: *Ecological Support Area (Important sub-catchment)*

This classification is relevant to the naturally vegetated areas and drainage lines of the property. This sub-category includes National Freshwater Ecosystems Priority Areas (FEPA) sub-catchments and Fish Support Areas. A river FEPA is the river reach that is required for meeting biodiversity targets for river ecosystems and threatened fish species. In managing the condition of a river FEPA, it is important to manage not only the river itself, but also the network of streams and wetlands as well as land based activities in the sub-catchment that supports the river FEPA. A proportion of tributaries and wetlands need to remain healthy and functional in order for the river FEPA to be kept in a good ecological condition. This requires that management activities are focused on maintaining water quantity and quality and the integrity of natural habitat in the sub-catchment. A bio-ecological report elaborates on the ecological status of the site (Appendix E-2).

One of the objectives of this report is to verify and investigate the abovementioned aspects and to provide recommendations and buffer zones where applicable.

4. Vegetation & habitat report and general biophysical descriptions

4.1 **General site description and land uses**

The property is located along the Mpumalanga University road (D725) to the north of Nelspruit near to the junction with the KaNyamazane road. No buildings or infrastructure except the entrance road are present. Tobacco farming used to be practiced on these properties but this has ceased in the past and the lands are fallow and vegetated by grasses. Natural vegetation is fragmented and limited to the ridge lines and drainage lines.

Two low ridges with a higher elevation than the surrounding land are present. These ridges have not been developed into agriculture lands due to their topography and their vegetation assemblage remains natural. No prominent rock outcrops are present, although eroded rocks are present on the ridge lines and the vegetation on these ridges is largely natural as it has been relatively protected on the property for many years from negative external drivers. The area surrounding the property is mostly used for agriculture but a residential development known as Kamagugu is located directly to the west. Several prominent drainage lines transect the study area and flows from west to east, attributing to the Friedenheim Stream that flows from north to the south east across the properties and tribute to the Crocodile River. This stream forms a deep ravine to the east of the proposed development land. Presently, the properties are uninhabited and no economic activities are practised. The biophysical features and habitat delineation of the study sites are projected on an aerial image (Figure. 1). Illustrations of the environment and vegetation are included with the following sections.

4.2 **Habitats & vegetation**

The land uses and habitat present on the property are classified according to simplified biophysical descriptions and discussed in the following sections:

i) **Modified land** (old agriculture lands and disturbed land)

Old lands form the largest extent of the proposed development land (Figure 1). None of the lands have been cultivated in the recent past. These lands are of low ecological sensitivity as the vegetation is homogenous and assembled of grass *Hyperthelia dissoluta, Eragrostis spp, Melinis repens, Heteropogon contortus, Cynodon dactylon, Cynodon nlemfuensis* and *Sporobolus panicoides*. No woody vegetation is present as the grass is cut on an annual basis.

A relatively large borrow pit is present on the central western boundary. This excavation has been filled with agriculture waste, rubble, vegetation matter and spoil material over the years and is presently vegetated mainly with exotic and alien invasive vegetation. Notable is the large *Casuarina equisetifolia* trees. This area is of low ecological concern.

ii) **Degraded woodland**

Small areas of land associated with shallow soils in the northwestern section have been subject to vegetation removal in the historic past (Figure 1). This is indicated by

the pioneer species of vegetation present (e.g. *Vachellia sieberiana, Vachellia natalita, Dalbergia armata, Dombeya pulchra, Vernonia adoensis, Lippia javanica* and vingerhoed). Larger trees that may be remnants of the original natural vegetation assemblage are *Sclerocarya birrea, Pterocarpus rotundifolius and Ficus ingens*. Exotic trees present are examples of *Casuarina equisetifolia*. The remains of the farm dwelling house is also present in this area. Another degraded area where vegetation removal has occurred consists of a small rock outcrop / boulders to the north of drainage line 2. A large specimen of *Ficus ingens* is situated on the outcrop and terrestrial trees around the outcrops are similar to thos described above. As these areas provides limited habitat and no threatened biota is present, it is allocated a Low-medium sensitivity rating on the index scale.

iii) **Legogote woodland & thicket**

The vegetation assemblage of the ridge and drainage line located in the northern section of the development land resembles *Legogote Sour Bushveld* (Mucina & Rutherford, 2006) and the structure is classified as closed woodland / thicket. The differentiating species is *Sterculia murex*. Commonly found shrubs and climbers are include *Searsia transvaalensis, Rhoicissus dentata, Bauhinia galpini, Hippobromus paucifloris, Ochna natalitia, Diospyros lycioides, Gymnosporia glaucophylla, Euclea natalensis, Euclea divinorum*, and *Grewia flava.* Prominent trees are *Sterculia murex* (frequent)*, Dombeya pulchra, Combretum molle, Combretum collinum subsp.suluense, Combretum apilculatum, Vachellia natalita, Heteropyxis natalensis, Pterocarpus rotundifolius, Peltophorum africanum, Sterculia murex, Cussonia spicata, Pappea capensis, Searsia transvaalensis, Ziziphus mucronata, Annona senegalensis, Antidesma venosum, Strychnos spinosa, Sclerocarya caffra, Ekebergia capensis* and *Maytenus undata.* The outer edges of this community are heavily infested with alien and indigenous invasive species (e.g. *Lantana camara, Chromolaena odorata, Tecoma stans, Solanum mauritianum, Dalbergia armata* and thickets *Senegalia ataxacantha*).

No large rocky outcrops or granite domes (base-rock areas) are present. Small granite rock outcrops are present within this community. These outcrops consist of large boulders and / or granite bedrock. Vegetation on the bedrock areas is limited to xerophytes *Jasminum multipartitum*, *Ficus ingens, Sarcostemma viminale, Aeollanthus parvifolius, Aloe petricola* (Protected) and the resurrection plant (*Selaginella dregei*). Species of ferns found in this niche are *Cheilanthes viridus* and *Pellaea calomelanos*.

The core woodland habitat maintains a diverse range of flora and provides refuge to other biota but ecological functions are compromised due to the fragmented state of the habitat. The habitat quality of the outer edges is considered to be lower than the central core zone due to the consequences of the invasive vegetation. The vegetation assemblage associated with the drainage line is described under a separate heading.

iv) **Pretoriuskop woodland**

The vegetation assemblage of the ridge and drainage lines located in the southern section of the development land resembles *Pretoriuskop Sour Bushveld* (Mucina & Rutherford, 2006) and the structure is classified as closed woodland. The differentiating species is *Terminalia sericea*. Prominent grasses recorded at the time of the assessment are L*oudetia simplex, Cymbopogon plurenodes, Heteropogon contortus* and *Panicum schinzii* and *Panicum deustum* in shady areas and drainage lines. Commonly found shrubs and climbers are much similar to the previously mentioned vegetation type and include *Rhoicissus dentata, Bauhinia galpini, Hippobromus paucifloris, Ochna natalitia, Diospyros lycioides, Combretum hereroense, Gymnosporia glaucophylla, Faurea saligna, Euclea divinorum, Euclea crispa* and *Grewia flava.* Prominent trees are *Terminalia sericea, Dombeya pulchra, Combretum collinum subsp.suluense, Combretum molle, Vachellia natalita, Heteropyxis natalensis, Annona senegalensis, Peltophorum africanum, Searsia transvaalensis, Strychnos madagascariensis, Lannea discolor, Sclerocarya caffra* and *Maytenus undata.*

As is the case with the previously described community, the outer edges of this community are also heavily infested with alien and indigenous invasive species (e.g. *Lantana camara, Chromolaena odorata, Tecoma stans, Solanum mauritianum, Dalbergia armata* and *thickets Senegalia ataxacantha).* The core woodland habitat maintains a diverse range of flora and provides refuge to other biota but ecological functions are compromised due to the fragmented state of the habitat. The habitat quality of the outer edges is considered to be lower than the central core zone due to the consequences of the invasive vegetation. The vegetation assemblage associated with the drainage line is described under a separate heading.

iii) **Riparian habitat & watercourses**

As the topography is associated with the ravine of the Friedenheim Stream, several drainage lines follows the slope from higher elevated land to the ravine. These are first order ephemeral watercourses that drain surface water from the higher lying land in the east to the Friedenheim Stream in the east. These drainage lines are described in the following section.

Drainage line 1

This is the northernmost drainage line and is surrounded by fallow lands. This is a small intermittend drainage line, in the form of a depression and a large loss of natural vegetation has occurred as the lands have been prepared and cultivated right onto the edge. Considering the infrequent availability of water (flow) as well as the remaining natural vegetation it can be assumed that terrestrial vegetation dominated this watercourse in its natural state. This drainage line is mostly grass covered (*Panicum schinzii*) and woody vegetation is limited to several shrubs and trees comprising the following species: *Combretum apiculatum, Pterocarpus rotundifolius, Annona senegalensis, Sclerocarya caffra* and *Lannea discolor*.

It is assumed that the vegetation assemblage was mostly restricted to terrestrial flora as this drainage line is small and flow is expected to be intermittend. This drainage line is of low ecological importance and low sensitivity.

Drainage line 2
This is an ephemeral drainage line and is located to the south of drainage line 1 and forms part of a fragment of *Legogote woodland*. The gradient is gentle and the channel is rather shallow and wide, indicating slower flow velocity. It originates on the western section of the property and receives concentrated storm water from the westernmost section of the proposed development land. *Phragmites australis* reed beds are present where flow is slowest and water is retained in shallow ponds after flow events. A large loss of riparian vegetation has occurred on the northern streambank where the agriculture land has encroached right onto the edge of the watercourse. Vegetation on this bank consit of grasses *Panicum schinzii* and *Panicum maximum* as well as weeds *Tagetes minuta, Lantana camara* and *Chromolaena odorata*. Specimens and small thickets of *Senegalia ataxacantha* and *Vachellia natalita* are also present on this bank (northern). The southern bank is associated with the largest fragment of *Legogote woodland* and riparian vegetation is largely natural on this bank. These include many species shared with the woodland as well as obligate riparian species such as *Syzygium cordata, Ficus sycomorus, Trichilia emetica* and *Schotia brachypetala*. *Senegalia ataxacantha* and *Dalbergia armata* forms thickets in places. These pathes of riparian vegetation is of high ecological importance. No RDL flora was recorded. It is apparent that flow is intermittent in this drainage line and it is of low aquatic ecological importance and sensitivity. It is of medium importance as refuge for biota and terrestrial interaction (connectivity).

Drainage line 3
This is an ephemeral drainage line and is located on the cenral section and forms part of a fragment of *Pretoriuskop woodland*. It originates on the western section of the property nearto the borrow pit. The watercourse originates on a gentle slope and the watercourse is not well defined in this zone but as the gradient becomes steeper 9To the central and eastern sections) the channel becomes deep and narrow. The vegetation assemblage is shared with the terrestrial component in the western section and obligate riparian vegetation is only found along the central and western sections. The most obvious are stands of *Syzygium cordata* and large *Combretum collinum* in the lower reaches. The vegetation is very lush (e.g. *Hippobromus paciflora, Peltophorum africanum, Ziziphus mucronata, Bauhina galpinii, Smilax* and *Dalbergia armata*) and thickets of *Senegalia ataxacantha* are present. The weeds *Lantana camara, Chromolaena odorata, Tecoma stans* and *Solanum mauritianum* also form dense thickets in places. No RDL flora was recorded. It is apparent that flow is intermittent in this drainage line. It is of low aquatic ecological importance and sensitivity. It is of medium importance as refuge for biota and terrestrial interaction (connectivity).

Drainage line 4
This is a relatively small intermittent drainage line located on the southern section of the development land. Flow is from south to northeast, tributing to drainage line 3.

The gradient is relatively steep and the drainage line is narrow and not well defined. Vegetation is terrestrial and shared with *Pretoriuskop woodland*. No RDL flora was recorded. It is apparent that flow is intermittent in this drainage line. It is of low aquatic ecological importance and sensitivity. It is of medium importance as refuge for biota and terrestrial interaction (connectivity).

4.3 **Occurrence of important flora species**

Conservation-important, naturally occurring species can be categorized according to specific features that are important, usually due to rarity, habitat specificity, medicinal value, ecological value, endemism, over-exploitation, economic value or a combination of these. Species of conservation importance are either categorized as Red Data Listed species (RDL species), according to specific scientifically researched criteria and administered by the South African National Biodiversity Institute (SANBI), or as Protected Trees and Plants by the national forests and the provincial nature conservation legislation. The National List for Red Data flora (2007) is the most updated and applicable reference for vegetation conservation in Mpumalanga. Applicable legislation that protect flora in South Africa and specifically in Mpumalanga Province are the National Environmental Management Biodiversity Act of 2004 (NEMBA), the Mpumalanga Nature Conservation Act of 1998 (MNCA) and the National Forests Act of 1998 (NFA). No RDL species was recorded (Table 2.1). Eight protected species were recorded and Table 2.2). Permits will have to be obtained from the Department of Forestry, and/or the Mpumalanga Tourism and Parks Agency, if legally protected trees or plant species are to be removed or destroyed.

Table 2.1 National RDL species potential for the relevant quarter degree grid (2531DA)

Species	**National Status**	**Habitat preference**
Brachystelma chlorozonum	Near Threatened	Bushveld habitats.
Dioscorea sylvatica	Vulnerable	Rock outcrops
Elaeodendron transvaalense	Near Threatened	Expected in natural bushveld;
Encephalartos laevifolius	Critically Endangered	Prefers higher altitude grassland.
Eriosema naviculare	Endangered	Expected in natural bushveld;
Siphonochilus aethiopicus	Critically Endangered	Forests

Table 2.2 Protected and RDL species recorded on site

Scientific Name	**RDL Status**	**Protected Status**	**Vegetation community/ Habitat**
Adenia gummifera	Least Concern	MNCA	Legogote woodland
Aloe petricola	Least Concern	MNCA	Legogote woodland
Aloe spicata	Least Concern	MNCA	Legogote woodland
Berchemia zeyherii	Least Concern	MNCA	Legogote / Pretoriuskop woodland
Eulophia streptopetela	Least Concern	MNCA	Legogote woodland
Faurea saligna	Least Concern	MNCA	Legogote woodland
Gladiolus hollandii	Least Concern	MNCA	Legogote woodland
Sclerocarya birrea	Least Concern	MNCA; NFA	Legogote / Pretoriuskop woodland

Also of conservation importance is the occurrence of alien invasive species and weeds. Such species are listed in the Conservation of Agricultural Resources Act of 1983 (CARA) and the Mpumalanga Nature Conservation Act (1998). The control by landowners of such species is regulated by these Acts. Several important exotic species are present and most of the natural habitats contain alien invader species (Section 4.1 and Table 2.3).

Table 2.3 Invasive vegetation and weeds identified on site

Scientific Name	**CARA Category**
Tecoma stans	Category 1 weed
Solanum mauritanium	Category 1 weed
Melia azeredach	Category 3 invader
Jacaranda mimosifolia	Category 3 invader
Lantana camara	Category 1 weed
Rubus coneifolius	Category 1 weed
Tagetes minuta	Naturalized/weed
Dalbergia armata	Bush encroachment
Senegalia ataxacantha	Bush encroachment
Dichrostachys cinerea	Bush encroachment

5. Terrestrial Fauna Report

The fauna investigation was not a comprehensive specialist survey but rather an overview of the available habitats and their potential to be utilized by fauna listed in checklists prepared by a desktop study. However, the affected area was investigated for fauna actually present.

5.1 **Amphibians**

A variety of frogs will utilize the aquatic and terrestrial habitats on the property for several reasons, including breeding purposes. Thirty frog species' range of distribution includes the study area, none of these have Red Data status. Only one species, the yellow-striped reed frog (*Hyperolius semidiscus*), is regarded as endemic. There is one species which are protected under the National Environmental Management: Biodiversity Act 2007, under the Threatened or Protected Species (TOPS) Rating, the African Bull Frog (*Pyxicephalus edulis*). It is not expected that the ecology or biology of frogs will be significantly affected by the proposed activity.

5.2 **Reptiles**

According to the South African Reptile Conservation Assessment (SARCA); (Bates et al. 2014) approximately 120 species of reptiles can potentially occur in the larger study area. The terrestrial and arboreal habitats present in the larger study area will provide habitat for a diverse group of important reptiles that are considered endemic or are Red Data Listed. Seventeen Endemic (South Africa, Lesotho, Swaziland) and 23 Near Endemic (Southern Africa) species are included with the list as well as two Regionally Endemic (restricted range) species. No locally- or ultra-endemic species (very restricted range) are expected on site. One Red Data Listed species is included with the list (Table 3.1).

Table 3.1 Important reptiles of the study area.

Scientific Name Common Name	Habitat and Ecology	Distribution / Endemic / Range Description	RDL Status
Crocodylus niloticus Nile Crocodile	Inhabits large rivers, swamps, lakes and river mouths.	Widespread throughout Africa. **Unlikely**, habitat inadequate.	Vulnerable A2ac
Smaug warreni warreni barbertonensis Barberton Girdled Lizard	A rupicolous species occurring on rock outcrops on hillsides and mountain summits, in savanna central Bushveld, Lowveld Mopane.	Regionally Endemic Restricted range. **Unlikely**, habitat inadequate.	Least Concern
Platysaurus intermedius wilhelmi Wilhelm's Flat Lizard	Commonly occurs on granite outcrops and inselbergs where it uses open exposed rock with associated boulders. Narrow rock crevices are important for refuge.	Regionally Endemic to atlas region. **Unlikely**, habitat inadequate.	Least Concern

Any negative impacts on these species' prime habitat will also reflect negatively on the maintenance potential of the site for these and other reptile species. By

conserving the core natural habitat zones on the property this order will not be significantly affected.

5.3 **Birds**

The literature review indicates that a diverse group of birds may utilize the area. More than 200 species' range of distribution falls within the study area and are supported by the available habitats. Due to the topography and habitat types present in the study area, the expected birds will be diverse and largely consistend with bushveld savannah species. Several Red Data Listed species are expected in the larger study area (Table 3.2).

Table 3.2 Red Data Listed birds that may be present in the study area. National Red Data listed birds according to Taylor M.R. et al, 2015.

Scientific name **Common name** (p Roberts)	**Habitat requirements**	**National Red data Status**	**Potential**
Aegypius occipitalis Whiteheaded vulture (p492)	Dry woodland, arid savannah, often associated with Baobab trees.	VU	Low
Aegypius tracheliotos Lappetfaced vulture (p491)	Open woodland in arid and semi-arid regions. *Acacia, Boscia, Terminalia.*	VU	Low
Alcedo semitorquata Half collared kingfisher	Fast flowing streams; clear water and well-wooded banks; rapids. Broken escarpment terrain. Riverbanks to excavate nest tunnels.	NT (Endemic)	Low
Anastomus lamelligerus Openbilled stork (p618)	Wetlands – floodplains, pans, marshes, ponds, streams, rivers, dams, lakes.	VU	Low
Aquila ayresii Ayre's eagle (p534)	Dense woodland and forest edges, often in hilly areas.	NT	Low
Aquila rapax Tawny eagle (p529)	Woodlands, lightly wooded areas: needs trees.	VU	Low
Bucorcvus leadbeateri Southern ground hornbill	Grassland, savanna, woodland. From higher than 2000m in grassland with patches of forests and gorges to lowland *Mopane* woodland.	VU	Low
Buphagus erythrorhynchus Redbilled oxpecker (p973)	Open savanna. Wide tolerance.	NT	Low
Ciconia nigra Black stork (p626)	Shallow water: streams, rivers, marshes, floodplains, coastal estuaries, large and small dams; dry land. Cliffs for breeding.	NT	Low
Ephippiorhynchus senegalensis Saddlebilled stork (p625)	Large rivers in open savanna, marshes, lake shores and flood plains.	EN	Low
Falco biarmicus Lanner Falcon (p556)	Open grassland and cleared woodland habitats. Cliff-nester, also in old nests in trees.	NT	Low
Gyps africanus Whitebacked vulture (p488)	Drier woodlands, mopane, arid Kalahari; tall trees for roosting and nesting.	VU	Low
Gyps coprotheres Cape Vulture (p489)	Both open country (grasslands) and woodland. Reliant on tall cliffs for breeding and roosting. Wanders widely.	VU	Low
Leptoptilos crumeniferus Marabou stork (p626)	Terrestrial and aquatic habitats, excluding desert and forests.	NT	Low
Mycteria ibis Yellowbilled stork (p617)	Dams, large marshes, swamps, estuaries, margins of lakes and rivers, seasonal wetlands.	NT	Visitor
Necrosyrtes monachus Hooded vulture (p486)	Mesic savanna. Well-developed woodlands with tall trees, e.g. Mopane, Jackal berry and Nyala tree.	VU	Low
Pododica senegalensis African finfoot (p314)	Forest and woodland areas: Perennial streams and rivers lined with reeds, overhanging trees and shrubs. Avoids stagnant and fast flowing water as well as silted water.	VU	Low
Polemaetus bellicosus Martial Eagle (p538)	Open grassland and scrub. Large trees for nests. Wide range of vegetation types: deserts densely wooded and forested areas.	VU	Low
Sagittarius serpentarius Secretary bird (p542)	Open country: Savanna, open woodland, grassland and dwarf shrubland.	NT	Low
Stephanoaetus coronatus Crowned eagle (p541)	Forests and plantations, dense woodland. Forested gorges in grassland.	NT	Medium (Ravine)
Terathopius ecaudatus Bateleur	Lowland and plains savannah	VU	Low

Abbreviations as follows: CR=critically endangered; EN=endangered; VU=vulnerable; T=threatened; NT=near threatened; LC=least concern; DD=data deficient. Endemic status (SA = South Africa; Sthrn A = Southern Africa):

It is obvious that most of the important taxa are raptors, vultures and storks (Table 3.2). As result of the fragmented and modified habitats available in the local area it is not expected that these are permanently present but several of these have large ranges and will be visitors from the nearby KNP in search of food. The general bird assemblage in the local area is diverse and representative of the atlas area (with exception of sensitive and specialized birds that may have been affected by negative changes to the local environment). The presence of large bird nests (e.g. raptors, vultures or storks) has to be investigated before clearing of vegetation commences. By conserving the core natural habitat zones on the property adequate habitat will be available to maintain a diverse bird assemblage.

5.4 **Mammals**

Several species of small to medium sized mammals will utilize the natural habitats on the property. The largest species expected to be present are Common duiker, Red duiker, Bushbuck and possibly Kudu. Table 3.3 projects the assemblage of Red Data Listed and Endemic mammals that falls within the distribution range of the study area (Child et al, 2016).

Table 3.3 Red Data listed mammals of the study area (Child et al, 2016)

Scientific Name *Common Name*	Habitat and Ecology	Endemism / Local status	Regional Status 2016	IUCN Status
ORDER: Artiodactyla - Family: Bovidae				
Cephalophus natalensis Natal Red Duiker	Inhabits evergreen forest, tropical/subtropical forest patches, coastal scrub, and riverine thickets.	Likely to be present locally	Near Threatened B2ab(ii,V)	Least Concern 2016
Damaliscus lunatus lunatus Tsessebe	Generally an inhabitant of floodplains and other grasslands in sub-Saharan Africa.	Locally extinct	Vulnerable D1	Least Concern 2008
Hippotragus niger niger Sable Antelope	The Sable Antelope is an “edge” species that frequents the woodland/grassland ecotone.	Locally extinct	Vulnerable A1ab+C2a(i) +D1*†	Least Concern 2008
Ourebia ourebi Oribi	Oribi inhabit savannah woodlands, floodplains and other open grasslands, from around sea level to about 2,200 m.	Unlikely to be present, habitat inadequate	Endangered C2a(ii)	Least Concern 2016
ORDER: Artiodactyla - Family: Hippopotamida				
Hippopotamus amphibius Hippopotamus	The Hippo is an amphibious creature, spending the majority of its day in water, and emerging at night.	Occasional visitor	Least Concern*†	Vulnerable A4cd 2008
ORDER: Perissodactyla - Family: Rhinocerotidae				
Ceratotherium simum Southern White Rhinoceros	The species is found in grassland in bushveld savanna habitats.	**Near Endemic**. Locally extinct	Near Threatened A4ad*†	Near Threatened C1+A3ad 2011
Diceros bicornis minor Black Rhinoceros	Black Rhino occur in a wide variety of habitats from desert areas in Namibia to wetter forested areas.	**Near Endemic.** Locally extinct	Endangered C2a(i)*†	Critically Endangered A2abcd 2012
ORDER: Perissodactyla - Family: Equidae				

ORDER: Artiodactyla Family: Giraffidae				
Giraffa camelopardalis Giraffe	Acacia savannah/woodland and open woodland landscapes are the preferred habitats for this subspecies.	Locally extinct	Least Concern	Vulnerable A2acd 2016
ORDER: Proboscidea Family: Elephantidae				
Loxodonta africana African Elephant	Within South Africa, elephants occur in most habitat types.	Locally extinct	Least Concern*†	Vulnerable A2a 2008
ORDER: CARNIVORA Family: Mustelidae				
Aonyx capensis Cape Clawless Otter	African Clawless Otters are predominantly aquatic and seldom found far from water.	Unlikely to be present, habitat inadequate	Near Threatened C2a(i)*	Near Threatened A2cde+3cde 2015
Lutra maculicollis Spotted-necked Otter	The Spotted-necked Otter inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes.	Unlikely to be present, habitat inadequate	Vulnerable C2a(i)	Near Threatened A3cde 2015
Poecilogale albinucha African Weasel	It is mainly found in savanna associations, although this species probably has a wide habitat tolerance.	Unlikely to be present, habitat inadequate	Near Threatened C1	Least Concern 2015
ORDER: CARNIVORA Family: Herpestidae				
Lycaon pictus African Wild Dog	African Wild Dogs were primarily an open plains species, more recent data indicate that they reach their highest densities in thicker bush.	Locally extinct	Endangered D	Endangered C2a(i)
ORDER: CARNIVORA Family: Felidae				
Leptailurus serval Serval	The Serval has quite specific habitat requirements, so it may be locally restricted to smaller areas within its broad distribution range.	Unlikely to be present, habitat inadequate	Near Threatened A2c + C2a(i)*†	Least Concern 2015
Panthera pardus Leopard	Leopards occur in the widest range of habitats among any of the Old World Cats.	Locally extinct	Vulnerable C1*†‡	Vulnerable A2cd
Panthera leo Lion	Wide tolerance of habitat. Social prides of several individuals.	Locally extinct	Least Concern	Vulnerable A2abcd
ORDER: CARNIVORA Family: Hyaenidae				
Hyaena brunnea Brown Hyaena	The Brown Hyaena is found in dry areas, rocky, mountainous areas with bush cover in the bushveld areas.	**Endemic to southern Africa.** Unlikely to be present	Near Threatened C2a(i)+D1*	Near Threatened C1 2015
Crocuta crocuta Spotted Hyaena	Widespread in African savannah.	Locally extinct	Near Threatened C2a(ii)*†‡	Least Concern
ORDER: Chiroptera Family: Vespertilionidae				

Miniopterus schreibersii Schreibers' Long-fingered Bat	Fragmented, Primary cause of change: Human interference.	Occasional visitor	Near Threatened	
ORDER: Insectivora Family: Chrysochloridae				
Amblysomus hottentotus Hottentot's Golden Mole	This species occurs predominantly within the mesic eastern regions of South Africa.	**Endemic.** Unlikely to be present, habitat inadequate	Least Concern	Least Concern 2015
ORDER: Insectivora Family: Soricidae				
Crocidura mariquensis Swamp Musk Shrew	This species has highly specific habitat requirements.	Unlikely to be present, habitat inadequate	Near Threatened B2ab(ii,iii,iv)	Least Concern 2016
Myosorex cafer Dark-footed Forest Shrew	Dark-footed Forest Shrews are restricted to moist, densely vegetated forests and grasslands.	**Endemic.** Unlikely to be present, habitat inadequate	Vulnerable B2ab(i,ii,iii,iv)*†	Least Concern 2016
ORDER: Primates Family: Cercopithecoidea				
Cercopithecus albogularis Samango Monkey	Samango Monkeys are primarily arboreal, utilising the canopy of evergreen forests.	Unlikely to be present, habitat inadequate	Near Threatened B2ab(ii,iii,v)	Least Concern 2008
ORDER: Rodentia Family: Muridae				
Dasymys robertsii African Marsh Rat	These species have been recorded from a wide variety of habitats, but they rely on intact wetlands in these areas.	Unlikely to be present, habitat inadequate	Near Threatened B2ab(ii,iii,iv)	Least Concern 2016
ORDER: Pholidota Family: Manidae				
Smutsia temminckii Temminck's Ground Pangolin	It is a predominantly solitary, terrestrial species that is present in various woodland and savannah habitats.	Locally extinct	Vulnerable A4d	Vulnerable A4cd*†‡

For interest sake, historically expected species are included (Table 3.3) and it can be concluded that nine species are locally extinct since historic times. Species that may be present represents smaller animals that can hide form humans and predators or / and have a secretive nature. The remaining species are not expected to be present due to the fact that species specific habitat parameters are inadequate or they are locally extinct. It can be assumed that the natural habitats on site provide ideal conditions for small mammals. By conserving the core natural habitat zones on the property adequate habitat will be available to maintain the expected mammal assemblage.

5.5 **Invertebrate Report**

Potentially, the natural habitats on site will offer refuge to all invertebrate groups with the available habitats on site. This consists of a large number of species for which field searches are to extensive to be accommodated for the present study. Picker *et. al.* (2002) can be referred to so as to get an idea of the large amount of invertebrate diversity that can be expected in the study area. The habitats present have the

potential to support approximately 275 species of butterflies. Cross-referenced larval host plants and prey items, a total of approximately 175 species may be present at one time or another. Due to the dynamic mobility of butterflies, any of these species has the potential to be present at a given time, although variable conditions will be a limiting factor. No Red Data Listed species are expected in the study area.

5.6 **Pollinators**

Pollinators provide an essential ecosystem service that result in the out-crossing and sexual reproduction of many plants. They benefit society by increasing food security in agricultural and natural ecosystem and they play an important role in conserving biological biodiversity (Eardly et al. 2006). Pollinator diversity includes an immense range of fauna, ranging from the tiniest invertebrates to relatively large vertebrates. Often, pollinators form part of a highly specific niche in pollinator-plant relationships and the ecosystem integrity as a whole. The loss of a single important habitat requirement (e.g. hides and cover objects, larval hosts, availability of water, etc.) for pollinators in an ecosystem could have far reaching effects, ultimately resulting in extinction. Fragmentation of habitats will undoubtedly also have a negative impact on the occurrence and distribution of pollinators and consequently on the genetic and population integrity of ecosystems. The successful survival of pollinators is thus further motivation for the conservation of undisturbed and unimpaired, interconnected ecological corridors crossing property boundaries in local areas.

6. Sensitivity and Impact Assessment

6.1 Sensitivity & buffer zones

The results of the biodiversity investigation indicate that the larger site area is largely transformed from its natural state and the ecological functions and the assemblage of natural biota have been negatively modified. The ecological importance and sensitivity index (based upon natural integrity, fauna potential and ecological functions) for the different ecological units is delineated in Figure. 1 and summarized in Table 4.1.

Table 4.1 Ecological sensitivity and surface areas

Habitat Description	Ecological Sensitivity	Total surface area		Development surface area	
		Ha	%	Ha	%
Modified land	Low	14.8	55.7	13.0	70.3
Degraded woodland	Low-medium	3.7	13.3	3.2	17.3
Legogote woodland & thicket	Medium	4.0	15.0	1.0	5.4
Pretoriuskop woodland	Medium	4.0	15.0	1.3	7.0
Total		**26.5**	**100**	**18.5**	**100**

6.2 Determining buffer zones

6.2.1 Aquatic & riparian buffer zone

The aquatic buffer zone determination for the watercourses was conducted by method of a site-based assessment according to Macfarlane et al (2014) as explained in section 2.4: This method is designed for site-based assessments and includes a more detailed evaluation of risks and consideration of site-specific factors that can affect buffer requirements. Such an approach is designed to inform any detailed development planning and provide an appropriate level of information for authorization purposes.

With application of this method it is found that all the drainage lines on site are “A” section ephemeral watercourses without sufficient indicators of active channels. This implies that further application of the buffer zone guidelines methodology is not warranted as “A” Section watercourses are regarded as the least sensitive from a water yield and contaminant risk perspective as they typically only carry water after storm events. In this case the guidelines recommend to take practical measures to limit the risk of diffuse source pollutants entering such sections. This could include the maintenance of a reduced vegetated buffer, based on expert opinion, around such features (watercourses).

By evaluating the potential risks it is found that a relatively narrow buffer zone will be sufficient to protect the watercourses from the proposed development. This is motivated by the following facts:

- The proposed development pose a low risk for pollution (water quality) as it will be serviced from a storm water -, solid waste and sewage point of view;
- Vegetated areas are present around the watercourses to act as buffer;
- The effect of storm water will be mitigated where it is discharged into the watercourses.

- No sensitive biodiversity is present that needs protection;
- Water will not be abstracted from the watercourses;
- The morphology of the watercourses will not be modified (except for watercourse road crossings).

The following measures must be incorporated with the design and operational phases:

- The storm water management plan must be formulated in such a way that concentrated storm water is not discharged directly into any watercourse without the velocity and energy being reduced (to prevent erosion);
- The watercourses must be monitored for changes and an annual report by a specialist should be submitted to the regulating authorities whereupon action should be taken if significant negative consequences become apparent.

In this instance, the drainage lines are clearly intermittend and may not have active flow for several years in succession and as noted in section 4.3 obligate riparian vegetation is mostly absent (naturally so or has been lost via human activities) and occurs in patches (natural fragments) where present. It is recommended to use the 1:100 year floodline as the aquatic and riparian buffer line as it will effectively protect the watercourses and any obligate riparian vegetation (and non-riparian vegetation) associated with the watercourses.

6.2.2 **Terrestrial buffer zone**

Per definition, a biodiversity buffer zone is designed to adequately mitigate adverse effects of adjacent land use activities on important biodiversity features or a core habitat (Core habitat: The area of natural habitat essential for the long-term persistence of a species and processes in its current distribution range). It must also be taken into consideration that buffer zones may unduly constrain development opportunities if implemented too conservatively or unneccessarily. In this instance there are no threatened or important biota that require a buffer zone as protection and the ecological functions have also been compromised. The natural vegetated areas on the properties represent a significant percentage (30%) of the total site surface area of 26.5Ha (Table 4.1). The development will encroach marginally into the naturally vegetated areas and approximately 2.3Ha (30% of 8.0Ha) will be lost. The core areas of the natural habitats will be conserved and will still be connected as is presently the case. For this reason a terrestrial biodiversity buffer is not recommended. However, the edge of the development line will serve as the perimeter of development activities. No vegetation clearing or other activities are allowed beyond. No spoil material may be pushed or stored beyond the development line into the natural terrestrial habitat, drainage lines or riparian areas.

6.2 **Impact assessment**

Site preparation for the proposed activity will lead to significant changes to the natural environment and negative direct and indirect impacts such as the loss of natural vegetation and loss and fragmentation of natural habitats and fauna. However, by projecting the development footprint onto the least sensitives ecological

areas and conserving the core areas of the natural habitats the potential impact on the natural environment is effectively mitigated to a low magnitude.

For this reason this report recommends that the development is concentrated on the modified land and degraded habitat but will also encroach slightly into the natural habitat where sensitivity is regarded to be of medium significance. By designing the development plan to accommodate / conserve the core habitats and representative biota of the local area the cumulative impact will be reduced significantly. The watercourses and core areas of the woodland habitats is of significant ecological importance as it provides refuge and a corridor that enables animals to move about the larger study area and to migrate in between adjacent terrestrial habitats that are connected by way of this corridor. These core areas will not be directly affected by the activities.

The potential and present impacts related to the above discussion were assessed by applying the following methodology:

- The *nature* of the impact entails a description of the cause of the impact, what will be affected and how it will be affected;
- The *extent* refers to the area where the impact will be significant e.g. on site, local area, regional, provincial, national or international;
- The *duration* refers to the lifetime of the impact:
    - Short term: 0-5 years
    - Medium term: 5-15 years
    - Long term: >15 years
    - Permanent
- The *probability* describes the likelihood of the impact occurring during the duration:
    - Improbable (Low likelihood)
    - Probable (Distinct possibility)
    - Highly Probable (Most likely)
    - Definite (Impact to occur regardless of any preventative measures)
- The *significance* is determined by analyzing the above subjects and is assessed as low, medium or high.

The impact assessment is propagated in Table 4.2 and additional mitigation measures in order to ensure that potential impacts are minimized are listed in Table 4.2 and in the following section.

7. Conclusion and Recommendations

The report concludes that development can be considered subject to conditons and measures to mitigate potential impacts on the natural environment. The following conditions and recommendations are relevant:

Site selection

- The recommended development areas are projected on Figure 1.
- It is recommended that watercourse crossings for pipelines and roads are placed on or nearto existing crossing sites to minimize potential impacts on the relevant habitat.
- Where existing crossing sites are not present, new sites can be considered but the distance and surface area of the activity footprint must be kept to the minimum.

General recommendations

The development plan must accommodate the following:

- Use only the recommended development areas as projected in Figure 1,
- Conserve as much of the natural habitats and minimize loss of large trees and sensitive biodiversity;
- Retain large indigenous trees on site where possible.
- Large trees that will be destroyed must be investigated for the presence of large bird's nests. If present these must be conserved for the time being (as per specialist advice).
- Improve the remaining habitat by conducting invasive vegetation control and bush encroachment management.
- Use only indigenous flora for landscaping and wind breaks.
- Implement an alien invader vegetation control program.
- Spoil material may not be pushed / stockpiled into the surrounding natural habitats, drainage lines or buffer zones.

Buffer zones

- No buffer lines are applicable in the areas where the development encroaches into the natural habitat. However, any activities beyond the development line within the natural habitat are strictly forbidden.
- The 1:100 year floodlines of the watercourses are proposed as buffer lines as this will effectively include the riparian habitat as well as the watercourses. (Figure 1).
- It is recommended that an Environmental Control Officer (ECO) is appointed who will be responsible to actually delineate the buffer zones on site (considering actual on site conditions and to ensure that large trees are not unnecessarily destroyed).
- Spoil material may not be pushed / stockpiled into the buffer zone or surrounding natural habitats.

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These include members of the IUCN Species Survival Commission Specialist Groups, IUCN Red List Partners, and many others, including experts from universities, museums, research institutes and non-governmental organizations. Website: www.iucn.org/redlist

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Appendixes

APPENDIX 1: SPECIALIST DETAILS