

**APPENDIX G6:
ECOLOGICAL SURVEY AND HABITAT ASSESSMENT REPORT**

**PROPOSED JABULANI DEVELOPMENT SOWETO,
GAUTENG**

**PELIMINARY ECOLOGICAL SURVEY: HABITAT
ASSESSMENT**



Compiled for BOHLWEKI SSI ENVIRONMENTAL by:

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SUBMITTED: 10TH March 2009

1. INTRODUCTION

The preliminary faunal survey is based on a single site visit conducted on the 4th of February 2009. A proposed commercial and residential development is proposed for the site. The study area is situated in the southern suburbs of Soweto in the suburb of Jabulani. The site has been divided into three portions namely portion A, B and C. The site is surrounded by Jabulani Mall to the east and high density residential developments to the west. An existing stadium which will be upgraded occurs on the north-western portion of the site. The majority of the site is dominated by secondary or transformed grasslands with several anthropomorphic grass and weedy plant species. The site is surrounded by transformed habitats and fragmented with no connectivity to any remaining natural open spaces.

1.1 Objectives of the preliminary ecological survey

- To provide a description of the current environmental status and habitats occurring on the Jabulani site.
- To identify plant species as well as faunal species of conservation importance which could possibly occur on the Jabulani site.
- To determine potential impacts of the proposed Jabulani commercial and residential developments on the immediate environment and associated fauna and flora.
- To provide management recommendations to mitigate negative and enhance positive impacts of the proposed project.

1.2 Scope of study

- A one day field survey conducted in and around the proposed Jabulani site recording the dominant vegetation as well as sightings and/or evidence of existing fauna.
- An assessment of the ecological habitats, evaluating conservation importance and significance with special emphasis on the current status of threatened animal and plant species (Red Data/Listed Species) on the actual site.
- Literature investigations, previous surveys as well as personal species lists with which to augment field data were necessary.
- Identification of potential ecological impacts that could occur as a result of the Jabulani commercial and residential developments and assess the significance of these, where possible.

- Investigate feasible and practical management recommendations that should be implemented to reduce or minimize the impacts, should the project be approved.
- Documentation of the findings of the study in a report.

1.3 Constraints or limitations to the survey included:

- Limitation to a base-line ecological survey for only 5 hours during the summer months (February). No botanical or faunal surveys were conducted but a brief field survey/ habitat assessment.
- The majority of threatened species are extremely secretive and difficult to observe even during intensive field surveys conducted over several seasons. The presence of threatened plant and animal species is base primarily on the presence of suitable habitat.
- Limitation of historic data and available databases. Insufficient knowledge on the specific habitat requirements (migratory, foraging and breeding) of the majority of threatened species.
- The presence of threatened species on site is assessed mainly on habitat availability and suitability as well as desk research (literature, personal records, previous surveys conducted in the Soweto/Lenasia area between 1999 and 2009).

2. METHODOLOGY

A survey of the site and surrounding areas was carried out by driving around the surrounding areas by car and closer inspection of the actual site carried out on foot.

As the site is situated around existing residential and commercial developments the majority of natural vegetation Soweto Highveld Grassland (Gm8; Mucina *et al.* 2005) has already been impacted on or totally transformed (informal settlement) due to poor land management, frequent fires as well as invasion of weedy plant (kikuyu) and tree species (*Acacia mearnsii*).

The site was visited predominantly during daylight hours (12h00-17h00) on the 4th of February 2009. No nocturnal surveys were undertaken. Data was heavily supplemented by literature investigations; personal records, historic data and previous surveys conducted in the area. Different habitats were explored to identify any sensitive or specialised species which could possibly occur on the site. Habitats explored included the

Hyparrhenia hirta transformed grassland as well as an artificially created stormwater pond.

Mammal names are as used by Skinner and Chimimba (2005), Bird names by Hockey, Dean & Ryan (2006); Reptile names by Branch (1998) and Amphibian names by Passmore and Carruthers (1995).

2.2 EXISTING IMPACTS ON THE SITE INCLUDE:



Photograph1. Existing impacts on the site include: **A-** illegal dumping, **B & D** weedy plant species on dumped piles; **C-** soil removal.

- The site is bordered to the east by the west by the Jabulani Mall, the east, north and south by existing residential areas.
- Dumping of building rubble as well as soil excavations have already occurred on the site.
- Remaining open grasslands around the site are dominated by secondary or transformed grasslands with heavy invasions of weedy plants (*Tagetes minuta*, *Xanthium strumarium*, *Datura strumarium*) and grasses (*Hyparrhenia hirta*) and sedges (*Cyperus esculentus*).
- Secondary access roads and human pathways bisect the entire site.

- The site is unfenced allowing easy access.
- The frequent burning of the remaining grassland patch alters the natural species composition of plants and animals especially amphibians, reptiles and smaller mammals. Burning of waste material results in frequent burning of the surrounding vegetation.
- Evidence of thatch/grass, plant and bulb harvesting in the grassland patches.
- Collecting and harvesting of traditional medicinal plants especially bulbous species such as *Hypoxis spp.*, *Boophane*.
- Evidence of illegal hunting and poaching throughout the site. Several wire snares were discovered along rocky ridge on the site as well as used shotgun cartridges. Hunting with dogs was observed on the site, especially during the weekend. Several dogs were observed on the site and around the informal settlements.
- Dumping of solid and waste material especially around the informal settlement as well as residential areas bordering the site.
- Litter is scattered throughout the site especially adjacent to the human pathways and informal roads due to limited or no waste management services.
- Wood harvesting and collecting occurs in certain areas of the site.
- Alien tree species in and around site especially adjacent to the informal roads which bisects the property include Pine *Pinus* sp. Black Wattle *Acacia mearnsii*, *Eucalyptus* sp.

3. VEGETATION AND FAUNAL HABITAT AVAILABILITY



Photograph2. As the site is situated around existing residential and commercial developments the majority of natural vegetation Soweto Highveld Grassland (Gm8; Mucina *et al.* 2005) has already been impacted on or totally transformed (informal settlement) due to poor land management, frequent fires as well as invasion of weedy plant species.

Vegetation in the study area falls within the Grassland Biome and has been classified by Mucina *et al.* (2006) as **Soweto Highveld Grassland** (Gm8; Mucina *et al.* 2005) previously classified as **Moist Clay Highveld Grassland** (LR 35) (Low & Rebelo 1995) which covers a relatively large area in Gauteng but can also be found in neighbouring provinces. The landscape forms part of the Highveld plateau, having gently undulating slopes and is dominated almost entirely by the anthropomorphic grass Common Thatching Grass *Hyparrhenia hirta* as well as Tall Khakiweed *Tagetes minuta*.

Synonyms:

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

Statistics:

10 265 km²; ~ 79% transformed; only a handful of patches statutorily 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 N 17 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.

Vegetation & Landscape Features: Gently to moderately undulating landscape on the Highveld plateau supporting short medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover. The vegetation on the Jabulani site has been transformed by previous agricultural as well as impacted on by commercial and residential developments. Various other weedy grass species are present and herbs that are especially fire resistant, usually by becoming dormant in the winter months due to the development of underground organs. These herbaceous plants resprout in the spring after the first rains. The majority of geophytes or bulbous plants have been removed for traditional medicinal use. The remnant grassland patch is frequently burned resulting in disturbances to the vegetation as well as associated fauna. Illegal dumping and littering occurs throughout the site as well as along several informal access roads. Rainfall is around about 660 mm per annum and falls predominantly in the summer months as afternoon thunderstorms.

Climate Summer-rainfall region (MAP 662 mm). Cool-temperate climate with thermic continentality (high extremes between maximum summer and minimum winter temperatures, frequent occurrence of frost, large

thermic diurnal differences, especially in autumn and spring). Temperatures vary between -13°C and 37°C, with an average of 15°C.

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:

Redgrass *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*, *Hyparrhenia hirta* 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*, *Chamaesycaequilatera*, *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*, *Harporchloa falx*, *Microchloa caffra*, *Paspalum dilatatum*.

Herbs: *Hermannia depressa*, *Acalypha angustata*, *Berkheya setifera*, *Dicoma anomala*, *Euryops gilfillanii*, *Geigeria aspera* var. *aspera*,

Graderia subintegra, *Haplocarpha scaposa*, *Heliichrysum 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*. (No geophytic herbs were recorded during brief field survey).

Herbaceous Climber: *Rhynchosia totta*.

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

Succulents: *Lithops lesliei* subspecies *lesliei*. No *Lithops* were observed or are likely to occur on the site due to extensive habitat transformation and degradation.

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. Large areas have been transformed in the Vereeniging area due to increase urban development, agricultural as well as sand mining. The majority of Soweto Highveld Grassland has been transformed in the Soweto and Jabulani areas due to extensive urban development.

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%).

References: Bredenkamp (1975, 1976, 1977), Bredenkamp & Theron (1978), Bezuidenhout & Bredenkamp (1991), Low & Rebelo (1998) and Mucina & Rutherford (2006).

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 surrounding Jabulani consists of transformed grassland due to increased urban development as well as commercial, industrial and agricultural activities. Limited remnant patches of open grassland remain.

Dominant grass species occurring on the site include *Tristachya leucothrix*, *Panicum maximum*, *Sporobolus africanus*, *Eragrostis racemosa*, *Heteropogon contortus*, *Hyparrhenia hirta*, *Diheteropogon amplexans* and *Trachypogon spicatus*, *Pennisetum clandestinum*, *Aristida adscensionis*, *Microchloa caffra*, with less *Themeda triandra*.

Pioneers or weedy herb species recorded included *Tagetes minuta*, *Amaranthus hybridus*, *Asclepias fruticosa*, *Bidens pilosa*, *Bidens bipinnata*, *Cirsium vulgare*, *Conyza albida*, *Conyza bonariensis*, *Hypochaeris radicata*, *Picris echioides*, *Schkuhria pinnata*, *Senecio consanguineus*, *Sonchus asper*, *Xanthium strumarium*, *Xanthium spinosum*, *Datura strumarium*, *Zinnia peruviana*, *Hibiscus cannabinus*, *Argemone ochroleuca*, *Plantago lanceolata*, *Striga asiatica*, *Solanum elaeagnifolium*, *Alternanthera pungens*, *Gomphrena celosioides*, *Guilleminea densa*, *Verbena aristegera*, *Ipomoea alba*, *Ipomoea purpurea*.

The faunal survey focused on the describing of the available and sensitive habitats on the site with special reference to the current status of threatened faunal species (amphibians, reptiles, avifauna (birds) and mammals) occurring, or likely to utilize the areas within the proposed Jabulani site. The survey was supplemented by literature investigations; personal records, historic data and previous surveys conducted between 2000-2009 in similar habitats as well as the immediate surrounding areas.

4 FAUNAL SURVEY

The faunal survey focused 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 study area, describing the available and sensitive habitats, identifying potential impacts resulting from the development and providing mitigation measures for the identified impacts.

No Faunal survey was conducted but merely a preliminary habitat assessment. 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. Reptiles were actively searched for and identified by actual specimens or observations of specimens. The data was supplemented by previous surveys conducted in the area, literature investigations, personal records and historic data.

4.1 AMPHIBIANS

Amphibians are an important component of South Africa's exceptional biodiversity (Siegfried 1989) and are such worthy of both research and conservation effort. This is made additionally relevant by international concern over globally declining amphibian populations, a phenomenon currently undergoing intensive investigation but as yet is poorly understood (Wyman 1990; Wake 1991). Frog populations throughout the world have crashed dramatically in the last twenty years. Deforestation, wetland draining and pollution are immediately obvious causes. But other, more fundamental, man-made impacts are causing population declines in 'pristine' habitats such as national parks and remote rainforests. Reductions in atmospheric ozone levels are allowing increased UV-radiation, pollutants are accumulating in natural systems and bacterial and virus distribution is accelerating across the globe (Carruthers 2001). Most frogs have a biphasic life cycle, where eggs laid in water develop into tadpoles and these live in the water until they metamorphose into juvenile frogs living on the land. This fact, coupled with being covered by a semi-permeable skin makes frogs particularly vulnerable to pollutants and other environmental stresses. Consequently frogs are useful environmental bio-monitors (bio-indicators) and may act as an early warning system for the quality of the environment. The Giant Bullfrog (*Pyxicephalus adspersus*)

has been chosen as a flagship species for the grassland ecoregion (Cook in le Roux 2002)

Seasonal fluctuations in amphibian population sizes occur depending on certain environmental parameters such as amount of rainfall, temperature and humidity. Precipitation strongly influences amphibian activity, distribution and dispersion patterns, reproductive cycles, and rates of growth and development. Many species remain underground or in aboveground retreats except during wet periods. Therefore, the best time to survey an area is often during the wet season or following heavy rain. Rainfall in Gauteng is extremely variable and concentrated between October and March. Rain falls most frequently in the form of heavy diurnal thunderstorms of relatively short duration. Considerable fluctuations in rainfall occur from year to year. Rainfall is important for amphibians in that it initiates activity and reproduction. Most of the amphibians in Gauteng are fossorial, avoiding desiccation during the dry winter months. Levels of amphibian activity are influenced by the intensity and duration of rainfall as well as temperature and humidity.

As no nocturnal survey were undertaken resulted in low amphibian observations. It must also be stressed that due to extensive habitat transformation surrounding the site and high levels of human activities on the site low amphibian diversity is expected. Reptiles and amphibians are sensitive to habitat destruction and transformation with only a few species surviving in disturbed grasslands and urban environments.

During this survey; fieldwork was augmented with species lists compiled from personal records; data from sites surveyed for the South African Frog Atlas Project (SAFAP) and published data, and the list provided in Appendix is therefore regarded as likely to be fairly comprehensive.



Photograph3. An artificially created seasonal pond has been created for stormwater attenuation. Ideally the seasonal pond should be rehabilitated and used for stormwater attenuation for the proposed commercial and residential developments.

No natural wetlands or seasonal or permanent drainage lines were observed on the site. A small seasonal pool has been artificially created and is fed by a concrete stormwater pipe. Two frog species was recorded breeding in the pool on the site namely Guttural Toad (*Amietophrynus (Bufo) gutturalis*) and Common Platanna (*Xenopus laevis*). All frog species observed on the site are common and widespread throughout Gauteng and South Africa. Guttural Toads are urban exploiters dominating artificial or transformed habitats and Platannas are common in artificially created wetland habitats such as farm dams (see Table2. Appendix).

THREATENED SPECIES

The Giant Bullfrog (*Pyxicephalus adspersus*) is a protected frog species whose conservation status has been revised and included as a Red Data Species under the category 'Lower Risk near-threatened'. Bullfrog density commonly varies within certain habitats (open grassland habitat with seasonal wetland 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.

No Giant Bullfrogs were observed on the site or in the immediate areas surrounding the site during this brief field survey. Giant Bullfrogs were not recorded in the immediate area during the South African Frog Atlas Project (SAFAP) or during previous surveys conducted on sites towards the south and east of the site. No suitable breeding habitat occurs on the site and limited suitable foraging habitat occurs on the site due to the poor land management (habitat degradation) as well as the fragmented nature of the site.

It is considered highly unlikely that the development of the transformed grasslands of the site, should it occur, will have a negative impact of more than a **low significance** on the conservation status of any threatened amphibian species, both locally and provincially within Gauteng.

4.2 REPTILES

Comprehensive reptile species lists are impossible to determine with extensive fieldwork over a number of months or even years. Reptile lists provided are of species most likely to occur on the site for reptile fauna present on the site (see Tables 3 & 4 Appendix). As a result of human presence in the area (previous agricultural activities) coupled with extensive habitat destruction (informal settlement) and disturbances (frequent fires at incorrect time of year), alterations to the original reptilian fauna are expected to have already occurred on the site especially in the transformed habitats on the site. No suitable low-lying rocky habitat occurs for rupicolous reptiles (agamas, skinks, snakes, geckoes) was observed on the site. The majority of rock material has been removed.

A few (<10) large termite mounds *Trinervitermes spp.* were observed on the site. 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. Moribund termite mounds also provide nesting site for numerous snakes, lizards (varanids) and frogs. No moribund termite mounds were noted.

No indigenous large tree species occur on the site although a few small (<50cm) Common Sweet Thorn (*Acacia karroo*) were observed. Trees including stumps; bark and holes in trees are vital habitats for numerous arboreal reptiles (chameleons, snakes, agamas, geckos and monitors). No logs or stumps were observed.

THREATENED SPECIES

Continual destruction of suitable habitats has resulted in the disappearance of numerous reptile species on the Highveld. No snake species were recorded during the brief field survey and low populations are expected due to the high levels of human activity on the site. Indiscriminate killing of snake species is likely to have resulted in the disappearance of the larger and the more sluggish snake species within the study area. The removal of the majority of natural rock material on the site severely restricts refuge habitat for the majority of reptile species. The frequent burning of the site will have a high impact on remaining reptiles by actual burning as well as increased predation levels. Fires during the winter months will severely impact on the hibernating species, which are extremely sluggish. Fires during the early summer months destroy the emerging reptiles as well as refuge areas increasing predation risks. No threatened reptile species were recorded during this survey, but 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 east (Broadley 1990). According to the habitat description provided for this species by Broadley (1990) and Branch (1988), this species has no suitable habitats contained within the study area (no moribund termite mounds and rock outcrops). It is considered highly unlikely that the development of the lower slopes and transformed grasslands of the site, should it occur, will have a negative impact of more than a **low or no significance** on the conservation status of any threatened reptile species, both locally and provincially within Gauteng.

4.3 AVIFAUNA/BIRDS

Thirty-four (34) bird species were recorded (see Table 5 Appendix) during the brief field survey (total 5 hours). Species recorded during the field survey are common, widespread and typical of fairly uniform disturbed grassland habitat. The majority of bird species recorded were small granivorous (grain or seed eating) or gramnivorous (grass seed eating) birds including Queleas, waxbills, Laughing Dove and Cape Turtle Dove as

well as frugivores (fruit eating) including Dark-capped Bulbul, Speckled Mousebird.

THREATENED SPECIES

Several bird species of conservation importance have been recorded in the Soweto-Johannesburg and surrounding ¼ degree square including:

Blue Crane

Black Stork

Yellowbilled Stork

Cape Vulture

Martial Eagle

African Marsh Harrier

Lanner Falcon

Whitebellied Korhaan

Blue Korhaan

Secretarybird

African Grass Owl

Melodious Lark

Numbers of bird species have declined due extensive habitat degradation and loss. 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, increased pasture management (overgrazing), decrease in grassland management and land-use alteration (urbanisation). Continuing pressure on sensitive wetland and surrounding grassland habitat are largely responsible for the decline of the majority of bird species in the Soweto and Johannesburg areas of Gauteng.

No threatened bird species were recorded on and the immediately area surrounding the site. High levels of human disturbance occur in these areas. Destruction of the transformed habitats on the site will have an impact of **low or no significance** on the conservation status of any threatened bird species within a local and provincial Gauteng scale.

4.4 MAMMALS

No small mammal trappings were conducted due to time constraints and the limitations that the results from one night survey would pose. The brief fieldwork was augmented with previous surveys in similar habitats as well as published data. Mammal species recorded within the study area as

well as those that may occur within the study area, on the basis of available distribution records and known habitat requirements, are included in the Appendix (see Table6).

The high density residential developments on the southern, northern and eastern boundary of the site and associated illegal hunting with dogs on the weekends and high levels of poaching activities limits the suitability of the site for certain larger mammal species. High levels of hunting and poaching were noted on and surrounding the site with the use of dogs and wire snares as well as several empty shotgun cartridges. A nearby resident confirmed that several illegal hunters as well as dogs are regularly observed on and surrounding the site on weekends. The collection or harvesting of wood (stumps) and rock material as well as the frequent burning of the 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 mammal species such as rabbits and mongooses. Secondary access roads and vehicles (motor cars, motor cycles, quad bikes) around the site as well as major road networks (R558) increase the risk of road fatalities (hedgehogs, hares). Smaller mammal species are extremely vulnerable to feral cats and dogs. Limited animal burrows of Highveld Gerbils and Multimmmate Mice as well as mounds of the African Mole-rat (*Cryptomus hottentotus*) were observed around the site.

THREATENED SPECIES

No sensitive or endangered mammals were recorded within the study area or are likely to occur in the transformed and degraded grasslands proposed for development. The majority of larger mammal species are likely to have been eradicated or have moved away from the area, as a result of previous agricultural activities, hunting and poaching as well as severe habitat alteration and degradation.

Destruction of the transformed grasslands will have a **high** impact on the remaining mammal populations (albeit low mammal diversity) occurring in these habitats and a **low significance** on the conservation status of any threatened mammal species within a local Jabulani scale and a **low/negligible** significance within Gauteng.

5. POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT ON THE ASSOCIATED FAUNA

5.1 Loss of habitat

The proposed medium-high density residential and commercial developments will most likely result in a **low, short, medium and long-term negative impact** if restricted to the transformed or degraded habitat with no conservation value. This will result in the destruction of transformed habitats which offers limited suitable habitat for remaining animal species. Further, direct and indirect impacts of the development include increased access and human presence into the area as well as neighbouring properties. Increased human pressure and activities in these degraded habitats could result in further environmental degradation if environmentally sensitive practices are not followed and maintained throughout all stages of the development.

Mitigation and Recommendations

During the **CONSTRUCTION** phase workers must be limited to areas under construction and access to the undeveloped areas must be strictly regulated ("no-go" areas during construction activities). The entire site should be fenced prior to construction activities. Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) water in the area. All temporary stockpile areas, litter and dumped material and rubble must be removed on completion of construction. All alien invasive plant and tree species should be removed from the site to prevent further invasion. No quad-bikes, motorcycles or off road vehicles and illegal hunting should be permitted in the adjacent properties. Vegetation clearance should be restricted to the areas under construction allowing remaining animals opportunity to move away from the disturbance. No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site. No hunting with firearms (shotguns, air rifles or pellet guns) or catapults should be permitted on the property as well as neighbouring areas.

5.2 Horticultural Activities

Landscape architects, and the developer, have an opportunity to conserve certain faunal biodiversity present on the site and possibly increase the biodiversity of certain animal species (birds). Vegetation has been reported to be the single most important habitat component for all species of animals. Linked to this, is the preservation, maintenance and creation

of tracts of natural and ornamental vegetation in all stages of ecological succession, interconnected by corridors or green belts for escape, foraging, breeding and exploratory movements. Landscaping projects are all too frequently characterized by exotic or indigenous (not to the area) trees, planted at the same time, at the same size and are spaced at regular centred settings. The resulting pattern and structure is one of limited vegetation diversity, trees of uniform size, even age stands and little or no under-story planting. Only a few species of animals (urban exploiters) will occupy these limited niches, leading to decreased faunal biodiversity.

Mitigation and recommendation

Remaining indigenous bulbous geophytes should be retained or replanted wherever possible. Gardens or landscaped areas around the proposed development should be planted with indigenous (preferably using endemic or local species from the area) grasses, forbs, shrubs and trees, which are water wise and require minimal horticultural practices. A species list of suitable species should be compiled for future property owners.

A Re-vegetation and Rehabilitation Manual should be prepared for the use of contractors, landscape architects and groundsmen. Where herbicides are used to clear vegetation, specimen-specific chemicals should be applied to individual plants only. General spraying should be prohibited. All alien vegetation should be eradicated over a five-year period. Invasive species (*Eucalyptus sp.*, *Acacia mearnsii*) should be given the highest priority.

Where the removal of alien species may leave spoil exposed, alternative indigenous species should be established before eradication takes place. Individual property owners should be encouraged to plant indigenous non-invasive plants. The attention of property owners must be drawn to the most recent Declared Weeds List (2001) in the *Conservation of Agricultural Resources Act 43 of 1983* and the associated penalties and prohibitions. Horticultural activities such as fertilisers, herbicide and pesticide runoff, increase in alien vegetation and weedy species, dumping of refuse and building material must be strictly managed and be environmentally sensitive and should meet the following requirements:

- Limited to building environs and limited areas of proposed development.

- Limited irrigation by water-wise gardening (use local plants adapted to local conditions).
- Strict fertiliser, pesticide and herbicide control (limited usage)
- Invertebrate pests on the site should be controlled in the following manner:
- The least environmentally damaging insecticides must be applied. Pyrethroids and Phenylpyrazoles are preferable to Acetylcholines. Use insecticides that are specific to the pest (species specific) in question. The lowest effective dosages must be applied. The suppliers advice should always be sought. Do not irrigate for 24 hours after applying insecticides in areas where there is a chance of contaminating water-courses or dams, fungal pathogens should be used in preference to chemical insecticides.
- Reduction of weed and erosion by minimum tillage gardening practices (groundcovers and mulching better in all respects).
- No dumping of any materials in undeveloped open areas and neighbouring properties. Activities in the surrounding open undeveloped areas (especially open grasslands and rocky ridge) must be strictly regulated and managed.

5.3 Erosion and Surface runoff

Urban development is characterised by large areas of sealed surfaces such as roads, houses etc. Impermeable surface cover ranges from 15% to 60% of suburban areas to almost 100% in central business districts. Infiltration is considerably reduced with an increase in surface run-off. Run-off is generally discharged to surface water systems and often contains pollutants. Pollutants range from organic matter, including sediments, plant materials and sewage, to toxic substances such as heavy metals, oils and hydrocarbons. Construction activities associated with urban development can lead to massive short term erosion unless adequate measures are implemented to control surface run-off. Sheet erosion occurs when run-off surface water carries away successive thin layers of soil over large patches of bare earth. This type of erosion is most severe on sloping soils, which are weakly structured with low infiltration, which promotes rapid run-off. It occurs on the site where vegetation has been destroyed. Continual erosion in sheet-eroded slopes is a common cause of gully erosion. Gully erosion results from increased flow along a drainage line, especially where protective vegetation has been removed and soils are readily transported. A gully has steep, bare sides and is often narrow and deep. Once formed, a gully usually spreads upstream

through continual slumping of soil at the gully head. Gully erosion can be associated with salting as the saline sub-soils are readily eroded.

Mitigation and recommendations

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. 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. Storm-water and runoff should be channelled through natural grassland buffer areas or into the artificially created seasonal retention/attenuation ponds reducing the erosional force and the potential risk of further disturbance to any wetland habitats to the east of the site.

The timing of clearing activities is of vital importance. Clearing activities and earth scraping should preferably be restricted to the dry season in order to prevent erosion and siltation. The dry months are also the period when the majority of species are either dormant or finished with their breeding activities. Future soil stockpiling areas must follow environmentally sensitive practices and be situated a sufficient distance away from drainage areas. Severely eroded areas should be appropriately re-vegetated. The careful position of soil piles, and runoff 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. Sufficient measures must be implemented to prevent the possible contamination of surrounding surface and groundwater.

5.4 Migratory Routes (Fencing)

The migratory movements of several animal (frog, reptile and mammal) species are currently completely disrupted by the erection of the high brick wall on the western boundary of the site, which restrict natural movements between suitable foraging and breeding areas. This could potentially result in the disruption of natural gene flow between populations and could result in a high impact on the highly mobile species. Fencing off of residential areas and private property also plays a critical

role in impeding the natural migration of the majority of animal species. A trade off thus exists between safety and security on the one hand and movement of animal species on the other.

Mitigation and recommendations

As the site is fragmented and does not border any open grasslands areas no migratory habitat remains and any fence may be erected.

5.5 Artificial Lighting

Artificial lighting will most likely result in a **moderate** negative short, medium and long- term impact on all nocturnal animal species. 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

During the construction phase, artificial lighting must be restricted to areas under construction and not directed towards the neighbouring area in order to minimize the potential negative effects of the lights on the natural nocturnal activities. 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 as many invertebrates (insects) at night and will not disturb the existing wildlife. Sodium lamps require a third less energy than conventional light bulbs.

5.6 Threatened animals

At a local scale the study site and surrounding transformed grasslands comprises no suitable habitat for any threatened plant or animal species.

6. CONCLUSION AND RECOMMENDATIONS

At a local (Jabulani) scale the study area comprises limited suitable habitat for animals and plants in general. The secondary grasslands which form the majority of the proposed development area are dominated by transformed habitats that no longer comprise the natural vegetation, and have **little or no conservation** or **biodiversity value**. Development should ideally be situated adjacent to existing road, electricity, water and sewerage infrastructure.

Destruction of the transformed habitats on the site will have an impact of **medium-low** significance on remaining animal species in the area (associated fauna) if environmentally sensitive practices are implemented throughout all stages of the proposed development. During construction activities, wherever possible, work should be restricted to one area at a time. This will give smaller birds, mammals, reptiles and amphibians an opportunity to move into undisturbed areas close to their natural habitat. The Developer must ensure that no faunal species are intentionally disturbed, trapped, hunted or killed during the construction phase.

Acknowledgements

The consultant is extremely grateful for the comments, information and recommendations provided from the Gauteng Directorate of Nature Conservation, especially Dr. Craig Whittington-Jones.

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APPENDIX

Lists of fauna recorded or possibly occurring within the study area.

Table3. List of frog species recorded during current and previous surveys and of species likely to occur on the site.

Common Name	Species	Breeding Requirements
Common River Frog	<i>Amietia/Afrana angolensis</i>	Rivers and permanent water (springs, ponds and farm dams)
Tremolo Sand Frog	<i>Tomopterna cryptotis</i>	Shallow permanent streams or vleis in grassland
Natal Sand Frog	<i>Tomopterna natalensis</i>	Shallow permanent streams or vleis in grassland
Bubbling Kassina	<i>Kassina senegalensis</i>	Open vleis, pans, dams in grassland
Common Caco/ Boettger's Caco	<i>Cacosternum boettgeri</i>	Marsh, vleis, inundated grassland
*Guttural Toad	<i>Bufo gutturalis</i>	Open vleis, pans, ponds, dams, slow streams
Raucous Toad	<i>Bufo rangeri</i>	Large permanent water bodies or farm dams and along ponds formed in drainage lines
Red Toad	<i>Schismaderma careens</i>	Permanent or semi-permanent pools. Breeds in deep water (>30cm)
Snoring Puddle Frog	<i>Phrynobatrachus natalensis</i>	Temporary pans and pools, vleis, dams and slow-flowing streams
*Common Platanna	<i>Xenopus laevis laevis</i>	Large permanent water bodies or farm dams and along ponds formed in drainage lines

*recorded during brief field survey

Table 4. Reptile species likely to occur on the site using habitat availability as an indicator for possible species presence. Actual species list will probably contain fewer species due to high levels of habitat transformation and degradation.

Common Name	Scientific Name
Leopard Tortoise	<i>Geochelone pardalis</i>
Cape Skink	<i>Trachylepis (Mabuya) capensis</i>
*Montane Speckled or Striped Skink	<i>Trachylepis (Mabuya) punctatissima</i>
Wahlberg's Snake-eyed Skink	<i>Panapsis wahlbergii</i>
Variable Skink	<i>Trachylepis (Mabuya) varia</i>
Common Rough-scaled Lizard	<i>Ichnotropis squamulosa</i>
Flap-neck Chamaeleon	<i>Chamaeleo dilepis</i>
Transvaal Thick-toed gecko	<i>Pachydactylus affinis</i>
Cape Thick-toed Gecko	<i>Pachydactylus capensis</i>
Cape Dwarf Gecko	<i>Lygodactylus capensis</i>
Yellow-throated Plated Lizard	<i>Gerrhosaurus flavigularis</i>
Ground Agama	<i>Agama aculeate</i>
Herald or Red-lipped Snake	<i>Crotaphopeltis hotamboeia</i>
Rinkhals	<i>Haemachatus haemachatus</i>
Mole Snake	<i>Pseudapsis cana</i>
Common or Rhombic Night Adder	<i>Causus rhombeatus</i>
Puff Adder	<i>Bitis arietans</i>
Snouted Cobra	<i>Naje annulifera</i>
Mozambique Spitting Cobra	<i>Naja mossambica</i>
Common or Rhombic Egg Eater	<i>Dasypeltis scabra</i>
Brown House Snake	<i>Lamprophis fuliginosus</i>
Aurora House Snake	<i>Lamprophis aurora</i>
Cape Wolf Snake	<i>Lycophidion capense</i>
Spotted or Rhombic Skaapsteker	<i>Psammophylax rhombeatus</i>
Striped Skaapsteker	<i>Psammophylax tritaeniatus</i>
Black-headed Centipede Eater	<i>Aparallactus capensis</i>
Common Slug-eater	<i>Duberria lutrix</i>
Common Wolf Snake	<i>Lycophidion capense</i>
Delalande's Beaked Blind Snake	<i>Rhinotyphlops lalandei</i>
Bibron's Blind Snake	<i>Typhlops bibronii</i>
Eastern Thread Snake	<i>Leptotyphlops conjunctus</i>
Peters' Thread Snake	<i>Leptotyphlops scutifrons</i>

* observed during brief field survey. Due to high levels of disturbance on the site and surrounding areas actual species list will probably contain far fewer species especially pertaining to snake species.

Table5. Mammal species recorded in the study area, and mammal species for which suitable habitat is likely to occur in the study area, and which may therefore be present (introduced species are in bold).

COMMON NAME	SCIENTIFIC NAME
Rusty Pipistrelle	<i>Pipistrellus rusticus</i>
Transvaal free-tailed Bat	<i>Tadarida ventralis</i>
Egyptian free-tailed Bat	<i>Tadarida aegyptiaca</i>
Cape Serotine Bat	<i>Eptesicus capensis</i>
Schreibers' Long-Fingered Bat	<i>Miniopterus schreibersii</i>
Scrub Hare	<i>Lepus saxatilis</i>
House Mouse	<i>Mus musculus</i>
* African (Common) Mole-rat	<i>Cryptomys hottentotus</i>
Four-striped Grass Mouse	<i>Rhabdomys pumilio</i>
Pouched Mouse	<i>Saccostomus campestris</i>
Natal Multimammate Mouse	<i>Mastomys natalensis</i>
Southern Multimammate Mouse	<i>Mastomys coucha</i>
*House Rat	<i>Rattus rattus</i>
Highveld Gerbil	<i>Tatera brantsii</i>
Tiny Musk Shrew	<i>Crocidura fuscomurina</i>
Reddish-Grey Musk Shrew	<i>Crocidura cyanea</i>
Lesser Grey-brown Musk Shrew	<i>Crocidura silacea</i>
Yellow Mongoose	<i>Cynictis penicillata</i>
*Slender Mongoose	<i>Galerella sanguinea</i>

* observed during brief field survey. Due to high levels of disturbance on the site and surrounding areas actual species list will probably contain far fewer species.

Table 6. Bird species recorded during brief field survey (5 hrs) (Introduced species are in bold). List has been augmented by previous surveys in the surrounding area.

Roberts' Number	Common name	Scientific Name
71	Cattle Egret	<i>Bulbulcus ibis</i>
94	Hadedda Ibis	<i>Bostrychia hagedash</i>
127	Blackshouldered Kite	<i>Elanus caeruleus</i>
255	Crowned Lapwing (Plover)	<i>Vanellus coronatus</i>
258	Blacksmith Lapwing (Plover)	<i>Vanellus armatus</i>
297	Spotted Dikkop or Thick-knee	<i>Burhinus capensis</i>
349	Rock or Speckled Pigeon	<i>Columba guinea</i>
352	Redeyed Dove	<i>Streptopelia semitorquata</i>
354	Cape Turtle or Ring-necked Dove	<i>Streptopelia capicola</i>
355	Laughing Dove	<i>Streptopelia senegalensis</i>
386	Diederik Cuckoo	<i>Chrysococcyx caprius</i>
415	Whiterumped Swift	<i>Apus caffer</i>
417	Little Swift	<i>Apus melba</i>
424	Speckled Mousebird	<i>Colius striatus</i>
494	Rufous-naped Lark	<i>Mirafrā africana</i>
507	Red-capped Lark	<i>Calandrella cinerea</i>
518	European or Barn Swallow	<i>Hirundo rustica</i>
526	Greater Striped Swallow	<i>Hirundo cucullata</i>
527	Lesser Striped Swallow	<i>Hirundo abyssinica</i>
548	Pied Crow	<i>Corvus albus</i>
568	Dark-capped (Black-eyed) Bulbul	<i>Pycnonotus barbatus</i>
587	Capped Wheatear	<i>Oenanthe pileata</i>
589	Familiar Chat	<i>Cercomela familiaris</i>
595	Southern Ant-eating Chat	<i>Myrmecocichla formicorva</i>
596	Stonechat	<i>Saxicola torquata</i>
664	Fan-tailed or Zitting Cisticola	<i>Cisticola juncidis</i>
677	Levaillant's Cisticola	<i>Cisticola tinniens</i>
683	Tawny-flanked Prinia	<i>Prinia subflava</i>
716	African or Grassveld Pipit	<i>Anthus cinnamomeus</i>

717	Long-billed Pipit	<i>Anthus similes</i>
727	Orange-throated Longclaw	<i>Macronyx capensis</i>
732	Fiscal Shrike or Common Fiscal	<i>Lanius collaris</i>
758	Indian or Common Myna	<i>Acridothermes tristis</i>
801	House Sparrow	<i>Passer domesticus</i>
814	Southern Masked Weaver	<i>Ploceus velatus</i>
815	Lesser Masked Weaver	<i>Ploceus intermedius</i>
821	Red-billed Quelea	<i>Quelea quelea</i>
824	Southern Red Bishop	<i>Euplectes orix</i>
846	Common Waxbill	<i>Esrilda astrild</i>
860	Pin-tailed Whydah	<i>Vidua macroura</i>