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HaskoningDHV**  
*Enhancing Society Together*

## **Appendix F: Preliminary Ecological Survey**





## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA


### DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

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Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

### PROJECT TITLE

**Charlie 1 Landfill Optimisation and Storm Water Management Project, Sasol Synfuels, Secunda, Mpumalanga**

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4.2 The specialist appointed in terms of the Regulations\_

I, **Clayton Cook**, declare that -- General declaration:

I act as the independent specialist in this application

I will perform 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 in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;


I will comply with the Act, regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority 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 form are true and correct; and

I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

  
\_\_\_\_\_  
Signature of the specialist:

*So dependent Consultant*  
\_\_\_\_\_  
Name of company (if applicable):

*06/08/2015*  
\_\_\_\_\_  
Date:

**PRELIMINARY ECOLOGICAL HABITAT  
ASSESSMENT FOR THE PROPOSED  
SASOL CHARLIE 1 OPTIMISATION AND  
STORMWATER MANAGEMENT PROJECT,  
SECUNDA;  
MPUMALANGA PROVINCE**



Compiled for **Royal HaskoningDHV**

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SUBMITTED: 15<sup>th</sup> of MAY 2015



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# 1. Background Information

The Sasol Synfuels, Secunda, Charlie 1 landfill site was authorised in 1993 as a Class II Site, in terms of the Environmental Conservation Act (ECA) (No. 73 of 1989). Recent changes in legislation such as the National Environmental Management: Waste Act, 2008 (No. 59 of 2008) and the Waste Classification and Management Regulations, 2013 (GN R. 634) have implications for the management of waste disposal sites.

The latest audits conducted at Charlie 1 landfill site highlighted that the water management is not in accordance with the permit requirements. Therefore the Pollution Control Dam (PCD) of approximately 16 000 m<sup>3</sup> will be constructed to ensure compliance with the existing permit requirements. It will be constructed to ensure effective management of leachate and stormwater at the site.

The PCD will be constructed on agricultural land adjacent to the western boundary of the existing landfill site. The overall footprint of the PCD area is approximately 2 ha.

The inflow to the PCD will mainly comprise of contaminated runoff from the active landfill cells as well as contaminated shallow seepage from the overall landfill footprint area (31 ha) which will be controlled within the PCD by means of enhanced evaporation. The quality of this water will most likely be very poor quality from the onset, and is likely to become poorer over time, due to the effect of evaporation. Hence, it is highly unlikely that the water accumulated in the dam will at any stage, even after prolonged rainfall events, be of acceptable quality to be released to the receiving environment.

The PCD will have a separate cell which will house the leachate from the leachate system, ensuring that the contaminated stormwater and the leachate will never mix in the PCD.

The extent of the proposed site for the construction of the PCD is approximately 3 ha and situated on portion of the Farm Driehoek 275 IS. Royal HaskoningDHV as an Independent Environmental Practitioner has appointed Prof. L. R. Brown to undertake the vegetation aspect and Mr. C.L. Cook to undertake the faunal aspect of the biodiversity or ecological habitat assessment for the proposed Charlie 1 pollution control dam project. The purpose of this document is to highlight potential impacts on the biodiversity of the proposed Charlie 1 pollution control dam site and the description of the vegetation type and vegetation units and faunal component (mammals, avifauna (birds) reptiles and amphibian). A preliminary site investigation was undertaken on the 23<sup>rd</sup> of April 2015.

The vegetation on the site consists entirely of transformed Soweto Highveld Grassland (Gm8) (Mucina and Rutherford, 2006). Large areas of the vegetation on the site have been transformed during previous and current agricultural activities. The majority of the site has been annually ploughed and planted with planted *Setaria pallide-fusca* pastures. The dumped soil piles and disturbed areas are dominated by pioneer weedy plant species such as *Rumex crispus*, *Lepidium bonariense*, *Cosmos bipinnatus*, *Chenopodium album*, *Tagetes minuta*, *Gomphocarpus fruticosus*,



*Conyza bonariensis*, and *Flaveria bidentis*, *Cyperus esculentus*, *Verbena bonariensis*, *Cirsium vulgare* and weedy grasses such as *Hyparrhenia hirta* *Eragrostis curvula*, *Cynodon dactylon*, *Polypogon monspeliensis*, *Echinochloa pyramidalis*. The highly invasive Kikuyu (*Pennisetum clandestinum*) is also present on old soil dumps and disturbed areas.

A brief field survey was conducted to determine the current environmental status of the site with emphasis placed on the potential occurrence of Red Listed/Data animal species likely to occur on or immediately adjacent to the proposed project site. By surveying the site for specialised habitats, as well as the remaining vegetation and specific habitats, one can make an assumption of the possible presence or absence of threatened plant and animal species. Due to the high levels of habitat transformation and impoverished habitats on the site; no additional vegetation or faunal surveys will be required.

### **1.1 Objectives of the initial faunal survey/ habitat assessment**

- To provide a basic description of the dominant vegetation units and faunal composition (mammals, birds, reptiles and amphibians) occurring or likely to occur on the proposed site.
- To provide a basic description of any red listed plant or animal species (mammals, birds, reptiles and amphibians) occurring or likely to occur on the proposed site.
- To describe the available habitats on site including areas of important conservation value or areas most likely to form important habitat for remaining threatened species on or around the proposed site.

### **1.2 Scope of study**

- An initial ecological survey with special emphasis on the current status of threatened plant and animal species (Red Listed/Data Species), within the proposed site and adjacent areas.
- An assessment of the ecological habitats, evaluating conservation importance and significance with special emphasis on the current status of threatened animal species (Red Data Species), within the proposed site and immediate adjacent areas.
- Documentation of the findings of the study in a report.

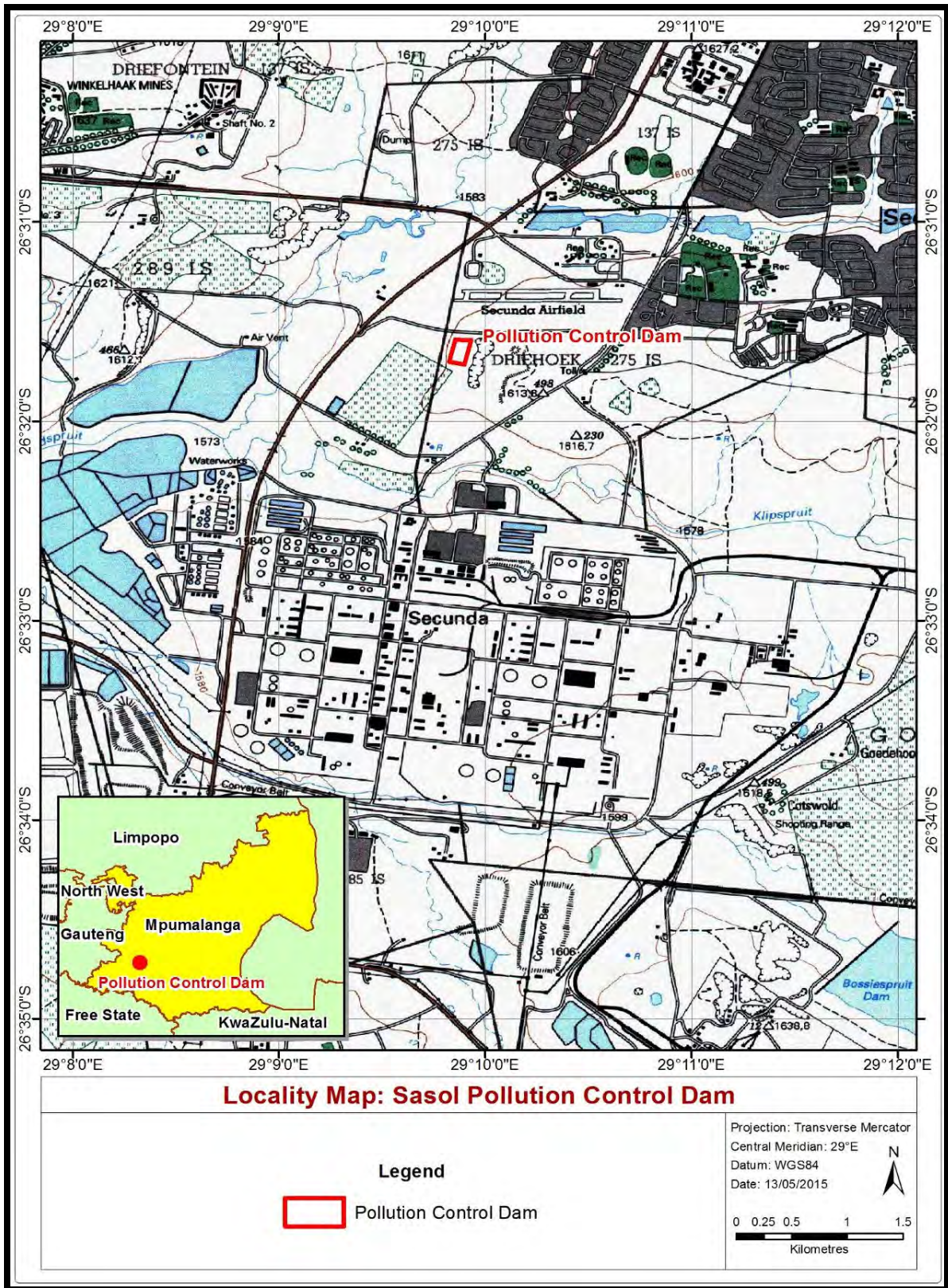


Figure 1: Locality map of the proposed project

## 2. Methodology

### 2.1 Predictive methods

A 1:50 000 map of the study area was provided showing existing infrastructure and the proposed Charlie 1 pollution control dam site. This was used as far as possible in order to identify potential “hot-spots” or specialised habitats e.g. Patches of undisturbed moist Soweto Highveld grassland, palustrine wetlands, dams as well as transformed areas including the Sasol plant, agricultural lands, old borrow pits, roads, mines and existing homesteads. Satellite imagery of the area was obtained from Google Earth was studied; in order to get a three dimensional impression of the topography and land use as well as potential wetland habitats on or immediately adjacent to the proposed Charlie 1 pollution control dam site.

### 2.2 Literature Survey

A detailed literature search was undertaken to assess the current status of threatened fauna that have been historically known to occur in the Secunda-Evander area. The literature search was undertaken utilising The literature search was undertaken utilizing *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford 2006) for the vegetation description as well as *National Red List of Threatened Plants of South Africa* (Raimondo *et al.*, 2009) as well as internet using POSA (<http://posa.sanbi.org> accessed on the 14<sup>th</sup> of May 2015). *The Mammals of the Southern African Subregion* (Skinner & Chimimba 2005) and *The Red Data Book of the Mammals of South Africa: A Conservation Assessment* (Friedmann and Daly (editors) 2004) as well as ADU’s MammalMap ([http://vmus.adu.org.za/vm\\_sp\\_list.php](http://vmus.adu.org.za/vm_sp_list.php) accessed on the 10<sup>th</sup> of February 2015) for mammals. *The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*. (Barnes 2000), *Roberts- Birds of Southern Africa VIIIth ed.* (Hockey *et al.* 2005) as well as SABAP2 (<http://sabap2.adu.org.za>) for birds. *The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians as well as SAFAP FrogMap (<http://vmus.adu.org.za> accessed on the 14<sup>th</sup> of May 2015) The *Field Guide to the Snakes and other Reptiles of Southern Africa* (Branch 2001) and *South African Red Data Book-Reptiles and Amphibians* (Branch 1988) as well as SARCA ReptiMAP (<http://sarca.adu.org.za> accessed on the 14<sup>th</sup> of May 2015) for reptiles. *The Atlas and Red Data Book of the frogs of South Africa, Lesotho and Swaziland* (Minter *et al.* 2004) for amphibians as well as SARCA FrogMAP (<http://sarca.adu.org.za> accessed on the 14<sup>th</sup> of May 2015).

### 2.3 Site Investigation Methodology

#### 2.3.1 Vegetation

The Braun-Blanquet survey principles (Brown *et. al* 2013) was used to describe plant communities as ecological units were used for this study. An overview of the vegetation was first obtained from relevant literature. Ecological sensitivity of the plant communities were assessed and categorised according to habitat and plant species assemblages. Aerial photographs and topographical maps were used to study the site and delineate the different vegetation units prior to the site visit. All these units were verified on foot on the site and vegetation sample plots placed in each.

- **Data recorded included:**

A list of all plant species present, including trees, shrubs, grasses, forbs, geophytes and succulents were compiled. All identifiable plant species were listed. Notes were additionally made of any other features that might have an ecological influence.

- **Red data species**

An investigation was also carried out on rare and protected plants that might possibly occur in the region. For this investigation the National Red List of Threatened Plants of South Africa, Lesotho & Swaziland, compiled by the Threatened Species Programme, South African National Biodiversity Institute (SANBI) was used. The internet source "Plants of Southern Africa" (POSA - SANBI) was also consulted. The presence of rare and protected species or suitable habitat was recorded during the field visit.

- **Data processing**

A classification of vegetation data was done to identify, describe and map vegetation types. The descriptions of the vegetation units include the tree, shrub and herbaceous layers. The conservation priority of each vegetation unit was assessed by evaluating the plant species composition in terms of the present knowledge of the vegetation of the Savanna Biome of South Africa.

### **2.3.2 Fauna**

A preliminary assessment of the status, spatial requirements and habitat preferences of all priority faunal species likely to occur in the proposed site. For certain species, an estimate of the expected or historical distribution for the area could be extrapolated from published information and unpublished reports, while habitat and spatial requirements were generally derived from the literature. For other species, little of this information was readily available and conservation targets remain speculative. Species assessments will be updated when additional data becomes available and where appropriate, proposed conservation targets will be revised.

### **2.4 Uncertainties in Predicting Results**

- Limitation to a single site visit for only 1 day (6 hours) during the late summer months (April 2015).
- The majority of threatened faunal species are seasonal only emerging after sufficient early heavy summer rainfalls between October and December.
- The majority of threatened animal species are extremely secretive and difficult to observe even during intensive field surveys conducted over several years.
- Limitation of historic data and available databases. Insufficient knowledge on the detailed habitat requirements (migratory, foraging and breeding) of the majority of threatened faunal species.



- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records and previous surveys conducted in Secunda-Evander and similar habitats between 1999-2015).

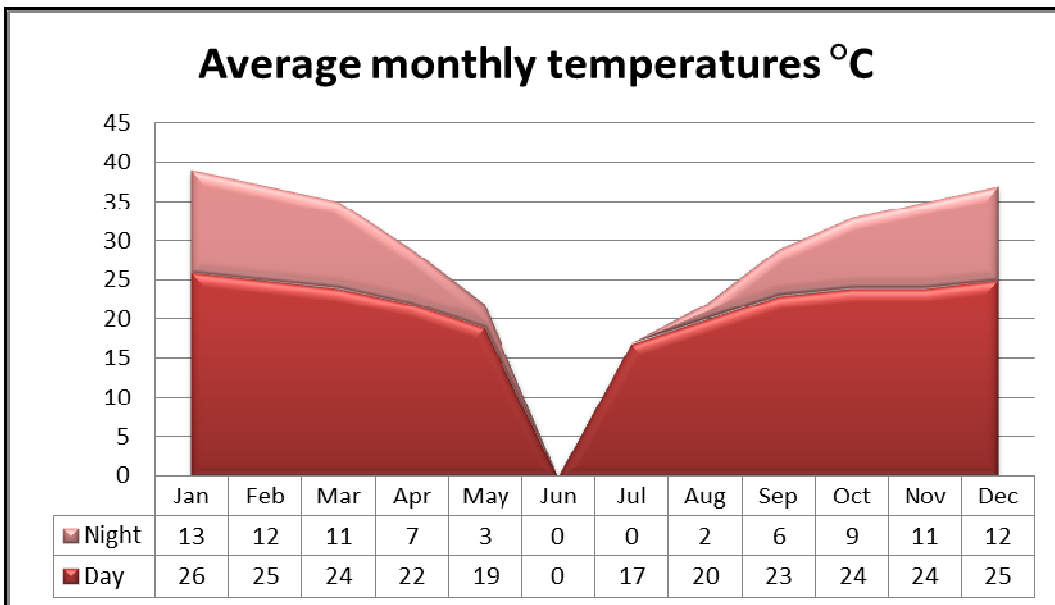
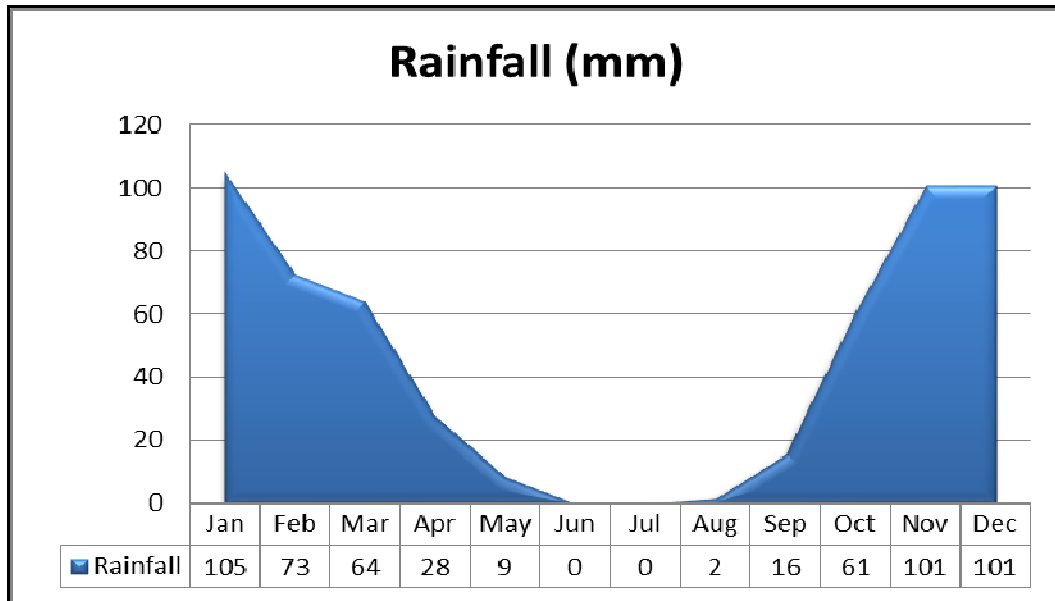
### **2.5 Gaps in the Baseline Data**

- Little long-term, verified data of faunal species distribution on micro-habitat level on the actual site and immediate surrounding area.
- Little long-term, verified data on impacts of habitat destruction during previous and current mining and agricultural activities (pasture grassland, maize, soya bean and cattle) as well as industrial activities on the environment especially water quality, air pollution etc and the effects of massive habitat degradation on the fauna in the area.

## **3. Description of the Affected Environment**

### **3.1 Climate**

The study area is located in the summer rainfall area of the country and has an annual average rainfall of 560 mm. The lowest rainfall is in June and July (0 mm) with the highest in November, December and January (101-105 mm). The average midday temperature for the study area ranges between 16°C and 25°C in June and January respectively. The coldest months are June and July with relatively mild summer temperatures ([http://www.saexplorer.co.za/south-africa/climate/secundal\\_climate.asp](http://www.saexplorer.co.za/south-africa/climate/secundal_climate.asp)).



**Figure 2: Average monthly rainfall and temperatures for the study area**



### 3.2. Vegetation Type

The vegetation of the site falls within the **Soweto Highveld Grassland (Gm8)** vegetation unit (Mucina & Rutherford, 2006) or **Moist Clay Highveld Grassland (35)** (Low & Rebelo, 1995).

#### Synonyms:

Turf Highveld (A52), *Themeda triandra-Aristida bipartita* Grassland.

#### Statistics:

10 265 km<sup>2</sup>; ~ 79% transformed; 0.00% conserved.

#### Locality & Physical Geography:

Mpumalanga, Gauteng (and to a very small extent into neighbouring Free State and North-West) Provinces: In a broad band roughly delimited by the N17 road between Ermelo until Johannesburg in the north, Perdekop in the southeast and the Vaal River (border with the Free State) in the south it extends further westwards along the southern edge of the Johannesburg Dome (including part of Soweto) as far as the vicinity of Randfontein. In southern Gauteng, it includes the surrounds of Vanderbijlpark and Vereeniging as well as Sasolburg in the northern Free State. Found in the Bethal-Standerton area in the southern parts of Mpumalanga, on flat to slightly undulating plains, at 1 420-1 760 m.l.

**Vegetation & Landscape Features:** The vegetation is dominated by grasses species reaching a height of ~1.0 m (*Themeda triandra*) while the herbaceous component (averages 0.9 m tall) comprises a cover of about 5%. Dominant species are *Themeda triandra* and *Hyparrhenia hirta*. In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover. No patches of natural *Themeda triandra* grassland, ridges or large rocky outcrops were observed on the site or adjacent areas.

**Geology and Soils** Shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the intrusive Karoo Suite dolerites which feature prominently in the area. In the south, the Volksrust Formation (Karoo Supergroup) is found and in the west, the rocks of the older Transvaal, Ventersdorp and Witwatersrand Supergroups are most significant. Soils are deep, reddish on flat plains and are typically Ea, Ba and Bb land types. The predominating soils along the drainage lines are very clayey, black vertic or near vertic, mostly of montmorillonitic clays.

#### Vegetation:

Red grass *Themeda triandra* exclusively dominates areas which are not severely degraded. Characteristic species are Three-awn Rolling Grass *Aristida bipartita*, Blackseed Fingergrass *Digitaria ternata*, Largeseed Setaria *Setaria nigrirostris*, *S. incrassata* and *Panicum coloratum*. Other important species are Weeping Lovegrass *Eragrostis curvula*, Speargrass *Heteropogon contortus*, Golden Setaria *Setaria sphacelata*, *Elionurus muticus*, *Microchloa caffra*, *Brachiaria serrata*, *Eragrostis plana* with Feathered Chloris *Chloris virgata*, Couchgrass *Cynodon dactylon* and Tassel Bristlegrass *Aristida congesta* prominent at degraded sites.

Dicotyledonous forbs are prominent and include *Berkheya pinnatifida*, Flower-in-a-cage *Crabbea acaulis*, Hairflower *Chaetacanthus costatus*, *Salvia repens*, *Pseudognaphalium luteo-album*, *Abildgaardia ovata*, *Anthospermum pumilum*, *Bulbostylis contexta* and *Evolvulus alsinoides*.

### IMPORTANT TAXA

**Graminoids (Grasses):** *Andropogon appendiculatus*, *Brachiaria serrata*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Elionurus muticus*, *Eragrostis capensis*, *E. chloromelas*, *E. curvula*, *E. plana*, *E. planiculmis*, *E. racemosa*, *Heteropogon contortus*, *Hyparrhenia hirta*, *Setaria nigrirostris*, *S. sphacelata*, *Themeda triandra*, *Tristachya leucothrix*, *Andropogon schirensis*, *Aristida adscensionis*, *A. bipartita*, *A. congesta*, *A. junciformis* subsp. *galpinii*, *Cymbopogon caesius*, *Digitaria diagonalis*, *Diheteropogon amplexans*, *Eragrostis micrantha*, *E. superba*, *Harpochloa falx*, *Microchloa caffra*, *Paspalum dilatatum*.

**Herbs:** *Hermannia depressa*, *Acalypha angustata*, *Berkheya setifera*, *Dicoma anomala*, *Euryops gilfillanii*, *Geigeria aspera* var. *aspera*, *Graderia subintera*, *Haplocarpha scaposa*, *Helichrysum miconiifolium*, *H. nudifolium* var. *nudifolium*, *H. rugulosum*, *Hibiscus pusillus*, *Justicia anagalloides*, *Lippia scaberrima*, *Rhynchosia effusa*, *Schistostephium crataegifolium*, *Selago densiflora*, *Senecio coronatus*, *Vernonia oligocephala*, *Wahlenbergia undulata*.

**Geophytic Herbs:** *Crinum* spp., *Haemanthus humilis* subsp. *hirsutus*, *H. montanus*.

**Herbaceous Climber:** *Rhynchosia totta*.

**Low Shrubs:** *Anthospermum hispidulum*, *A. rigidum* subsp. *pumilum*, *Berkheya annectens*, *Felicia muricata*, *Ziziphus zeyheriana*.

### Key Environmental Parameters:

This vegetation type is restricted to very clayey soils of the high rainfall areas of the southern Mpumalanga highveld.

### Economic Uses:

The clay soils are often not ploughed, and mostly utilised for grazing by cattle and sheep. The site is currently utilised for soya bean lands and extensive cattle grazing activities along the valley bottom wetland and mist grassland.

### Conservation Status:

Soweto Highveld grasslands are considered to be **Endangered**. The conservation target is 24%. Only a handful of patches statutorily conserved (Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, Rolfe's Pan Nature Reserves) or privately conserved (Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site). Almost half of the area already transformed by cultivation, urban sprawl, mining and building of road infrastructure. Some areas have been flooded by dams (Grootdraai, Leeuikuil, Trichardtsfontein, Vaal, Willem Brummer). Erosion is generally very low (93%).

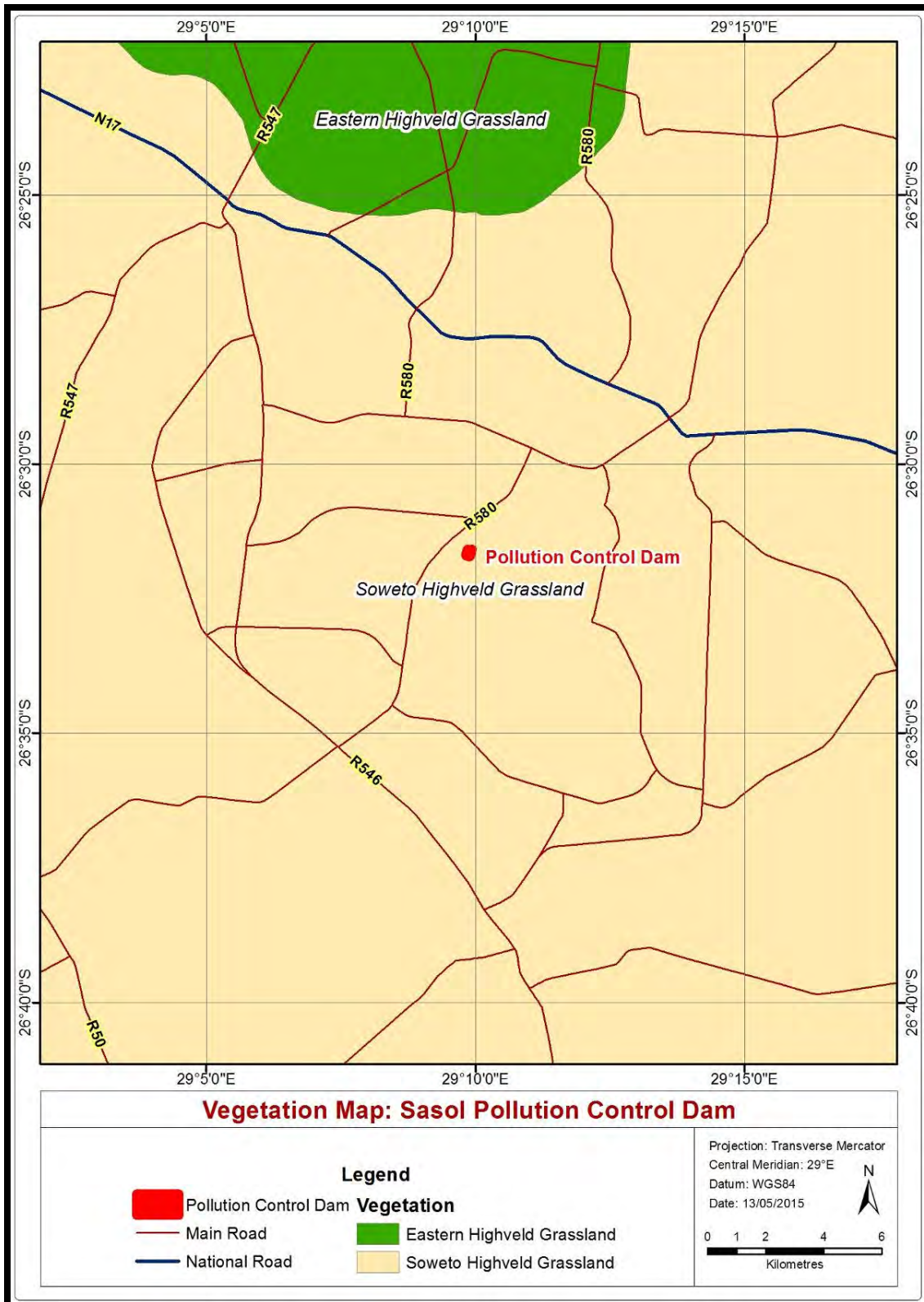


Figure 3: Vegetation map of the proposed site (adapted from Mucina & Rutherford, 2006)

### 3.3 Vegetation of study site

The study site occurs on dark clay soil on a relatively flat area. Two vegetation units were identified during the ecological survey namely the 1) Pasture field and the 2) Degraded area:

#### 3.3.1 Pasture Field



<b>Status</b>	Transformed		
<b>Land practice</b>	Harvesting of grasses for pasture purposes		
<b>Rock cover:</b>	0%	<b>Soil</b>	Clay
<b>Signs of animals</b>	Birds & insects		
<b>Conservation Priority</b>	<b>Low</b>		

This unit comprises the largest part of the study site and is located in the southern section of the site. The soil is dark clay with no rocks present. The area is mostly level with a slight 1° northern slope. The vegetation is dominated by the grass, *Setaria pallide-fusca* which is harvested for pasture purposes. The pioneer forb, *Solanum panduriforme* is prominent in some areas where few grasses grow. Other species present include the grasses: *Hyparrhenia hirta*, *Cynodon dactylon*, *Eragrostis curvula* and the forbs: *Amaranthus hybridus*, *Tagetes minuta*, *Plantago lanceolata* and *Oenothera rosea*.

The alien invasive grass *Pennisetum clandestinum* is present in some localities while large numbers of the declared Category 1 weed *Cirsium vulgare* is present throughout this unit.

**Medicinal plants**

No medicinal plants were identified within this vegetation unit.

**Red data species**

No red data plant species or suitable habitat for such species was observed in this vegetation unit.

The following is a list of species identified on the site (Red = alien invasive species):

<b>GRASSES</b>
<i>Cynodon dactylon</i> (L.) Pers.
<i>Eragrostis curvula</i> (Schrad.) Nees
<i>Hyparrhenia dregeana</i> (Nees) Stapf
<i>Hyparrhenia hirta</i> (L.) Stapf
<i>Panicum schinzii</i> Hack.
<i>Paspalum dilatatum</i> Poir.
<i>Pennisetum clandestinum</i> Chiov.
<i>Urochloa panicoides</i> P.Beauv.
<b>FORBS</b>
<i>Amaranthus hybridus</i> L.
<i>Bidens pilosa</i> L.
<i>Chenopodium album</i> L.
<i>Cirsium vulgare</i> (Savi) Ten.
<i>Conyza canadensis</i> (L.) Cronquist
<i>Cosmos bipinnatus</i> Cav.
<i>Oenothera rosea</i> L'Hér. ex Aiton
<i>Plantago lanceolata</i> L.
<i>Senecio</i> species
<i>Solanum panduriforme</i> E.Mey.
<i>Tagetes minuta</i> L.
<i>Verbena bonariensis</i> L.
<i>Verbena brasiliensis</i> Vell.



### 3.3.2 Degraded Area



<b>Status</b>	Transformed		
<b>Land practice</b>	Open area not used but heavily degraded		
<b>Rock cover:</b>	0%	<b>Soil</b>	Clay
<b>Signs of animals</b>	Insects		
<b>Conservation Priority</b>	<b>Low</b>		

This unit is located in the northern and eastern side of the study area. The soil is dark clay with no rocks present. The area is mostly level with a slight 1° northern slope though artificial soil heaps previously dumped on the area are present. The area has a patchy vegetation cover with grasses in some areas, forbs in the others and open or barren soil in others. The forb layer is the most conspicuous with the forb *Rumex crispus* and the alien invasive weed (Category 1) *Cirsium vulgare* dominant. Other species present include the grasses: *Eragrostis curvula*, *Cynodon dactylon*, *Polypogon monspeliensis*, *Echinochloa pyramidalis* and the forbs: *Lepidium bonariense*, *Cosmos bipinnatus*, *Chenopodium album*, *Tagetes minuta*, *Gomphocarpus fruticosus*, *Conyza bonariensis*, and *Flaveria bidentis*. Alien invasive species include declared Category 2 invader tree, *Casuarina cunninghamiana*, the grass, *Pennisetum clandestinum* and the forbs: *Cirsium vulgare* and *Datura stramonium*.



### Medicinal plants

Two medicinal plant species were found to be present in this vegetation unit namely the forbs *Datura stramonium* and *Gomphocarpus fruticosus*. Both species are pioneer weeds with *Datura stramonium* declared as a Category 1 invasive weed.

### Red data species

No red data plant species or suitable habitat for such species was observed in this vegetation unit.

The following is a list of species identified on the site (Red = alien invasive species):

<b>WOODY SPECIES</b>
<i>Casuarina cunninghamiana</i>
<i>Stoebe vulgaris</i> Levyns
<b>GRASSES</b>
<i>Cynodon dactylon</i> (L.) Pers.
<i>Digitaria velutina</i> (Forssk.) P.Beauv.
<i>Echinochloa pyramidalis</i> (Lam.) Hitchc. & Chase
<i>Eragrostis curvula</i> (Schrad.) Nees
<i>Hyparrhenia hirta</i> (L.) Stapf
<i>Pennisetum clandestinum</i> Chiov.
<i>Polypogon monspeliensis</i> (L.) Desf.
<i>Sporobolus fimbriatus</i> (Trin.) Nees
<b>FORBS</b>
<i>Amaranthus hybridus</i> L.
<i>Chamaecrista mimosoides</i> (L.) Greene
<i>Chenopodium album</i> L.
<i>Cirsium vulgare</i> (Savi) Ten.
<i>Conyza bonariensis</i> (L.) Cronquist
<i>Cosmos bipinnatus</i> Cav.
<i>Datura stramonium</i> L.
<i>Flaveria bidentis</i> (L.) Kuntze
<i>Gomphocarpus fruticosus</i> (L.) Aiton f.
<i>Lepidium bonariense</i> L.
<i>Rumex crispus</i> L.
<i>Schkuhria pinnata</i> (Lam.) Cabrera
<i>Senecio</i> species
<i>Sonchus nanus</i> Sond. ex Harv.
<i>Tagetes minuta</i> L.

### 3.4 Protected Tree Species

In terms of the National Forests Act 1998 (Act No 84 of 1998) certain tree species can be identified and declared as protected. The Department of Agriculture (now Department of Agriculture, Forestry and Fisheries) developed a list of protected tree species. In terms of Section 15 (1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. No protected tree species or indigenous tree species were observed or occur on the proposed site. The alien invasive *Cassuarina equestifolia*\* occurs on the eastern boundary fence.

### 3.5 Red Data / Endemic Species

**Table 1: List of red data species that could possibly occur in the larger Secunda area**

Genus	Species	Family	National Status	Comments
<i>Alepidea</i>	<i>attenuata</i>	APIACEAE	NT	Habitat not suitable
<i>Aloe</i>	<i>cooperi</i> subsp <i>cooperi</i>	ASPHODELACEAE	Declining	Habitat not suitable
<i>Aloe</i>	<i>integra</i>	ASPHODELACEAE	VU	Habitat not suitable
<i>Aloe</i>	<i>kniphofioides</i>	ASPHODELACEAE	VU	Habitat not suitable
<i>Boophone</i>	<i>disticha</i>	AMARYLLIDACEAE	Declining	Habitat not suitable
<i>Brachystelma</i>	<i>villosum</i>	APOCYNACEAE	Rare	Habitat not suitable
<i>Crinum</i>	<i>bulbispermum</i>	AMARYLLIDACEAE	Declining	Habitat not suitable
<i>Crinum</i>	<i>stuhlmannii</i>	AMARYLLIDACEAE	Declining	Habitat not suitable
<i>Gnidia</i>	<i>variabilis</i>	THYMELAEACEAE	VU	Habitat not suitable
<i>Haworthia</i>	<i>koelmaniorum</i> var <i>mcmurtryi</i>	ASPHODELACEAE	EN	Habitat not suitable
<i>Lotononis</i>	<i>difformis</i>	FABACEAE	VU	Habitat not suitable
<i>Miraglossum</i>	<i>davyi</i>	APOCYNACEAE	VU	Habitat not suitable
<i>Pachycarpus</i>	<i>suaveolens</i>	APOCYNACEAE	VU	Habitat not suitable
<i>Senecio</i>	<i>eminens</i>	ASTERACEAE	DD	Habitat not suitable
<i>Trachyandra</i>	<i>erythrorrhiza</i>	ASPHODELACEAE	NT	Habitat not suitable

No red listed or endemic plant species have been listed for the 2629 CB Quarter Degree area of the study site. Three red listed Declining\* plant species have been observed within the adjacent

\* A taxon is 'Declining' when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.

Secunda-Evander areas by the faunal consultant during previous surveys. These include the Cape Poison Bulb (*Boophone disticha*), African Potato (*Hypoxis hemerocallidea*) and River Lily (*Crinum macowanii*).

### **3.5 Alien Vegetation**

A single individual of the declared alien invasive tree *Casuarina cunninghamiana* was found to be present on the site (unit 2), together with the declared Category 1 weeds *Cirsium vulgare* (units 1 & 2) and *Datura stramonium* (unit 2). The highly invasive alien grass *Pennisetum clandestinum* (kikuyu) was present in both units on the site. These species should be removed and eradicated from the site.

### **3.6 Land Degradation**

The study area is located within an area where soil erosion is regarded as insignificant with large areas being mined and others ploughed for crop production. Grazing by cattle has also had a significant effect on large areas with heavy and mild overgrazing leading to degradation of the natural land. Various wetland and seep areas occur within the region however, some areas have been negatively affected by adjacent coal mining activities as well as uncontrolled livestock grazing and trampling along the valley bottom wetlands.

## **4. Results of the Preliminary Faunal Survey or Habitat Assessment**

This preliminary faunal survey focused mainly on mammals, birds, reptiles and amphibians of the study area. The survey focused on the current status of threatened animal species occurring, or likely to occur within the Sasol-Secunda study area, describing and mapping the available and sensitive habitats (see Figure 12: Preliminary Sensitivity Map). Faunal data was obtained during a 1-day field survey of the proposed site. All animals (mammals (larger), birds, reptiles and amphibians) seen or heard; were recorded. Use was also made of indirect evidence such as nests, feathers and animal tracks (footprints, droppings) to identify animals. Birds were identified with the use of binoculars (10x50), Newman's Field Guide as well as by individual calls. Amphibians were identified by visual observations of adults as well as sweep netting for juveniles (tadpoles). Reptiles were actively searched for and identified by actual specimens or observations of specimens. The data was supplemented by previous surveys conducted in the Secunda-Evander areas (1998-2015), literature investigations, personal records and historic data. Different habitats were explored to identify any sensitive or specialised species. Mammal names are as used by Skinner and Chimimba (2005), bird names by Hockey, Dean & Ryan (2006); reptile names by Bates *et al.* (2014); amphibian names by Du Preez and Carruthers (2005).

### **4.1 Vegetation and Faunal Habitat Availability**

Vegetation structure is generally accepted to be more critical in determining faunal habitat than actual plant composition. Therefore, the description of vegetation presented in this study concentrates on factors relevant to faunal species abundance and distribution, and does not give an exhaustive list of plant species which occur in the study area. Large areas around the proposed

site consists of transformed grassland due to previous and current agricultural activities as well as heavily degraded especially adjacent to the dumping site outside the eastern boundary of the site

The following faunal micro-habitats were identified in the study area during the field investigation:

#### **4.1.1 Moist Soweto Highveld Grassland**



**Figure 4: Patches of moist grasslands**

Remnant patches of moist grasslands occur adjacent to the channelled valley bottom wetland approximately 1km to the north of the proposed site. The moist grasslands are in various stages of degradation.

The grassland biome is one of the most threatened biomes in South Africa, with 40% irreversibly transformed and only 2.8% formally conserved. The grasslands host a high diversity of indigenous species second only to the Cape Floristic Region. They contain several endemic fish species, high numbers of threatened mammal species, 10 of the 14 globally threatened bird species and 52 of the 122 Important Bird Areas in South Africa. Virtually the entire untransformed grassland is used as rangeland with some 150 000 head of cattle and 1.5 million sheep grazing the grass. About 20% of the grassland is cultivated for cash crops such as maize, wheat, sugar and potatoes. Afforestation has been another key transformer of the grasslands over the past 10 years as the



high rainfall and cold conditions in areas such as the Mpumalanga escarpment and parts of the Eastern Cape are suitable for the one million hectares of commercial plantations. Urban expansion is threatening unique grassland habitats and species (SANBI Grassland Summary May 2005).

The grasslands deliver essential ecosystem services, such as water production and wetland functioning, upon which economic development is dependent. For example, the supply of water from the grassland catchments around Wakkerstroom in south-eastern Mpumalanga, is crucial to the functioning of the Highveld power stations and Sasol's Secunda petrol-from-coal plant. In many of the deep rural areas within the grassland biome, poor people depend largely on ecosystem resources for their livelihoods including livestock grazing, harvesting of traditional medicinal plants as well as hunting and poaching. Remnant homogenous stands of *Setaria nigrirostris*, *Setaria sphacelata*, *Leersia hexandra*, *Echinochloa colona*, *Paspalum urvillei* occur on the black turfs to the north of the site. The moist grasslands in the Secunda area represent important habitat for a variety of grassland dependant Red Data faunal species such as, Southern Bald Ibis, Secretarybird, South African Hedgehog and African Grass Owl. No suitable habitat remains on the proposed site due to the high levels of habitat and vegetation transformation and degradation.

#### **4.1.2 Transformed Grasslands and Old Agricultural lands**

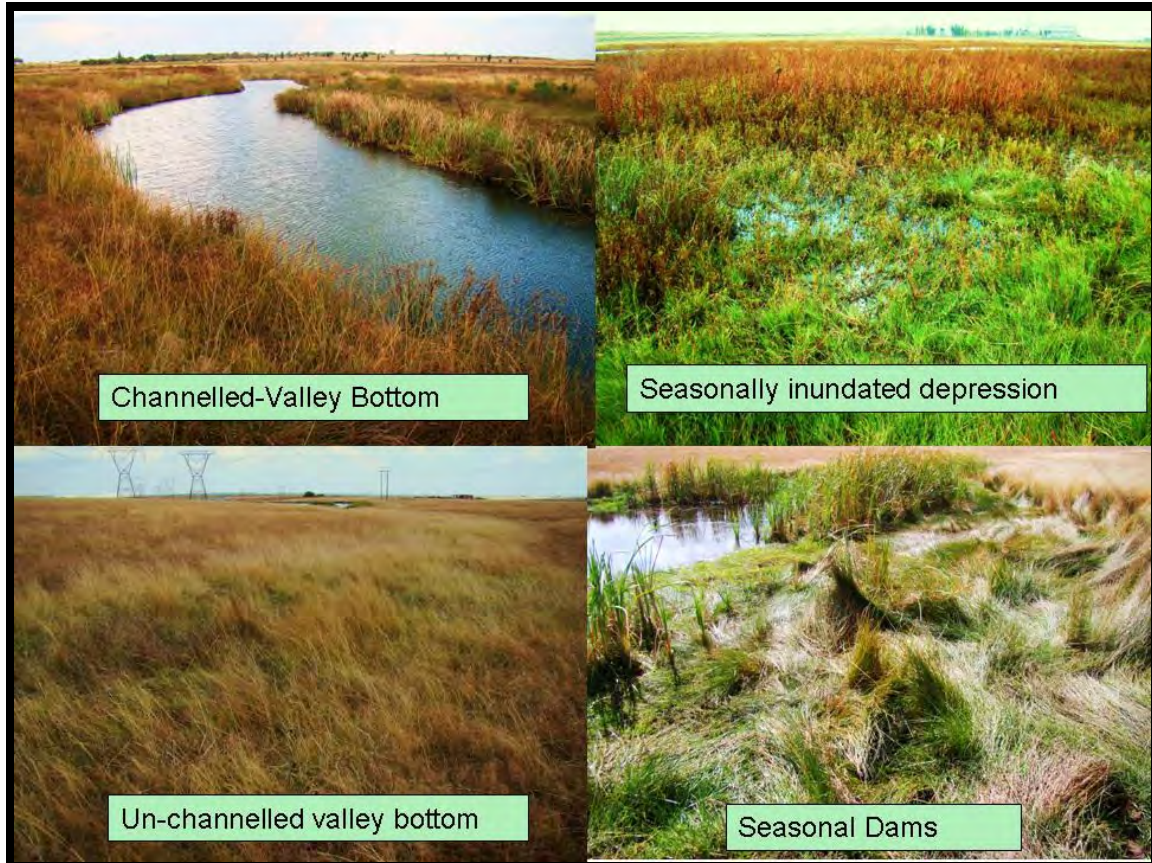


**Figure 5: Examples of transformed grasslands**

The current and historic agricultural lands represents suitable foraging areas for certain rodent species such as African Molerat, Highveld Gerbil and Multimammate Mouse through the tilling opening up the soil surface, making many insects, seeds, bulbs and other food sources suddenly accessible. Rodents construct burrows in the sandier soils and attract other predators such as the Slender Mongoose. Certain threatened species such as Southern Bald Ibis are often located foraging in transformed secondary grasslands (especially after burning) and Blue Cranes and Secretarybirds foraging on grasshoppers in old maize lands. The planted *Setaria pallide-fusca* pastures offer suitable foraging areas for several granivorous bird species.

#### 4.1.3 Wetlands

Wetlands consisting of perennial and seasonal channelled and un-channelled valley bottoms, depressions and artificially created dams.



**Figure 6: Collage of photographs all the dominant wetland types found within the Secunda-Evander area**

A channelled valley bottom wetland occurs approximately 1km to the north of the proposed project site. A seasonally inundated depression occurs approximately 4km to the south-east of the proposed site.

Wetlands are characterized by hydric or hydromorphic soils and slow flowing water and tall emergent vegetation, and provide habitat for many faunal species. The conservation status of many of the faunal species that are dependant on wetlands reflects the critical status of wetland nationally, with approximately 50% having already been destroyed. In this study area (Secunda), wetlands including seasonal pans are important habitats for several animal species (especially birds). They also offer the most favourable habitat for certain threatened faunal species such as Giant Bullfrogs, Rough-haired Golden Mole and African Grass Owl. One clearly defined channelled valley-bottom wetland occurs approximately 1km to the north of the site as well as 1km to the south of the site. Several seasonally inundated depressions occur approximately 4km to the south-east of



site or adjacent to the valley bottom wetlands. These depressions are most likely old borrow pits as well as livestock drinking points.

Several mammal species including Vlei Rats, Cape Clawless Otter and Marsh Mongoose could still possibly occur along the margins of the channelled valley-bottom wetland as well as using the dense reed beds in the artificially created dams for foraging and refuge habitat. Waterbirds, which were formerly restricted to high rainfall areas with natural wetland habitat, make use of man-made dams, and surrounding seasonally inundated wetland areas, for feeding, roosting and breeding.

The rank vegetation along certain sections of the adjacent valley bottoms as well as dense sedge and grass vegetation around the seasonally inundated depressions offers favourable rooting and possible nesting habitat for African Grass Owls. The vegetation adjacent to valley bottom wetlands and seasonally inundated depressions has been transformed and dominated by dense pioneer weedy plant and grass species such as *Paspalum urvillei*, *Imperata cylindrica*, *Verbena bonariensis* and the forbs *Typha capensis*, *Senecio inornatus* and *Cosmos bipinnatus*. The majority of amphibian species in the Secunda area will utilize the shallow seasonally inundated depressions, margins of the dams or seasonal pools in the valley bottoms for breeding purposes.

Species recorded during previous surveys included Several Cape River Frogs (*Amietia fuscicula*), Common Caco (*Cacosternum boettgeri*) and Common Platanna (*Xenopus laevis*). Amphibian diversity on and surrounding the site will depend on the water quality of the adjacent valley bottoms as well as any seasonal wetland habitats including the old borrow pits. Reptile species such as the Dusky or Brown Water Snake, Herald Snake, Green Water Snake, Nile or Water Monitor, Marsh Terrapin are associated with wetland habitats including permanent dams. Low reptile and amphibian diversity is expected on the actual site due to extensive habitat transformation and degradation.



**Figure 7: Collage of photographs displaying the dominant vegetation observed on the site**

**A:** The majority of the site comprises transformed agricultural lands which are dominated by planted *Setaria palide-fusca* pastures. **B:** The rubble and soil stockpiles on the northern portion have been colonized by pioneer weedy plant species such as *Rumex crispus*, *Lepidium bonariense*, *Cosmos bipinnatus*, *Chenopodium album*, *Tagetes minuta*, *Gomphocarpus fruticosus*, *Conyza bonariensis*, and *Flaveria bidentis*. **C:** The highly invasive kikuyu (*Pennisetum clandestinum*\*) occurs within old soil dumping areas. **D:** Barren soil areas occur on the site due to trampling of livestock.

#### 4.2 Existing Impact on the Proposed Project Site

- The site occurs adjacent to the Sasol Charlie 1 Landfill within completely transformed agricultural lands.
- Previous as well as current agricultural activities have occurred on and surrounding the site has transformed the majority of the remaining moist grasslands. The site is currently used for pasture cultivation.
- No Moist Soweto Highveld Grassland occurs on the site or adjacent areas.
- The remaining grassland habitat to the north and west of the site is in various stages of degradation due to poor veld or grassland management and livestock grazing and trampling along the channelled valley bottom wetland.
- Invasion of exotic tree species (*Syringa*, *Melia azedarach*, Black Wattle, *Acacia mearnsii* and *Eucalyptus sp.*) and plant/grass species including kikuyu (*Pennisetum clandestinum*), *Solanum mauritanium*, *Pyracantha sp.* on the adjacent properties to the east. No alien tree species were observed on the actual site. A few *Cassuarina cunninghamiana* have been planted on the eastern boundary fence.
- The site is completely fenced-off, restricting access. Fences along the entire Charlie 1 area severely restrict the migratory movement of larger animal species.
- Previous rubble piles as well as recent soil piles were observed around the northern portion of the site.
- Frequent fires; at the incorrect time of the year (spring, summer and winter burns) has disturbed the underlying grass and forb vegetation layer as well as trampling by cattle and is now dominated by weedy species. Massive stands of Black-Jacks *Bidens pilosa*, Khaki Weed *Tagetes minuta*, *Cosmos bipinnatus* are found within the heavily degraded and disturbed sections along the channelled valley bottom wetland to the north of the site. Frequent burning of remaining grasslands reduces refuge habitat as well as potential foraging habitat for remaining animal species.
- Surrounding main roads with high vehicular traffic as well as secondary dirt roads increase the possibility of road fatalities of migrating species and especially nocturnal species such as Owls and Bullfrogs, which are attracted to the open roads. Secondary roads are located around the entire site.
- Extensive bank erosion due to uncontrolled livestock grazing and trampling along the adjacent valley bottom wetlands.
- Removal of certain plant species (bulbous geophytes); thatch harvesting, wood harvesting and collecting within remaining open grasslands surrounding the site.

Previous and current agricultural activities have transformed the entire site and large areas to the west of the site. Agricultural activities place pressure on the environment in the following ways:

- Change in land use: natural grasslands containing a diversity of vertebrate and invertebrate fauna are converted to monocultures of one particular crop leading to considerable loss of faunal biodiversity.
- Small tracts of indigenous grassland become surrounded by monocultures causing fragmentation of previously intact natural habitats.

Current and previous mining activities occurred in the surrounding areas. Drainage waters from the mines have serious effects on receiving water quality (both surface and ground water) and thus on aquatic ecosystems:.

- Deterioration in water quality including increases in total dissolved solids and total suspended solids (TDS, TSS), sulphate, hardness and trace metals and reduction in dissolved oxygen and pH.
- The deleterious effects of this drainage water may be evident a significant distance from the source of pollution and for many years after the closure of the mine (Dallas & Day, 2004).

#### **4.2 Mammals**

The adjacent Sasol Charlie 1 Landfill site and dense human settlements surrounding the site as well as several informal settlements and associated hunting and poaching limits the suitability of the site for larger mammal species. High levels of hunting were noted in the open grasslands surrounding the site with the use of dogs and wire snares as well as several empty shotgun cartridges. The collection or harvesting of grass (thatch) and rock material, overgrazing by livestock as well as the frequent burning of the grassland vegetation reduces available refuge habitat and exposes remaining smaller terrestrial mammals to increased predation levels. The use of wire snares for high intensity poaching activities will significantly affect remaining smaller mammal species such as rabbits and mongooses. Secondary access roads and vehicles (motor cars, motor cycles, quad bikes) which transverse and bisect the grasslands increase access to the site as well as potential road fatalities. Major road networks with high vehicular traffic increase the risk of road fatalities (hedgehogs, hares) of mammals.

Smaller mammal species are extremely vulnerable to feral cats and dogs. Limited animal burrows (Highveld Gerbil, Multimammate Mouse) and African Mole rat were observed within the grasslands adjacent to the site. A single Scrub Hare was flushed from an uncut patch of *Setaria pallide-fusca* planted pastures. A scat of a Slender Mongoose was observed on the dumped soil piles on the northern portion of the site.

No indigenous tree species occur on the site. Tree species adjacent to the site are exotics and mainly highly invasive species (Category 1 and 2); hence the absence of arboreal (such as lesser Bushbabies, Tree rats and Woodland dormice) on and surrounding the site. No major rocky outcrops occur on the site; hence the absence of rupicolous mammals (Rock rabbits, Elephant shrews). Low mammal diversity is expected from the transformed agricultural lands and adjacent landfill and dumping site. Species likely to occur include urban exploiters such as Feral cats, House rat and House mouse.



**Figure 8: A Scrub Hare (*Lepus sextalis*) was flushed from the planted *Setaria pallide-fusca* pastures on the site**

#### **4.2.1 Threatened Species**

According to the “South African Red Data Book of Terrestrial Mammals” (Smithers, 1986) and Skinner and Smithers (1990) updated by the IUCN Council in December 1995, the study area falls within the distribution ranges of 12 species which are placed into one of known threatened species (Endangered, Vulnerable and Rare). Due to the high level of human activity within the study area it is however unlikely that the study area comprises significant habitat for any species of threatened larger mammals. Larger mammals such as Black-backed Jackal may occasionally utilize the open moist grasslands to the north of the site for exploratory or foraging movements. On the basis of the habitat descriptions provided for the above-mentioned threatened species by Skinner and Chimimba (2005), and the high level of human activity (hunting, poaching) within the study area, it is deemed highly unlikely that the study area provides suitable habitat for any of the above-mentioned threatened species.



**Table 2: Mammal species recorded from the 2629 BA QDGC according to MammalMAP**

Family	Common name	Genus	Species	Red list category	Atlas region endemic
Bovidae	Oribi	<i>Ourebia</i>	<i>ourebi</i>	Endangered	Yes
Canidae	Cape Fox	<i>Vulpes</i>	<i>chama</i>	Least Concern	Yes
Erinaceidae	Southern African Hedgehog	<i>Atelerix</i>	<i>frontalis</i>	Near Threatened	Yes
Felidae	Black-footed Cat	<i>Felis</i>	<i>nigripes</i>	Least Concern	Yes
Felidae	Serval	<i>Leptailurus</i>	<i>serval</i>	Near Threatened	Yes
Herpestidae	Meerkat	<i>Suricata</i>	<i>suricatta</i>	Least Concern	Yes
Muridae	Highveld Gerbil	<i>Gerbilliscus</i>	<i>brantsii</i>	Least Concern	
Muridae	Southern African Mastomys	<i>Mastomys</i>	<i>coucha</i>	Least Concern	Yes
Muridae	Southern African Pygmy Mouse	<i>Mus</i>	<i>minutoides</i>	Least Concern	Yes
Muridae	Southern African Vlei Rat	<i>Otomys</i>	<i>auratus</i>	Not listed	Yes
Muridae	Xeric Four-striped Grass Rat	<i>Rhabdomys</i>	<i>pumilio</i>	Least Concern	Yes
Mustelidae	African Clawless Otter	<i>Aonyx</i>	<i>capensis</i>	Least Concern	Yes
Mustelidae	Striped Polecat	<i>Ictonyx</i>	<i>striatus</i>	Least Concern	Yes
Nesomyidae	Common African Fat Mouse	<i>Steatomys</i>	<i>pratensis</i>	Least Concern	Yes
Procaviidae	Rock Hyrax	<i>Procavia</i>	<i>capensis</i>	Least Concern	Yes
Soricidae	Dark-footed Mouse Shrew	<i>Myosorex</i>	<i>cafer</i>	Data Deficient	Yes
Soricidae	Forest Shrew	<i>Myosorex</i>	<i>varius</i>	Data Deficient	Yes

No suitable habitat occurs for Oribi, South African Hedgehog or Serval within the completely transformed agricultural lands and dumping areas on and surrounding the site. No sensitive or endangered mammals were recorded within the study area during the brief field survey or are likely to occur on the site and adjacent areas. The majority of larger mammal species are likely to have been eradicated or have moved away from the area, as a result of hunting and poaching as well as habitat alteration and degradation.

Smaller mammal species are extremely vulnerable to snares and poaching activities as well as feral cats and dogs. Due to extensive habitat transformation and destruction within the Charlie 1 study area it is however unlikely that the proposed site and immediate adjacent transformed habitats comprise significant habitat for any threatened mammal species. The conservation and correct management of the palustrine wetland habitats to the north, south and east of the site with adequate moist *Themeda triandra* grassland buffer zones; should ensure the conservation of all



remaining suitable habitat for the threatened grassland and wetland associated mammals in the area.

### 4.3 Avifaunal (Bird) Survey

A comprehensive bird species list requires intensive surveys compiled over several years. Fifteen bird species were recorded on the site during the field survey. Species recorded were all common and widespread species indicative of transformed agricultural lands and degraded grasslands. All species recorded were granivorous species feeding of the *Setaria pallide-fusca* seeds. Bird species recorded during the surveys as well as bird species that have been recorded in the vicinity of the proposed site during the current SA Bird Atlas Project 2; the Eskom's Red Data Book of Birds of South Africa, Swaziland and Lesotho as well as the latest Roberts Birds VII Edition (see Table 3).

Red Data List bird species previously recorded from the 2630\_2905 pentad during the SABAP 1 and within which the proposed site is situated, and that occur or could possibly within or in the vicinity of the study area due to suitable habitat are presented in Table 3.

**Table 3: Red Data List bird species previously recorded from the 2630\_2905 pentad**

Robert's Nr.	Common Name	Scientific Name	Regional Red List Status (2014)	Habitat Requirements
92	Southern Bald Ibis	<i>Geronticus calvus</i>	Vulnerable	High altitudinal short grassland and cultivated lands. Forages in recently burned grasslands.
96	Greater Flamingo	<i>Phoenicopterus ruber</i>	Near-Threatened	Highly nomadic and partially migratory and favours saline or brackish shallow waterbodies such as salt pans, large dams and coastal mudflats.
165	African Marsh Harrier	<i>Circus ranivorus</i>	Endangered	Inland and coastal freshwater wetlands and adjacent moist grassland. Require large (>100 ha) wetlands in which to breed.
208	Blue Crane	<i>Anthropoides paradiseus</i>	Near-Threatened	Mostly found in natural grasslands but also in freshwater wetlands, cultivated pastures and croplands.
393	African Grass Owl	<i>Tyto capensis</i>	Vulnerable	African Grass Owls are found exclusively in rank grass, typically, although not only, at fair altitudes. African Grass Owls are secretive and nomadic breeding in permanent and seasonal vleis, which it vacates while hunting or

Robert's Nr.	Common Name	Scientific Name	Regional Red List Status (2014)	Habitat Requirements
				post-breeding, although it will breed in any area of long grass and it is not necessarily associated with wetlands.
118	Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable	Favours open grassland with scattered trees or shrubs. They are territorial with home ranges of 20-230 km <sup>2</sup> around the nest, usually an area of between 50-60 km <sup>2</sup> , is defended against conspecifics (other Secretarybirds). Nests are usually placed on top of a thorny tree, frequently in Black Thorn <i>Acacia melifera</i> , Umbrella Thorn <i>Acacia tortilis</i> , Sweet Thorn <i>Acacia karroo</i> , Common Hook Thorn <i>Acacia caffra</i> . They may also nest in exotic species such as Black Wattle <i>Acacia mearnsii</i> or Pine ( <i>Pinus</i> sp.).

#### 4.3.1 Habitat Available for Sensitive or Endangered Species

Several rare or threatened bird species may occasionally utilise the moist grasslands and adjacent channelled valley bottom wetland for occasional foraging and exploratory movements. These include the large raptors such as Secretarybird and African Marsh Harrier. The shorter (overgrazed and frequently burned) *Setaria spp.* grasslands offer suitable occasional foraging habitat for Southern Bald Ibis. Several Southern Bald Ibis (21) have been recently recorded from a site to the north of Secunda (SABAP 2). No threatened bird species have been recorded for the 2930\_2905 pentad during the on-going SABAP2 project.

The channelled valley bottom wetlands to the north, east and south of the site and neighbouring properties to the west, offer occasional foraging arrays for African Marsh Harriers; especially on the Caper River Frogs. The consultant has recorded African Grass Owls from a valley bottom wetland to the south-west and north of the proposed project site.

African Grass Owls are found exclusively in rank grass, typically, although not only, at fair altitudes. African Grass Owls are secretive and nomadic breeding in permanent and seasonal vleis, which it vacates while hunting or post-breeding, although it will breed in any area of long grass and it is not

necessarily associated with wetlands. In wetlands it is usually outnumbered by the more common Marsh Owl (*Asio capensis*) by 10:1 (Tarboton *et al.* 1987).

African Grass Owls nest on the ground within a system of tunnels constructed in mostly tall grass; peak-breeding activity (February-April) tends to coincide with maximum grass cover (Steyn, 1982). The burning of the grassland and especially the wetlands will have a negative impact on any remaining African Grass Owls. The current cattle grazing and drinking along the adjacent valley bottom wetlands as well as major road networks and driving of off-road vehicles through the grasslands are potential threats to remaining African Grass Owls. No suitable rank grassland remains on the proposed site for African Grass Owls. The planted pasture grass (*Setaria plallidifusca*) on the site is a short grass species as is annually harvested and offers limited refuge habitat for African Grass Owls.

Limited rocky highveld and moist sandy grassland and seepage/wetland or drainage lines remain in the Mpumalanga Province. Numbers of bird species in the Secunda-Evander area have declined mainly due to increased levels of human disturbances (quad and off-road bikes); extensive habitat transformation due to mining and agricultural activities as well as severe habitat degradation. Human activity has transformed grasslands in South Africa to a point where few pristine examples exist (Low & Rebelo, 1996; Barnes, 1998). Factors such as agricultural intensification, intensive open cast mining, increased pasture management (overgrazing), decrease in grassland management due to frequent fires and land-use alteration (urbanisation). Continuing pressure on sensitive wetland and surrounding open grassland habitat are largely responsible for the decline of the above-mentioned avifaunal species.

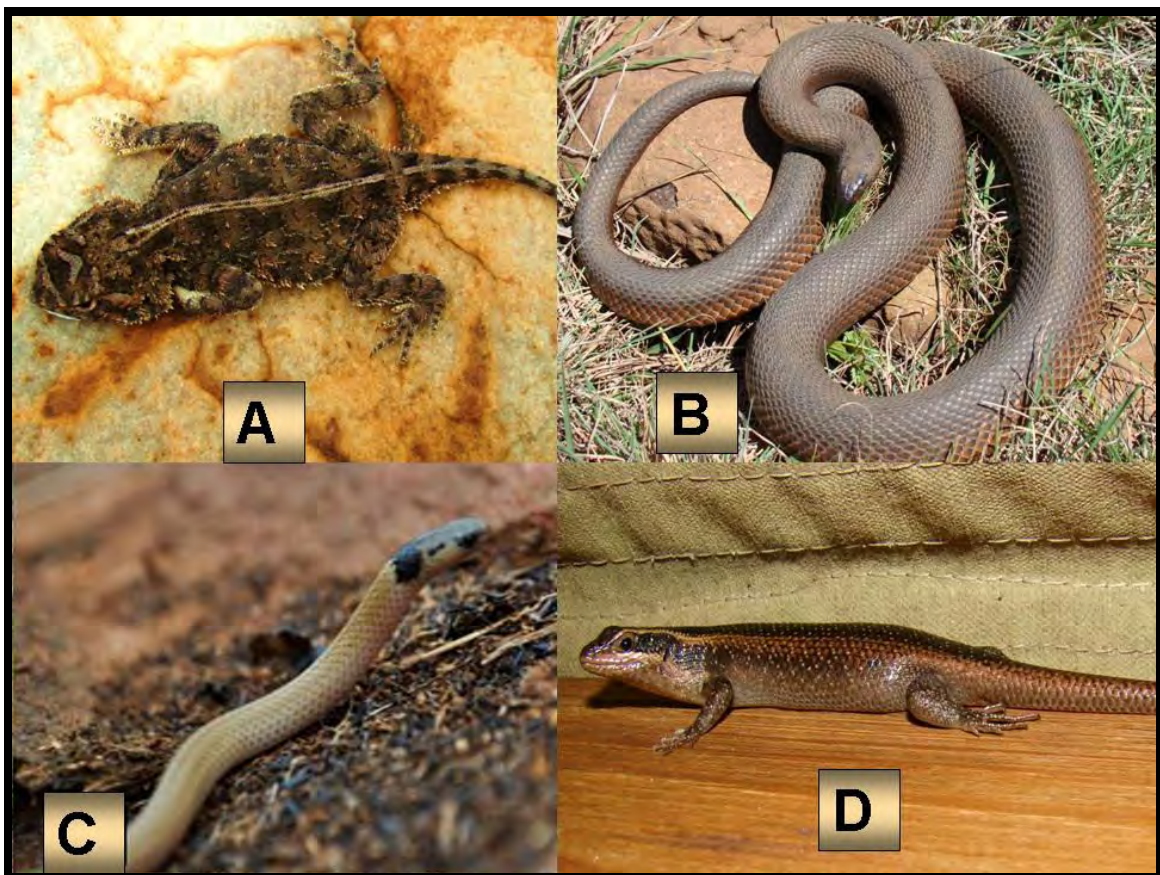
The proposed site offers no suitable habitat for any of the above-mentioned threatened bird species due to high levels of habitat transformation as well as anthropogenic activities in the adjacent landfill site.

#### **4.4 Reptiles**

Reptile lists require intensive surveys conducted for several years. Reptiles are extremely secretive and difficult to observe during field surveys. The majority reptile species are sensitive to severe habitat alteration and fragmentation. Due to human presence in the adjacent landfill and dumping site; coupled with increased habitat destruction and disturbances around the site are all causal factors in the alteration of reptile species occurring on the site and surrounding areas. No termite mounds were observed in the planted pastures on the site. Termite mounds offer important refuges for numerous frog, lizard and snake species. Large number of species of mammal, birds, reptiles and amphibians feed on the emerging alates (winged termites). These mass emergences coincide with the first heavy summer rains and the emergence of the majority of herpetofauna. Termite mounds also provide nesting site for numerous snakes, lizards (varanids) and frogs. No indigenous tree species occur on the site; hence the lack of arboreal reptiles (chameleons, snakes, agamas, geckos and monitors). The indiscriminate killing of all snake species on the site as well as adjacent areas reduces snake populations drastically. The annual harvesting of the planted pastures on the site will have a high impact on remaining reptiles due to limited vegetative cover. Fires during the

winter months will severely impact on remaining reptile species undergoing brumation and are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks.

The removal of rock material from the agricultural lands severely restricts refuge areas during fires. The majority of reptile as well as amphibians use animal burrows and moribund termite mounds to escape fires in open grasslands. No major animal burrows on the site. No reptile species was recorded on the site during the brief field survey. Low reptile diversity is expected from the site due to extensive habitat transformation and degradation as well as high levels of anthropogenic disturbances from the adjacent landfill site. Smaller reptile species are extremely vulnerable to feral cats.



**Figure 9: Reptile species likely to occur on the site and adjacent areas**

**A:** Distant's Ground Agama (*Agama aculeata distanti*); **B:** Mole Snake (*Pseudaspis cana*); **C:** Cape or Blackheaded (*Aparallactus capensis*); **D:** Speckled Rock Skink (*Trachylepis punctatissima*).



**Table 4: Reptile species recorded from the 2629 CA QDGC according to ReptileMAP (SARCA 2014).**

Family	Common name	Genus	Species	Sub-species	Red list category	Atlas region endemic
Agamidae	Distant's Ground Agama	<i>Agama</i>	<i>aculeata</i>	<i>distanti</i>	Least Concern (SARCA 2014)	Yes
Atractaspididae	Black-headed Centipede-eater	<i>Aparallactus</i>	<i>capensis</i>		Least Concern (SARCA 2014)	
Atractaspididae	Spotted Harlequin Snake	<i>Homoroselaps</i>	<i>lacteus</i>		Least Concern (SARCA 2014)	Yes
Colubridae	Rhombic Egg-eater	<i>Dasypeltis</i>	<i>scabra</i>		Least Concern (SARCA 2014)	
Colubridae	Brown Water Snake	<i>Lycodonomorphus</i>	<i>rufulus</i>		Least Concern (SARCA 2014)	
Colubridae	Cross-marked Grass Snake	<i>Psammophis</i>	<i>crucifer</i>		Least Concern (SARCA 2014)	
Colubridae	Spotted Grass Snake	<i>Psammophylax</i>	<i>rhombeatus</i>	<i>rhombeatus</i>	Least Concern (SARCA 2014)	
Colubridae	Mole Snake	<i>Pseudaspis</i>	<i>cana</i>		Least Concern (SARCA 2014)	
Elapidae	Rinkhals	<i>Hemachatus</i>	<i>haemachatus</i>		Least Concern (SARCA 2014)	
Scincidae	Speckled Rock Skink	<i>Trachylepis</i>	<i>punctatissima</i>		Least Concern (SARCA 2014)	

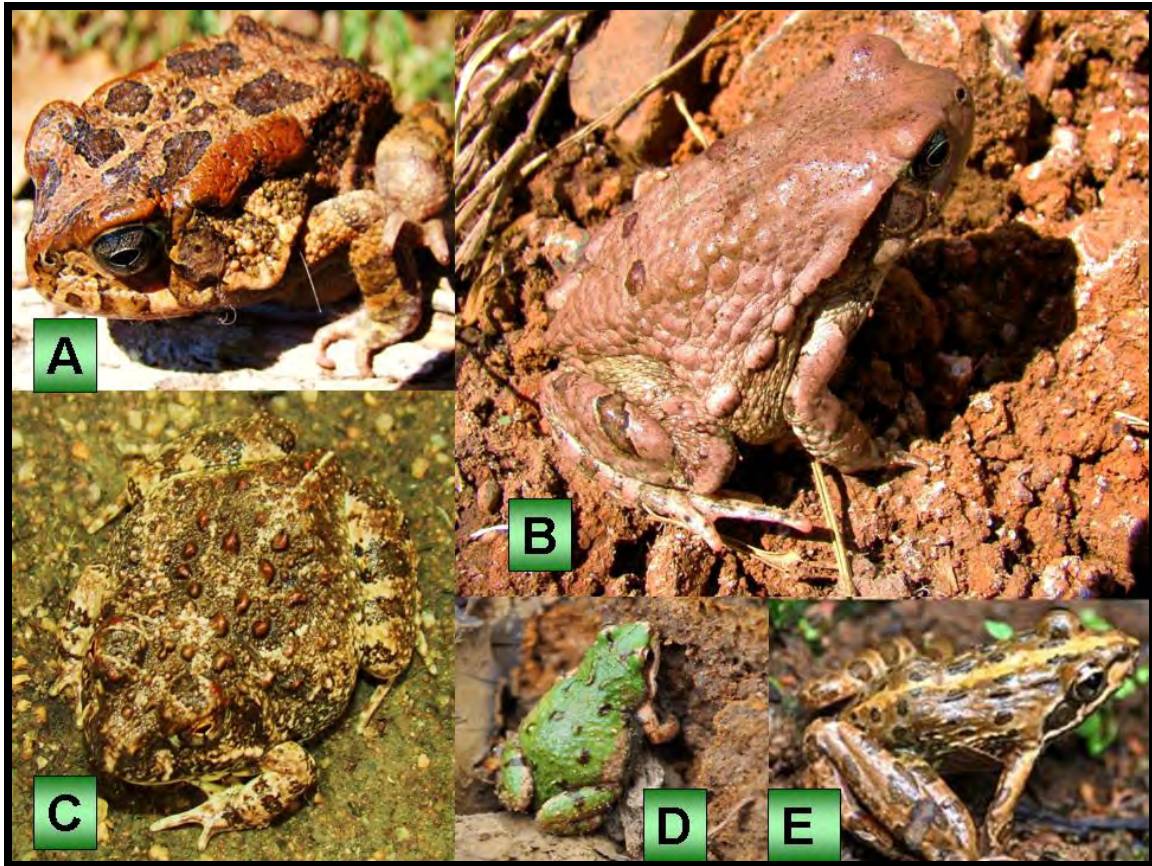
#### **4.4.1 Habitat Available for Sensitive or Endangered Species**

No threatened reptile species have been recorded for the 2629 CA QDGC (SARCA 2014). The Striped Harlequin Snake (*Homoroselaps dorsalis*), which is categorised as Rare in the Red Data List (Branch, 1988) has been recorded from adjacent grid squares to the south and the east (Broadley, 1990). According to the habitat description (moribund/old termite mounds and scattered loose rock) provided for this species by Broadley (1990) and Branch (1988); no suitable habitat occurs on the site (moribund termite mounds) as well as loosely embedded rock material. Low reptile diversity is expected from the site due to extensive habitat transformation and high levels of anthropogenic activities in the adjacent dumping site.

#### **4.5 Amphibians**

Breeding in African frogs is strongly dependent on rain, especially in the drier parts of the country where surface water only remains for a short duration. The majority of frog species in the Mpumalanga Province can be classified as explosive breeders. These frog species only emerge after the first heavy summer rainfalls and are dormant during the cold winter months. Explosive breeding frogs utilise ephemeral pans or inundated grasslands for their short duration reproductive cycles.

As the survey was undertaken during the late summer months (April) the majority of amphibians had initiated their short duration breeding events on the site. No frog species were recorded during the brief field survey. Four frog species were recorded from the channelled valley bottom wetland approximately 1km to the north of the Charlie 1 site during a previous field survey. Species recorded included Drakensberg River Frog (*Amietia quecketti*); Cape River Frog (*Amietia (Afrana) fuscigula*), Guttural Toad (*Amietophrynus (Bufo) gutturalis*) and several calling Common Caco males (*Cacosternum boettgeri*). Comprehensive herpetological surveys can only be undertaken throughout the duration of the wet season (November-March). It is only during this extended period that accurate frog lists can be compiled for the site. No suitable breeding habitat occurs on the proposed site and adjacent areas (>1 000m). The current water quality within the seasonal palustrine wetlands will determine the biodiversity of amphibians adjacent to the site.



**Figure 10: Frog species recorded in the Secunda area**

**A:** Guttural Toads (*Amietophrynus gutturalis*); **B:** Red Toad (*Schismaderma carens*); **C:** Tremelo Sand Frog (*Tomopterna cryptotis*); **D:** Common or Boettger's Caco (*Cacosternum boettgeri*) and **E:** Drakensberg River Frog (*Amietia queketti*).

**Table 5: Frog species recorded from the 2629 CB QDGC according to Frog Map (SAFAP)**

Family	Common name	Genus	Species	Red list category	Atlas region endemic
Bufoinae	Guttural Toad	<i>Amietophrynus</i>	<i>gutturalis</i>	Least Concern	No
Bufoinae	Raucous Toad	<i>Amietophrynus</i>	<i>rangeri</i>	Least Concern	No
Hyperoliidae	Bubbling Kassina	<i>Kassina</i>	<i>senegalensis</i>	Least Concern	No
Hyperoliidae	Rattling Frog	<i>Semnodactylus</i>	<i>wealii</i>	Least Concern	No
Phrynobatrachidae	Snoring Puddle Frog	<i>Phrynobatrachus</i>	<i>natalensis</i>	Least Concern	No
Pipidae	Common Platanna	<i>Xenopus</i>	<i>laevis</i>	Least Concern	No

Family	Common name	Genus	Species	Red list category	Atlas region endemic
Pyxicephalidae	Cape River Frog	<i>Amietia</i>	<i>fuscigula</i>	Least Concern	No
Pyxicephalidae	Drakensberg River Frog	<i>Amietia</i>	<i>quecketti</i>	Least Concern	Yes
Pyxicephalidae	Common Caco	<i>Cacosternum</i>	<i>boettgeri</i>	Least Concern	No
Pyxicephalidae	Striped Stream Frog	<i>Strongylopus</i>	<i>fasciatus</i>	Least Concern	No
Pyxicephalidae	Tremelo Sand Frog	<i>Tomopterna</i>	<i>cryptotis</i>	Least Concern	No
Pyxicephalidae	Natal Sand Frog	<i>Tomopterna</i>	<i>natalensis</i>	Least Concern	No
Pyxicephalidae	Tandy's Sand Frog	<i>Tomopterna</i>	<i>tandyi</i>	Least Concern	No

#### 4.5.1 Threatened Species

No threatened amphibian species have been recorded in the 2629CA and 2629 CB QDGC according to FrogMAP (SAFAP). The Giant Bullfrog is currently assigned as a near-threatened species (IUCN Red List category). Giant Bullfrogs have been recorded from the adjacent grid squares (Middleburg area) during previous surveys as well as during the South African Frog Atlas Project (SAFAP). Specimens recorded were of road fatalities, migrating adult males as well as potential breeding localities in the Middleburg area. Bullfrog density commonly varies within certain habitats (open grassland habitat). High densities are often associated with specific microhabitats or patches (hygrophytic or aquatic ephemerophytic grass and sedge dominated temporary pans) that can be identified and randomly sampled.

Emphasis must be placed on remaining natural open grassland habitats (important migratory and foraging areas) as well as seasonal wetlands (drainage and marshland vegetation) approximately 1km to the north, east and south of the site. The seasonal wetland habitats including seasonally inundated depressions adjacent to the valley bottom wetlands offer the most suitable breeding habitat for Giant Bullfrogs in the area. The open moist *Setaria spp.* grasslands to the north and west of the site offer favourable foraging and possible aestivation habitat for remaining Giant Bullfrogs (if any). No Giant Bullfrogs have been recorded from the Secunda-Evander area during the South African Frog Atlas Project (SAFAP); as well as previous surveys conducted by the consultant between 2000-2015 and no Giant Bullfrogs are expected on the proposed site or immediately surrounding areas due to extensive habitat transformation (mining, industrial and agricultural activities; major road networks bisecting foraging and breeding habitats) as well as degradation (massive deterioration in surface and groundwater quality).

## 5. Sensitive Habitats on the Site and Adjacent Areas

From the desktop study using inter alia aerial photographs and Google Earth™ imagery as well as a preliminary site investigation (23<sup>rd</sup> April 2015) the following four sensitivity categories of areas were identified:

- High:** Areas with high species richness and habitat diversity comprising natural indigenous plant species. These areas are ecologically valuable and important for ecosystem functioning.
- Medium-High:** An area with a relatively natural species composition; a threatened or unique ecosystem; moderate species and habitat diversity. These areas are ecologically valuable and important for buffering adjacent ecosystem functioning (valley bottom wetlands).
- Medium:** An area with a relatively natural species composition; not a threatened or unique ecosystem; moderate species and habitat diversity but is currently degraded. Could be developed with mitigation and expected low impact on adjacent ecosystems.
- Low:** A totally degraded and transformed area with a low habitat diversity and ecosystem functioning; no viable populations of natural plants. Development could be supported with little to no impact on the adjacent natural vegetation / ecosystem.

The Mpumalanga Biodiversity Conservation Plan (MBCP) has been jointly developed by the Mpumalanga Tourism and Parks Agency (MTPA) and the Department of Agriculture and Land Administration (DALA). The MBCP is a spatial biodiversity plan for Mpumalanga that is based on scientifically determined and quantified biodiversity objectives, intended to guide conservation and land-use decisions in support of sustainable development.

The MBCP mapped the distribution of Mpumalanga's known biodiversity into six categories, namely:

- (a) Protected areas (already protected and managed for conservation);
- (b) Irreplaceable areas (no other options available to meet targets – protection is crucial);
- (c) Highly Significant areas (protection needed, very limited choice for meeting targets);
- (d) Important and Necessary areas (protection needed, greater choice in meeting targets);
- (e) Ecological Corridors (mixed natural areas with most choices, including for development);
- (f) Areas of Least Concern (natural areas with most choices, including for development);
- (g) Areas with No Natural Habitat Remaining (transformed areas that make no contribution to meeting targets).

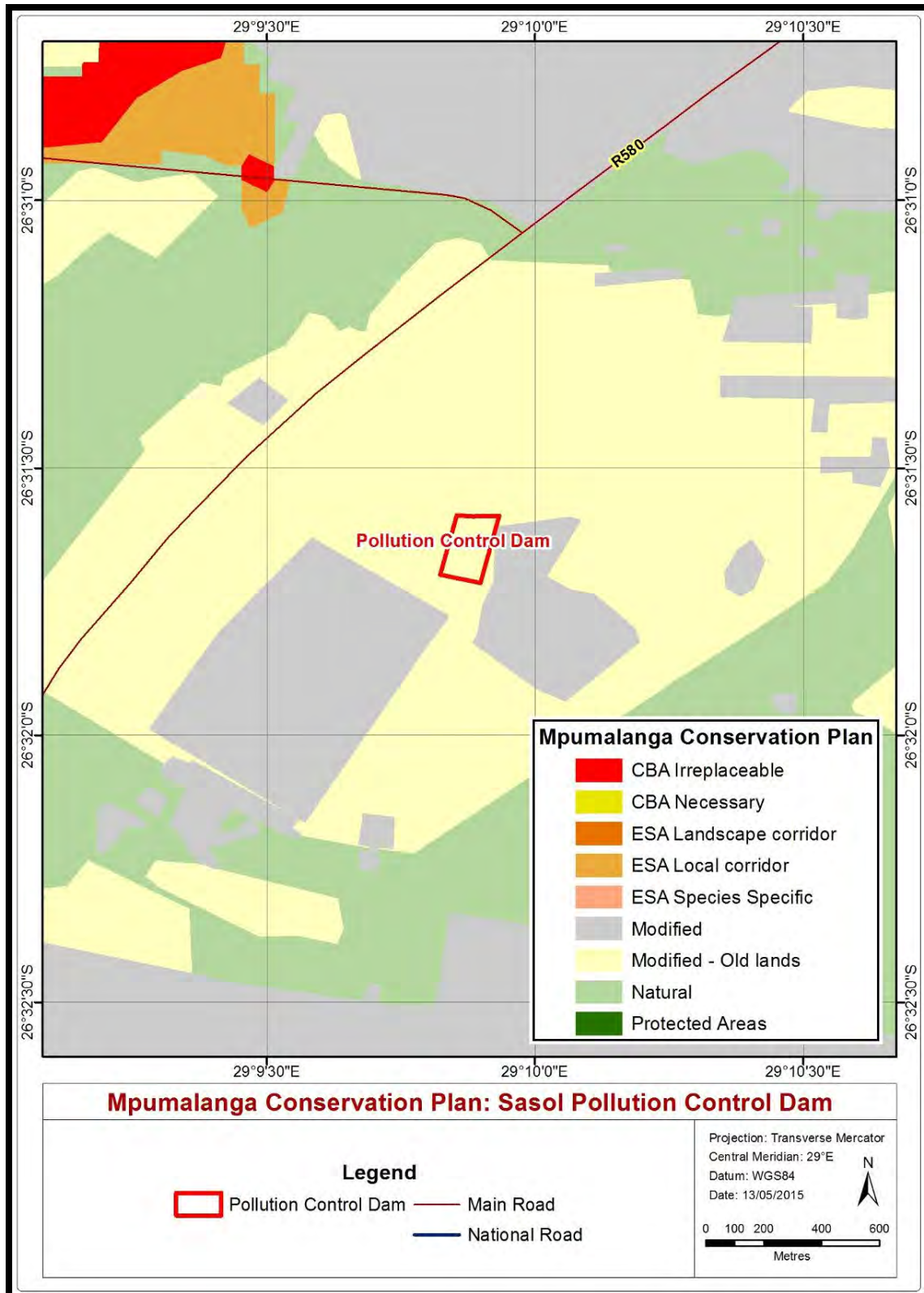


The MBCP is accompanied by land-use planning guidelines to guide planning and development within each of the biodiversity conservation categories throughout the Province. In each category there are different land use and development consequences.

The entire site and adjacent areas are classified as “Modified-Old Agricultural Lands” according the Mpumalanga Biodiversity Sector Plan (MBSP, 2014).

**Vegetation unit 1 (Pasture Field)** has been used as a planted pasture for many years. As a result the land has previously been ploughed and disked and grass seeds sown. The natural vegetation has been displaced with no remnants of the original vegetation remaining. The few natural species present are all pioneer and weedy species while many individuals of alien invasive weeds are present as would be expected on pasture lands where continuous disturbance takes place. The area has low species richness and is uneven in terms of species diversity with *Setaria pallide-fusca* dominant. The planted pastures and adjacent dumping site have a low faunal component due to the impoverished habitats on the site and adjacent areas. From a vegetation and faunal perspective the site has a **low sensitivity and conservation value as well as ecosystem functioning.**

The **Degraded area (Vegetation unit 2)** is influenced by various factors namely dumping of soil, ploughing, and a rubble heap bordering onto it in the east. These effects has led the area to become totally degraded with pioneer weedy and declared invasive weeds dominating the vegetation. There is no resemblance to natural vegetation and the area is transformed. Low faunal diversity is expected from these heavily degraded areas on the site. From vegetation and faunal perspective the site and adjacent areas have a **low sensitivity and conservation potential/value as well as ecosystem functioning.**



**Figure 11: Mpumalanga Biodiversity Sector plan for the proposed project**

The entire site is classified as 'Modified-Old Lands' with low conservation potential.

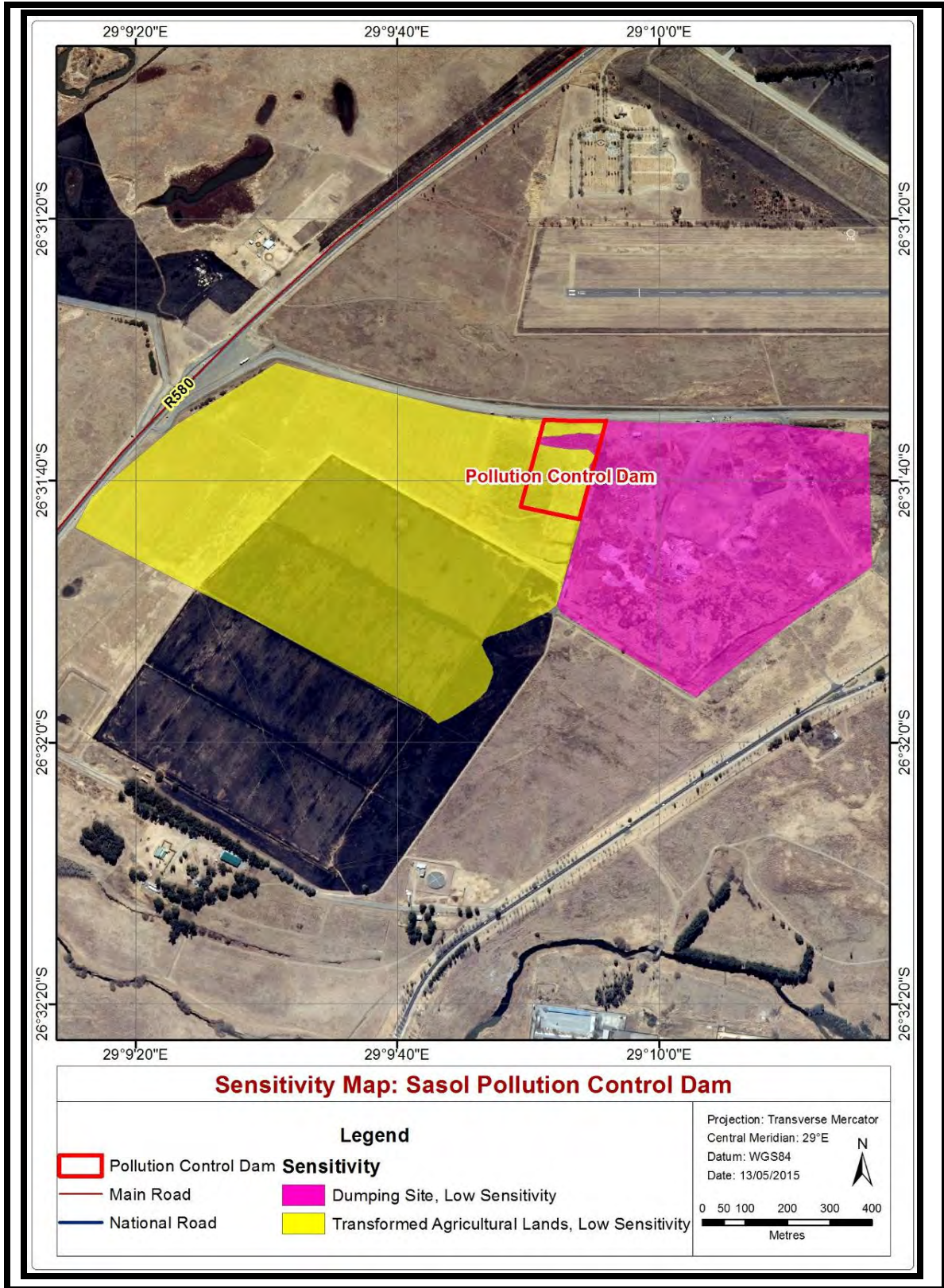


Figure 12: Preliminary ecological sensitivity map for the proposed project

**Table 6: The impact rating criteria used for determining potential impacts of the proposed project**

Descriptive criteria	
<b>Nature</b>	<b>Include a descriptive sentence</b>
<b>Probability</b>	<b>Categories 1 – 5</b>
	1 Improbable (less than 24% chance of occurring)
	2 Probable (25 – 49%)
	3 Likely (50 – 69%)
	4 Very likely (70 – 89%)
	5 Definite (90 – 100%)
<b>Frequency</b>	<b>Categories 1 – 5</b>
	1 Very rare to remote (once or twice a decade)
	2 Unusual to occasional (once or twice every 5 years)
	3 Frequent (a few times a month)
	4 Very frequent (a few times a week, to daily)
	5 Continuous (daily to a significant percentage of every day)
<b>Extent</b>	<b>Categories 1 – 5</b>
	1 Footprint / site
	2 Local
	3 Regional
	4 National
	5 International (trans-boundary)
<b>Duration</b>	<b>Categories 1 – 5</b>
	1 Short (few days to a few months, less than a phase)
	2 Short (few months, or less than a phase in total)
	3 Medium (a few years, significant part of a phase)
	4 Long (lifespan of development (i.e. all of operation))
	5 Permanent
<b>Intensity</b>	<b>Categories 1 – 5</b>
	1 Very low – natural processes not affected
	2 Low – natural processes slightly affected
	3 Medium – natural processes continue but in a modified manner
	4 Medium-high – natural processes are modified significantly
	5 High – natural processes disturbed significantly so that they cease to occur (temporarily / permanently)
<b>Significance</b>	<b>Significance = P + F + E + D + I</b> Minimum value of 5, maximum of 25 Status determines if positive / negative
	<b>Any positive value</b> No impact High to low consequence, probability not an issue as positive, <b>no mitigation required</b>



Descriptive criteria	
- 5	Low-Low consequence, probably, <b>minimal mitigation may be required</b>
- 6 to 10	Medium-Medium consequence, probably, <b>mitigation is advised / preferred</b>
- 11 to 15	Medium to high-Medium to high consequence, probably to very probable, <b>mitigation is necessary</b>
- 16 to 20	High-High consequence, probably / definite, <b>mitigation is essential</b>
- 21 to 25	Extreme-Very high consequence, definite, <b>Fatal flaw!</b>

**Table 7: Summary table of the potential impacts and ratings for the proposed project**

Nature of Impact	Probability	Frequency	Extent	Duration	Intensity	Significance
Habitat destruction with transformation of natural vegetation and habitats within the proposed site.	Improbable (no chance of occurring)	During Construction Phase	Local Footprint / site	Permanent	Very low – natural processes not affected	Low-Low consequence, probably, <b>minimal mitigation may be required</b>
Destruction of suitable habitat for red listed plants and animals.	Improbable (no chance of occurring)	During Construction Phase	Local Footprint / site	Permanent	Very low – natural processes not affected	Low-Low consequence, probably, <b>minimal mitigation may be required</b>
Erosion and sediment control from the site.	Probable (25 – 49%)	Frequent (a few times a month) especially during construction phase	Local Footprint / site, but eroded soil could be washed onto other ecosystems	Short (few months, or less than a phase in total) to medium term (until soil adjacent to the dam has been stabilised with vegetation)	Low – natural processes slightly affected	Medium-Medium consequence, probably, <b>mitigation is advised / preferred</b>



Nature of Impact	Probability	Frequency	Extent	Duration	Intensity	Significance
Contamination of ground water.	Improbable* (less than 24% chance of occurring)	Unusual to occasional (once or twice every 5 years)	Local	Short (few days to a few months, less than a phase)	Medium – natural processes continue but in a modified manner	Medium to high-consequence, probably to very probable, <b>mitigation is necessary</b>

## 6. Potential Impacts

The potential impacts of the proposed project on the immediate and surrounding environment include:

### 6.1 Loss of Faunal Habitats

Development of the proposed 3 ha site will most likely have a **low negative, short to long-term impact** on the remaining (albeit limited) faunal component, residing in or utilising the transformed agricultural lands on the site. The entire site and adjacent areas to the west of the site consists of transformed agricultural lands. An existing dumping site occurs immediately to the east of the site. The high level of human disturbances within the adjacent dumping site and agricultural lands significantly reduces the potential impacts due to the alteration of the majority of habitats within these transformed areas on the site and ultimately the displacement of species with narrow tolerance limits.

Alteration of the transformed agricultural lands within the proposed site will directly, and indirectly, impact on the smaller sedentary species (insects, arachnids, reptiles, amphibian and mammals) adapted to their ground dwelling habitats. Larger, more agile species (birds) will try and re-locate in suitable habitats away from the development during the construction phase of the dam. In addition, heavy construction machinery, vehicles and the anticipated increased human population density, will most likely directly and indirectly result in the short and long-term alteration of the faunal composition of the site. A further indirect, moderate to high, long term, negative impact, which is likely to affect the remaining fauna, is possible uncontrolled hunting (“poaching”) around the site. This will naturally have the effect of reducing affected animal species around the site.

### Mitigation and recommendations

During the construction phase, workers must be limited to areas under construction (dam site) and access to neighbouring agricultural lands must be strictly regulated (“no-go areas” through all stages of the project), preventing uncontrolled hunting and poaching. Construction should be limited, where practical, to the daylight hours preventing disturbances to the nocturnal activities of certain species and nearby human populations. Weeds and alien vegetation should be removed

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\* Dam is correctly sealed.

and prevented from spreading into newly disturbed areas or areas cleared of vegetation. This will continue through all phases of the development. The placing of soil stock piles sufficiently away from drainage areas; preventing possible siltation and sedimentation of the adjacent lower-lying valley bottom wetlands approximately 1km to the north of the site.

### **6.2 Surface Run-off: Erosion (Sedimentation) and Possible Siltation**

Run-off from the construction site for the Charlie 1 pollution control dam could potentially result in deterioration of water quality and increased siltation and sedimentation of the adjacent lower-lying valley bottom wetlands.

#### **Mitigation and recommendations**

Future soil stockpiling areas must follow environmentally sensitive practices and be situated a sufficient distance away from drainage areas towards the channelled valley bottom wetland. The careful position of soil piles, and run-off control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site. Vegetation plays a critical role in the hydrological cycle by influencing both the quantity and quality of surface run-off. It influences the quantity of run-off by intercepting rainfall, promoting infiltration and thus decreasing run-off. Vegetation can influence water quality in two ways: by binding soils thus protecting the surface layer, and by intercepting surface run-off thus buffering the pan against suspended and dissolved substances. When the speed of the run-off is reduced, suspended particles can settle out and dissolve substances, such as nutrients, can be assimilated by plants. The vegetation has a filtering effect.

### **6.3 Surface and Groundwater**

Provision of adequate sewerage and wastewater facilities must be implemented throughout all stages of development to prevent the possible contamination of surface and ground (borehole) water. All construction machinery must be regularly serviced and checked for oil and fuel leaks.

#### **Mitigation and recommendations**

Mobile toilets must be provided for the construction workers. The proposed site must be adequately sealed to prevent any possible contamination to the ground-water in the area.

### **6.4 Migratory Routes (Fencing)**

The migratory movements of several animal (frog, reptile and mammal) species are completely disrupted by numerous walls, fences (current Sasol Charlie 1 fence) and road networks, which restrict natural movements between suitable foraging and breeding areas. This is especially prevalent for highly mobile species, such as Giant Bullfrogs, which can migrate up to six kilometres from suitable foraging areas (open grassland) to favourable breeding areas (seasonal pans or ponds). Fencing off of the Charlie 1 site plays a critical role in impeding the natural migration of the majority of larger animal species in the area. A trade off thus exists between safety and security on the one hand and movement of animal species on the other.

### **Mitigation and recommendations**

The preservation, maintenance and creation of tracts of natural vegetation (biological corridors) in all stages of ecological succession, interconnected by corridors or green belts for escape, foraging, breeding and exploratory movements along the adjacent valley bottom wetlands as well as natural Soweto Highveld grasslands needs to be considered. High risk areas such as the proposed site should be fenced off, and remain fenced off during the operational phase of the project. This will prevent animals from drowning in the dam. Reverse curbing of approximately 50-70cm should be placed around the dam preventing reptiles and amphibians entering into the dam area.

### **6.5 Artificial Lighting**

Numerous species will be attracted towards the light sources and this will result in the disruption of natural cycles, such as the reproductive cycle and foraging behaviour. The lights may destabilise insect populations, which may alter the prey base, diet and ultimately the well being of nocturnal insectivorous fauna. The lights may attract certain nocturnal species to the area, which would not normally occur there, leading to competition between sensitive and the more common species.

### **Mitigation and recommendations**

Where lighting is required for safety or security reasons, this should be targeted at the areas requiring attention. Yellow sodium lights should be prescribed as they do not attract invertebrates at night and will not disturb the existing wildlife. Sodium lamps require a third less energy than conventional light bulbs.

## **6. Conclusion and Recommendations**

The proposed project should be restricted to the transformed current agricultural lands and old dumping site. The study area is located within an area where soil erosion is regarded as insignificant. However, large areas are and have been mined with others used for various agricultural activities such as crop farming and grazing by cattle. Large areas have as a result been ploughed for crop production. Grazing by cattle has also had a significant effect on large areas with heavy and mild overgrazing leading to degradation of the natural land. Various wetland and seep areas occur within the region however, some areas have been negatively affected by mining activities.

The topography of the study site is mostly level with a slight eastern slope. The area directly east of the site is used as a dumping site for rubble, litter and other products. The soil varies from clay to loam with no rocks present. Whereas vegetation unit 1 is used as a planted pasture area where the grasses are harvested for fodder purposes, vegetation unit 2 is a degraded area along the edge of unit 1 and was previously used for dumping soil and other rubble. Both areas have good vegetation cover, but comprise pioneer and secondary successional plant species not representative of the natural environment or vegetation type.

These areas are regarded as **transformed** with little resemblance to the natural vegetation that existed there many years ago. These areas are not lying adjacent any natural area and have as a

result no linkage with any natural ecosystem. No red data plant or animal species were found to be present on the site and the habitat is too degraded and not suitable for such plant and animal species. Only two medicinal plant species were found to be present though both are pioneer weeds with no conservation value, while one of them is also a declared Category 1 weed. Thus from a vegetation and faunal as well as ecological and ecosystem functioning perspective the proposed site and adjacent transformed agricultural lands and dumping site are regarded as having a **low conservation value** and **sensitivity**.

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