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Oliphant Estate Township Development, Kimberley: Northern Cape Province

Summary of the Terrestrial Fauna Biodiversity and Animal Species

January 2022

Photograph provided by Antoinette Eyssell, January 2022

Specialist Qualification & Declaration

Barbara Kasl (CV summary attached as Appendix A):

- Holds a PhD in Animal, Plant and Environmental Sciences from the University of the Witwatersrand;
- Is a registered SACNASP Professional Ecological and Environmental Scientist (Pr.Sci.Nat. Registration No.: 400257/09), with expertise in faunal ecology; and
- Has been actively involved in the environmental consultancy field for over 13 years.

I, Barbara Kasl, confirm that:

- I act as independent consultant and specialist in the field of ecology and environmental sciences;
- I have no vested interest in the project other than remuneration for work completed in terms of the Scope of Work;
- I have presented the information in this report in line with the requirements of the Animal Species and Terrestrial Biodiversity Protocols as required under the National Environmental Management Act (107/1998) (NEMA) as far as these are relevant to the specific Scope of Work;
- I have taken NEMA Principals into account as far as these are relevant to the Scope of Work; and
- Information presented is, to the best of my knowledge, accurate and correct within the restraints of stipulated limitations.

19-01-2022

Acronyms

ADU	Animal Demographic Unit
AI(S)	Alien Invasive (Species)
BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Areas
EMP(R)	Environmental Management Plan (Report)
ESA	Ecological Support Area
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
NFEPA	National Freshwater Ecosystem Priority Area
NPAES	National Protected Area Expansion Strategy
PA	Protected Area
PES	Present Ecological State
QDGS	Quarter Degree Grid Square
RL	Red-listed
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern (specifically listed in the SANBI's 2020 Species Guideline)
SEI	Site Ecological Importance
SWSA	Strategic Water Source Area
TOP(S)	Threatened or Protected (Species)

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1. Introduction & Desktop Setting

Oliphants Housing Estate (Pty) Ltd is proposing the construction of a mixed use residential development on the Remainder of Portion 18 of the Farm Roode Pan 70 in Kimberley in the Sol Plaatjie Local Municipality, (Frances Baard District), Northern Cape Province. The property lies approximately 10km to the north of Kimberley CBD between the Kamfers Dam and the Midlands Road. The project area is around 300ha in extent and the development area is approximately 150 hectares. Desktop ecological features of relevance to terrestrial fauna are summarised in Table 1.

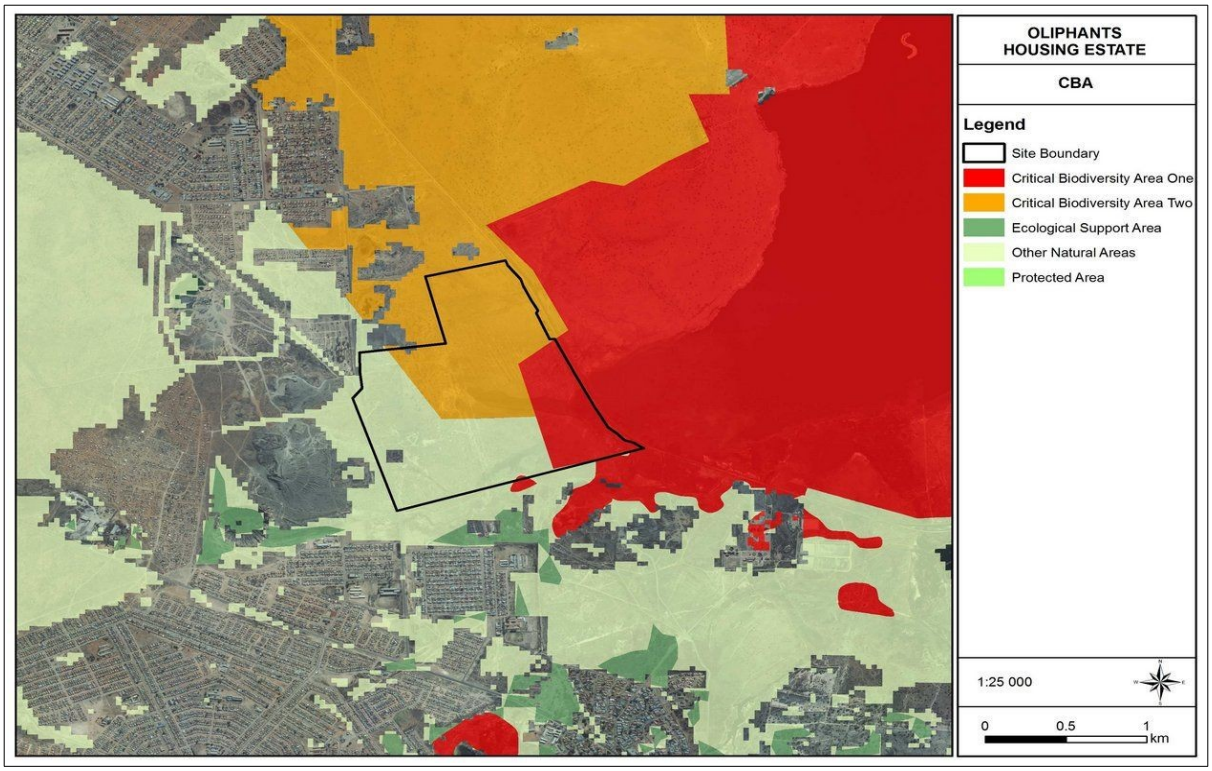
The Oliphant Estate Township Development entails the construction of the 2886 housing units on the above mentioned property consisting of 175 freehold units and 2711 sectional title units consisting of High Density Residential, Lower Density Residential Nodes and a Business Node. The following associated infrastructure will also be constructed to provide basic services to the development:

- Construction of internal access roads to serve the entire development. As far as reasonably possible, the existing roads that provide direct access to the site will be utilised and upgraded where required;
- Public open spaces; and
- Storm water management systems.

Table 1: Ecologically significant features relevant to the site ("as-crow-flies" distances indicated)

Ecological feature / area	Description of feature relevant to the site
International Conservation	No RAMSAR Wetlands or World Heritage Sites occur within 50km of site.
Important Bird Areas (IBAs) (Marnewick *et al*., 2015)	The Kamfersdam IBA is east and encroaches the south-east corner of the site. Main threats include poor water quality and flooding of the dam. Botulism is a sporadic threat which has resulted in the death of hundreds of water birds. Other threats include urban development towards the dam, poor legislation and enforcement, hunting and collecting water birds, railway line collisions and AIS infestation around the dam.
Protected Areas (PA)	No Protected Areas (PA) occur within 10km of site. The formally protected Mokala National Park is the nearest PA, more than 25km west of site. The De Beers' Dronfield Nature Reserve lies north-east of the dam, associated with the Dronfield IBA east and adjacent to the Kamfersdam IBA. No NPAES occur within 10km of site.
Water Catchments & NFEPA Features	The site is not within an NFEPA Catchment. The nearest NFEPA River (>14km north-west of site) is the Largely Modified (PES D) Vaal River. The site drains east via drainage lines and a stream into the Kamfersdam, on eth south-eastern fringes of the site. This dam is a Rank 2 NFEPA wetland and is the only breeding site for the Lesser Flamingo in South Africa.
Biome and Ecosystem	The area falls within the Savanna Biome and includes the Kimberley Thornveld, Vaalbos Rocky Shrubland and Highveld Salt Pans vegetation types. No TOP Ecosystems plot over the area.
SWSAs	No Strategic Water Resource Areas occur within 10km of site.

Ecological feature / area	Description of feature relevant to the site
Northern Cape Conservation (Plan 1)	The CBAs occur on the eastern part of the site with the remaining western area largely classified as "other natural areas". The south-western corner has small areas classified as ESAs composed of the mine quarries and man-made aquatic habitats.
Kimberley Spatial Development Framework (SDF)	The Kimberley SDF delineates and Eco-Friendly Precinct around the dam area to primarily facilitate the conservation of the flamingos and support and promote tourism and hospitality activities in support of the conservation area. The precinct covers extensive areas around the dam and connects the dam to the Dronfield Nature Reserve north of the dam. The precinct has NOT adequately incorporated buffer areas of the dam in the south, and should be updated to incorporate at least the minimal 500m buffer for the protection of breeding sites as per the new species guidelines (SANBI, 2020). The proposed site is not within this precinct, but does overlap the 500m buffer of the dam.
QDGS	The site lies in QDGS 2824DA.



Plan 1: Site in relation to the provincial biodiversity conservation plan (SANBI, BGIS Data)

1.1 Scope of Work

A full biodiversity study was completed by Bredenkamp *et al.* (2018) prior to the release of the protocols. According to the Environmental Screening Report, the site has areas ranked as Low and Very High sensitivity for terrestrial biodiversity (CBAs and ESAs) and areas ranked as Low, Medium (1 bird) and High (2 birds) sensitivity for animal species.

The information in the report is recent (completed 3-4 years ago), addresses the terrestrial biodiversity components as relevant to terrestrial fauna and also addressed the three listed Species of Conservation Concern (SCCs). This report is therefore compiled as a summary report (the 2018 report is attached as Appendix B) extracting the requirements of the relevant protocols and supplemented with additional desktop information where deemed necessary:

- Synopsis of historically recorded TOP invertebrates.
- An assessment of photographs provided by other ecologists completing site work has also been completed to ensure the overall fauna habitat status as describe in the 2018 report is still relevant.
- Summary and impact statement on the relevant terrestrial biodiversity features relevant to terrestrial fauna.
- Summary and impact statement on the SCCs listed for the area.
- Site ecological importance (SEI) assessment.
- Update the mitigation and management measures as may be relevant to the protocols and additional findings.

1.2 Biodiversity Characterisation and Fauna Sensitivity Mapping

The site ecological importance (SEI) is mapped as per the requirements of the Animal Species Environmental Assessment Guideline (SANBI, 2020). The assessment criteria and matrices are detailed in Table 2, Table 3 and Table 4. SEI is a function of the Biodiversity Importance (BI) of the receptor (e.g. species of conservation concern or the fauna community) and Receptor Resilience (RR) defined as the intrinsic capacity of the receptor to resist major damage from disturbance and / or to recover to its original state with limited or no human intervention **(SEI = BI + RR)**. BI is a function of Conservation Importance (CI) (evaluated in accordance with recognised criteria as detailed in Table 2) and the Functional Integrity (FI) of the receptor (e.g. the vegetation/fauna community or habitat type) defined as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions **(BI = CI + FI)**.

Table 2: Criteria for assessing CI, FI and RR

	Conservation Importance	Functional Integrity	Receptor Resilience
Very high	Species confirmed / likely AND restricted (< 10 km^2) CR, EN, VU or Extremely / Critically Rare. Globally significant populations of congregatory species (>10% of global population).	Very large (>100 ha) intact natural area. High connectivity and functional ecological corridors. No / minimal ecological impact with no signs of major past disturbance (e.g. ploughing).	Species very likely to remain during impact / return after impact ceases.
High	Confirmed / likely CR, EN, VU listed under criterion (B-E; if A then only if at <10 locations or <10 000 adults). Globally significant populations of congregatory species (1% - <10% of global population).	Large (20 – 100ha) intact natural area. Good connectivity with potentially functional ecological corridors. Minor ecological impacts (e.g. few livestock) with no signs of major past disturbance (e.g. ploughing); good rehabilitation potential.	Species highly likely to remain during impact / return after impact ceases.
Medium	Confirmed or highly likely NT species. Presence of range-	Medium (5 – 20ha) semi-intact natural area. Narrow corridors of good	Species moderately likely to remain

	Conservation Importance	Functional Integrity	Receptor Resilience
	restricted species. More than 50 % contains natural habitat for species of conservation concern (SCC).	connectivity / larger areas of poor connectivity. Minor ecological impacts; some major impacts (e.g. AIS) and signs of minor past disturbance; moderate rehabilitation potential.	during impact / return after impact ceases.
Low	No confirmed or highly likely SCC or range-restricted species. Less than 50 % contains natural habitat with limited potential to support SCC.	Small (1 – 5ha) area. Almost no connectivity but migration still possible across transformed / degraded habitat; very busy surrounds. Several minor and major ecological impacts. Low rehabilitation potential.	Low likelihood of species remaining during the impact / returning after impact ceases.
Very low	No confirmed and highly unlikely SCC or range-restricted species. No natural habitat remaining.	Very small (<1 ha) area. No connectivity except for flying species. Several major current ecological impacts.	Species unlikely to remain during the impact / return once impact ceases.

Table 3: Matrix for determining BI

Biodiversity Importance		CI				
		Very High	High	Medium	Low	Very Low
FI	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 4: Matrix for determining SEI

SEI (Mitigation)		BI				
		Very High	High	Medium	Low	Very Low
RR	Very Low	Very High (Avoid)	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)
	Low	Very High (Avoid)	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Very Low (Minimise)
	Medium	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)
	High	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)	Very Low (Minimise)
	Very High	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)	Very Low (Minimise)	Very Low (Minimise)

The SEI ranks are utilised to generate the fauna sensitivity plan. This plan must be considered along with the floral sensitivity map to obtain an overall species sensitivity plan. In addition, the SEI ranks will inform mitigation as follows:

- Very High – Avoidance mitigation: No destructive development activities should be considered. Offset mitigation not acceptable / not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems / unique species assemblages. Destructive impacts for species / ecosystems where persistence target remains.
- High – Avoidance mitigation wherever possible and Minimization mitigation: Changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
- Medium – Minimization and restoration mitigation: Development activities of medium impact acceptable followed by appropriate restoration activities.
- Low – Minimization and restoration mitigation: Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Very Low – Minimization mitigation: Development activities of medium to high impact acceptable and restoration activities may not be required.

Comment and discussion is provided on the prior sensitivity map, the current SEI and relevant ecological features as identified within Table 1.

1.3 Limitations

The 2018 report's fauna assessment (Bredenkamp *et al.*, 2018) addresses the fauna-related requirements and this summary report has extracted and summarised the protocol requirements from this report in line with the relevant protocols. It is therefore a desktop process supplemented by additional desktop information, where required, and a photographic assessment.

The SEI assessment proposed in SANBI's guideline (SANBI, 2020) must be understood in terms of the activity (it is not a stand-alone assessment). **The SEI rank in no way relates to the preference of the site for development (lower SEI ranks do not mean the site is preferred for development) and only goes to inform the level of mitigation and management required.**

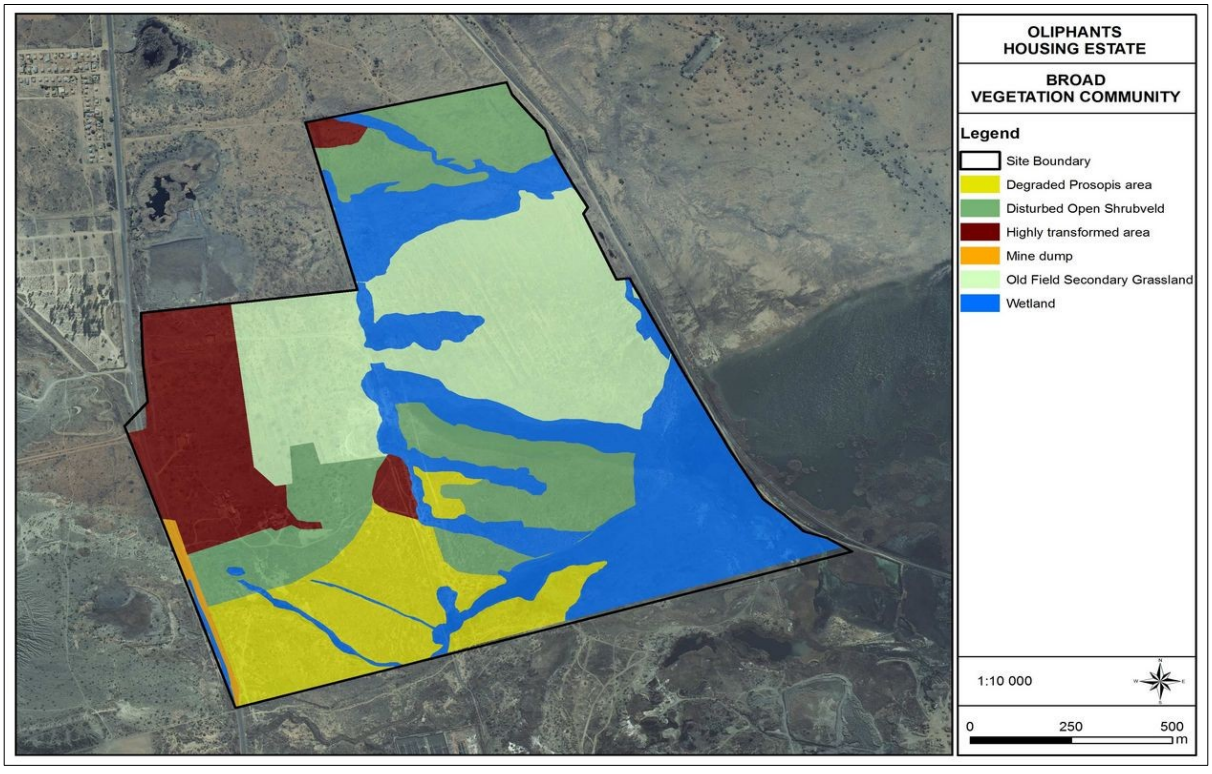
The Animal Species Guidelines (SANBI, 2020) only requires the assessment of SCCs (largely IUCN species), which excludes many of our nationally protected and Red-listed species, such as the Lesser Flamingo in this specific study, which has been detailed in this report. The 2018 report (Appendix B) also discusses other TOP avifauna which have not been assessed in further detail in this report.

There are inherent errors in mapping programmes which must be considered with all mapping information presented. All mapping has been completed and estimated on Google Earth and all final mapping requirements and buffers should be finalised by qualified GIS specialist.

2. Results

The current status on site is not considered to have significantly changed from the 2018 report (based on photographs provided by on-site ecologists), but may be slightly more impaired from anthropogenic activity on site. As per the 2018 report, most of the site can be considered as transformed habitat used for grazing of livestock and cultivation of subsistence crops and modified and disturbed areas. Moribund termitaria were recorded on some parts of the site and are generally good indicators of the occurrence of small mammals, which could be supported by the local vegetation cover. Broad habitat units (Plan 2) include:

- Disturbed shrubveld dominated by open thornveld woodland and grassy under-storey. When untransformed, this habitat supports a high bird richness and conforms to Kimberley Thornveld.
- Degraded *Prosopis* shrubveld scattered across site and supporting short 1-2m woody canopy and grassy under-storey.
- Old field secondary grassland representing secondary grassland which was historically cleared and tilled.
- Transformed habitat, quarries and mine dumps tend to be devoid of vegetation or dominated by exotics and AI plant species. Quarries tend to be filled with water providing aquatic and reedy habitats.
- Wetland and aquatic habitats include seeps and drainage lines and a stream with associated wetlands at the southern boundary of site flowing into the nearby Kamfers Dam (east of site), with its breeding population of Lesser Flamingos.



Plan 2: Broad vegetation units

Other specific habitat characteristics described in the 2018 report include:

- Red, sandy soil which provides good habitat for various burrowing animals.
- Low growing scrub offers excellent refuge for a number of small animals.
- The arboreal habitat varies in density, but is generally lower than two metres. Mature trees >4-5m are scattered through the landscape where present.
- Natural rocky habitats are present on neighbouring properties, but on site rocky habitat is limited to ruins, building rubble and other man-made structures.
- No natural caves occur on site; some of the buildings and quarries may serve as roosts for the more common bats.

Anthropogenic influences on site and in the general area which have affected the habitat include hunting and snaring, railway line, tar and gravel roads, power lines, rubble dumping, invasive plants, winter veld fires, extensive mining exploration and other diggings, ruins, buildings, and old mining activities.

2.1 Mammals

Many species listed as likely or with a high probability to occur are common species tolerant of anthropogenic influence and / or tolerant of human activity or have large ranges and cannot be excluded from site. The 2018 report states that the mammal species richness is deemed poor to fair for such an area due to its disturbed nature and the encroaching urbanisation (within the town limits of Kimberley).

No mammal SCCs are listed in the environmental screening report for the site and no other mammal SCCs are likely on site.

No TOP mammals are confirmed or considered as highly likely to occur on site.

None of the endemic mammals recorded or likely in the area are restricted and the area is not an area of mammal endemism.

The various ecosystem services provided by the historically recorded species and likely TOP fauna are fairly typical and include:

- Significant prey-base for predators / raptors.
- Control of potential vermin, pests and AI species, including potential vectors for disease.
- Seed dispersal.
- Burrowers are eco-engineers where burrows create a micro-habitats that facilitates the existence of other vertebrate species. Burrows also create traps for moisture, seeds and nutrients and create localised micro-habitats and source points of habitat regeneration.

2.2 Birds

The Kamfersdam IBA trigger species include (Marnewick *et al.*, 2015):

- Globally threatened species: Lesser Flamingo and Chestnut-banded Plover.
- Regionally threatened species: Greater Flamingo.

- Biome-restricted species: Burchell's Sandgrouse, Kalahari Scrub Robin and Sociable Weaver
- Congregatory species: Black-necked Grebe, South African Shelduck and Egyptian Goose.

The dam supports more than 20 000 birds at a given time and is a significant water bird habitat, particularly for the Lesser Flamingo (only breeding site in South Africa for the species) and Greater Flamingo (foraging area). The dam also provides habitat for the African Marsh Harrier (SCC discussed below) and the Chestnut-banded Plover.

Three bird SCCs are listed in the screening report, but none were recorded for the area in the 2018 report. None are considered as likely species on site. The following SCCs are listed:

- African Marsh Harrier (*Circus ranivorus*).
    - The status of the species: National GN151 status is Protected (no management plan in place for species); local Red-list status is Endangered (Criterion A2/A3/A4 – population reduction observed / inferred; and C1 – reduction of population ongoing); IUCN status is Least Concern (no criterion applicable).
    - The bird was not recorded from site in the 2018 report and historical records for Kamfersdam date back to 1997 when 1-2 individuals constituted the population for Kamfersdam. It is therefore unlikely to be present on site, especially considering that the Kamfersdam IBA would be a birding hotspot and species would most likely have been spotted if present. In terms of further assessment, the species is considered present as a cautionary approach
    - The current proposed conservation measures for the species stipulate that wetlands greater than 100ha should be prioritised for conservation of the species (Taylor *et al*., 2015). The 2018 report identified suitable habitat that encompassed around 40ha and an additional approximate 45 hectares may be present along the southern boundary of the Kamfersdam. The existing potential suitable habitat may therefore sustain small populations but is unlikely to be of value in the long-term conservation of the species.
    - Main threats include deterioration and loss of wetlands, primarily draining and damming of wetlands. Also threatened by poor land management practices and direct disturbance by humans during the breeding season (Taylor *et al*., 2015).
- Secretarybird (*Sagittarius serpentarius*).
    - The status of the species: Local Red-list status is Vulnerable (Criterion A4 – population reduction observed / inferred; and C1 – reduction of population ongoing); IUCN status is Endangered (Criterion A2/A3/A4 – population declining and individuals estimated between 6 700 and 67 000).
    - The species is a possible, irregular forager within the transformed bushveld and grassland habitat units; more likely to forage with in the wooded areas bordering the Kamfersdam. In the event that the bird should forage on site, the anthropogenic activity on site means that the bird is unlikely to remain on site as it is highly likely to be chased off site.
    - Conservation measures are currently aimed at protecting breeding sites and associated territories (20-45km^2 in wooded areas) outside protected areas. The bird is not considered to be breeding on site or in the immediate area (Taylor *et al*., 2015), more likely to be present in the Dronfield IBA adjacent and east of Kemfersdam IBA. .
    - Main threats include loss and degradation of grassland habitat through poor grazing and fire management, bush encroachment, urban development and agriculture. Also threatened by trade, hunting and nest raiding, collisions with power-lines, drowning in sheer-walled reservoirs and wind-farms (Taylor *et al*., 2015).

- Ludwig's Bustard (*Neotis ludwigii*) (GN151 Vulnerable; RL Endangered; IUCN Endangered).
    - The status of the species: National GN151 status is Vulnerable (no management plan in place for species); local Red-list status is Endangered (Criterion A4 – population reduction observed / inferred); IUCN status is Endangered (Criterion A4 – population declining and individuals numbers unknown).
    - The site is just inside the main distribution range of the species (IUCN), but within a low species density area (Taylor et al., 2015) for the species. This, with the lack of historical records for the species in the area, makes the species an unlikely resident in the area and on site.
    - The species occurs on flat, open and semi-arid shrubland and grassland and will also utilise pastures and cultivated fields (usually once harvested), and therefore has some tolerance to transformed habitats. However, as a targeted game bird (threatened by hunting) it is unlikely to persist on site due to the anthropogenic activity on site (active hunting of birds was recorded in the 2018 report and dogs run rampant on site).
    - Conservation measures are targeted at education and awareness at stopping the hunting of these birds. Other initiatives are aimed at power-related infrastructure (Taylor *et al*., 2015).
    - Threats include collision with overhead lines, hunting and poisoning (Taylor *et al*., 2015).

The previous report discusses several confirmed Near Threatened species (the Lesser and Greater Flamingo, and Red-footed Falcon). Only one other TOP bird was confirmed for site and is considered an occasional visitor to the area (site unlikely to provide food):

- White-backed Vulture (*Gyps africanus*) (RL Critically Endangered; IUCN Critically Endangered). Species feeds on large carrion and is important in terms of clearing carrion and recycling nutrients. Main threats include contamination of food supply, negative interactions with humans and human infrastructure (power-lines, concrete/sheer reservoirs, vehicular collisions, aircraft) and demand for traditional health industry (Taylor *et al*., 2015).

Other TOP birds considered as highly likely to occur on or near site include:

- Maccoa Duck (*Oxyura maccoa*) (RL Near Threatened; IUCN Vulnerable)a foraging visitor and possible breeder at Kamfersdam. Threats include draining of wetlands, pollution through bio-accumulation and AIS infestation. Water quality changes that alter their food source could also impact population numbers (Taylor *et al*., 2015).
- Lanner Falcon (*Falco biarmicus*) (RL Vulnerable), is considered an occasional foraging visitor to site. Threats include loss and degradation of grassland habitat through agriculture and afforestation, which reduces its prey numbers. Also threatened by poisoning, collisions with power-lines, persecution by fowl farmers and pigeon enthusiasts (Taylor *et al*., 2015).

Due to the fact that the Kamfersdam is the only breeding site for the Lesser Flamingo in South Africa and one of four regular sites in sub-Saharan Africa, further discussion is needed for this Near-Threatened species:

- Lesser Flamingo (*Phoenicopterus minor*).
    - The status of the species: Local Red-list status is Near-Threatened (Criterion A2/A3/A4 – population reduction observed / inferred); IUCN status is Near-Threatened (Criterion A2/A3/A4 – population declining and individual numbers unknown). 10 000 to 80 000 individuals estimated for Kamfersdam (Marnewick *et al.*, 2015).
    - Conservation measures are targeted at implementing species-based management plans (International Single Species Action Plan for the Conservation of the Lesser Flamingo),

reconstruction of the breeding island at Kamersdam (or creating other manipulated breeding sites) and affording the dam and wetlands formal protection. Other initiatives are aimed at compilation and implementation of wetland management plans for other wetlands utilised by significant numbers of flamingos, such as the Flamingo Pan in Welkom (Taylor *et al*., 2015).

- The Kimberley Spatial Development Framework (SDF) has encompassed most of the areas around the dam as part of the Kamfersdam Eco-Friendly Precinct with the aim of flamingo conservation. However the site and areas south of the dam are excluded from this precinct. This is an over-sight in the SDF as a buffer area must be established around the dam as an absolute minimal measure, to ensure water quality impacts through runoff can be mitigated. This is supported by the new species guidelines (SANBI, 2020) which stipulates at least a 500m buffer for breeding / sensitive water bird habitat. The Rank 2 NFEPA wetland status means the site is important for sensitive aquatic or wetland species.
- Threats include changes in water levels and water quality that impact their very specialised breeding and foraging site, including use of pesticides that affect their food (Taylor *et al*., 2015).
- The 2018 report stipulates a 500m buffer along the edge of Kamfersdam for the protection of breeding Lesser Flamingos. This buffer is in agreement with the proposed buffers for large breeding water birds (SANBI, 2020).

None of the endemic birds recorded or likely in the greater area are restricted and the area is not an area of avifaunal endemism.

Many bird species do not specifically contribute to ecosystem functioning, but cumulatively insectivores, predators of small mammals, birds and fish will contribute to control of pest invertebrates, pest rodents, alien avifauna and alien fish. Furthermore, the cumulative foraging on aquatic invertebrates (largely water-birds) and terrestrial invertebrates means a degree of control of potential disease-carrying vectors.

The various specific ecosystem services provided by avifauna include pollination and seed dispersal. Scavenging birds play a critical role in waste removal and nutrient recycling and reduce the risk of diseases that could arise from carrion. In addition birds and eggs are food sources to other fauna in the food chain and some species are critical for the survival of parasitic nesters.

2.3 Herpetofauna

No herpetofauna SCCs are listed in the environmental screening report.

One TOP frog cannot be excluded from the site and surrounds (species swarms from breeding sites):

- Giant Bullfrog (*Pyxicephalus adspersus*) (GN151 Protected). Species is threatened by loss and degradation of its wetland and neighbouring terrestrial habitat through increased urbanisation and agricultural activity.

No other TOP reptiles or frogs are expected to occur on site.

No restricted endemics are likely on site and the area is not an area of herpetofauna endemism.

Many of the herpetofauna species feed on arthropods and will cumulatively contribute to control of invertebrate numbers, including aquatic invertebrates that may be vectors for disease. Many reptiles and frogs are also food source to many birds and mammals, as well as other reptile species.

2.4 Invertebrates

No invertebrate assessment was undertaken in the 2018 report. A synopsis of TOP invertebrates historically recorded in the area is provided below, sourced from ADU and iNatualist. The Northern Cape Nature Conservation Ordinance 19 of 1974 includes various insects as endangered and protected wild animals which have been incorporated into the TOP synopsis where relevant (note that the ordinance is outdated and compiled for the old Cape Province and many species listed are restricted to Western Cape and Eastern Cape).

- No invertebrate SCCs are listed for the are in the environmental screening report.
- No TOP spiders were recorded on the ADU or iNaturalist.
- No TOP scorpions were recorded on the ADU or iNaturalist.
- No TOP dragonflies were recorded on the ADU or iNaturalist.
- No TOP or provincially protected butterflies were recorded on the ADU or iNaturalist.
- No provincially protected scarabs or stag beetles were recorded on ADU or iNaturalist and none are expected on site.
- No provincially protected velvet worms were recorded on ADU or iNaturalist and none are expected on site.

3. Terrestrial Biodiversity and Fauna Species

This section must be read together with the floral sensitivity plan and wetland sensitivity plan to ensure a comprehensive terrestrial fauna biodiversity sensitivity plan.

3.1 Terrestrial Biodiversity

Table 5 summarises the terrestrial fauna biodiversity findings as required under the terrestrial biodiversity protocol.

Table 5: Terrestrial fauna biodiversity features and preliminary impact statements

Aspect	Fauna findings
Ecological processes	The main ecological process is the plant-based primary production of 'food' through photosynthesis, which also absorbs CO_2 and releases O_2 and forms the principal base of the food-chain in a terrestrial environment. Secondly, the associated contribution to the water cycle through evapotranspiration is also a significant ecological process provided by the plant life. Another important process is that of natural fires. As the natural fire cycles in South Africa's grassland and savanna have already been impacted by humans, this is not evaluated further. Impact: In the given area these process will cease, but the impact in terms of terrestrial fauna will be limited in the disturbed areas where vegetation might be scant (such as mine areas) or

Aspect	Fauna findings
	where common and highly adaptable fauna species occur (such species will persist in the surrounding areas). The less disturbed areas are largely associated with wetlands and should remain undeveloped and therefore processes in such areas should remain unaffected as long as indirect impacts are managed.
Ecological drivers: climate change, AIS infestation & habitat changes.	Other than the wetlands which should remain undeveloped, the site represents disturbed, secondary and transformed habitats with ongoing human activity and associated anthropogenic impact. Impact: In the given area the impact in terms of terrestrial fauna will be limited in the disturbed / transformed habitat units. The less disturbed areas are largely associated with wetlands and the Kamfersdam which should remain undeveloped, but any indirect impacts that could alter the habitat in these habitat units are considered to be of very high significance in terms of the terrestrial fauna, particularly avifauna as assessed in the 2018 report. The development is not expected to significantly negatively alter the existing AI species dynamics.
Ecological services	No special or critical ecological services provided by fauna were identified for the area and were largely related to the usual services provided by fauna (soil enrichment through burrowing, invertebrate control, prey-base in food chain, pest control, pollination and seed dispersal). The wetlands and terrestrial habitats around the Kamfersdam are critical in terms of regulating water quality and quantity to the Kamfersdam and buffering the dam from other impacts such as noise and litter, all critical for the continued breeding of Lesser Flamingos. Impact: Services will cease in the immediate construction footprint but will continue in the surrounds and impact and is not considered highly significant, due to the disturbed and transformed nature of the development footprint. Any impacts to wetlands, the Kamfersdam or 500m buffer zone that directly impacts the water birds or indirectly impairs water quality and / or quantity could impact habitat utilised by sensitive fauna and must be managed as per the wetland specialist's recommendations.
Ecological Corridors and Buffers	The connectivity of the on-site wetlands to each other and through adjacent terrestrial habitat is good and provides fair habitat heterogeneity over a fairly limited area which is directly connected to the adjacent Kamfersdam. The site as a whole provides limited value to any significant ecological corridors, but the 500m buffer zone around the dam would contribute to the connectivity of terrestrial habitat around the Kamfersdam and provide additional protection to the Kamfersdam. Impact: No significant impacts will occur to any significant ecological corridors. Any development in the 500m buffer around the dam and the main reedy wetland unit in the south-eastern corner of the site will sever the habitat connectivity around the Kamfersdam, which is considered a significant impact as it could have severe consequences on the Lesser Flamingo breeding populations.
CBAs & ESAs	CBAs occur on the eastern part of the site with the remaining western area largely classified as "other natural areas". No ESAs occur on site; limited ESAs are associated with the mine quarries which have formed man-made aquatic habitats on the property west of site. The 2018 report recorded a solitary Red-Footed Falcon in this area, but the are is not considered of any specific conservation value to the species. Impact: The CBA incorporates mine quarries and transformed habitat units which provide little value as terrestrial fauna habitat or for long-term conservation of TOP fauna and impact to this western half of the CBA is not considered to be significant in terms of terrestrial fauna. The southern extent of the CBA is within the 500m buffer zone and should not be developed. The eastern half of the CBA supports disturbed bushveld habitat and contributes to the connectivity between the on-site wetlands to terrestrial habitat units and no development

Aspect	Fauna findings
	should be allowed in this part of the CBA.
IBAs	The Kamfersdam IBA is east and encroaches the south-east corner of the site. Impact: The site is upstream of the IBA and will contribute to impacts or threats faced by the IBA (poor water quality and flooding of the dam) if buffer zones are not respected and if the activities are not properly managed.
International Conservation	No RAMSAR wetlands or World Heritage Sites occur within 50km of the site; no impacts expected to international conservation areas.
PAs	The De Beers' Dronfield Nature Reserve lies north-east of the dam, associated with the Dronfield IBA east and adjacent to the Kamfersdam IBA. No PAs lie within 10km of site. Impact: The on-site development will not impact the Dronfield Nature reserve, but a slight influx of fauna could be expected as fauna flee development areas. This is not considered significant enough to cause any significant cumulative or residual impact to the reserve in the long term.
NPAES	No NPAES occur within 10km of site; no impacts are expected on NPAES.
SWSA	No SWSA occur within 10km of site; no impacts expected on SWSAs.
NFEPA features	No NFEPA catchments or rivers are within the impact zone of the proposed development. The site drains east via drainage lines and a stream into the Kamfersdam, east and adjacent to site. This dam is a Rank 2 NFEPA wetland and is the only breeding site for the Lesser Flamingo in South Africa. Impact: The site is upstream of the dam and clearing and construction activities will contribute to increased risk of contaminated and silt-loaded runoff and / or flooding of the dam if buffer zones are not respected and if the activities are not properly managed. This will be a highly significant impact if the breeding populations of Lesser Flamingos are impacted.

3.2 Fauna Species

The following is relevant in terms of vertebrate fauna species:

- Of the three listed bird SCCs:
  - The African Marsh Harrier (*Circus ranivorus*) cannot be excluded from the reedy vegetation of the stream and dam in the eastern corner of the property and this species forms the focus of the SEI assessment below. Although records in the past were scant and recent records are absent, any destruction of the reedy wetlands would result in loss of any potential existing individuals or prevent the recurrence of the species in the area.
- In terms of other TOP species recorded in the greater area or likely to occur on site:
  - The Maccoa Duck (*Oxyura maccoa*) is considered a foraging visitor and possible breeder at Kamfersdam. As an aquatic species its main habitat unit is largely off-site, but may be exposed to indirect impact through contaminated water runoff, which must be managed.
  - Although unlikely to utilise the Kamfersdam, as an opportunistic breeder during the rainy season, the Giant Bullfrog (*Pyxicephalus adspersus*) cannot be excluded from site or neighbouring areas from where the species may swarm onto site during the breeding season. Active monitoring and adaptive management measures must be implemented to reduce potential impact to the species.
- The Kamfersdam and associated IBA is a significant water bird habitat within the greater arid region. Many significant congregatory species and water birds utilise the dam. Furthermore the

Kamfersdam is the only breeding site for the Lesser Flamingo (*Phoenicopterus minor*) in South Africa and one of four regular sites in sub-Saharan Africa. The Maccoa Duck (*Oxyura maccoa*) may also be a potential breeder in the dam.

- The site is not within a significant area of faunal endemism.

In terms of invertebrates:

- No SCC trigger species are listed in the Environmental Screening Report.
- No significant TOP species populations are expected on site. Species that do occur on site will also occur in the adjacent landscapes and will persist in the area, especially in the Dronfield Nature Reserve, north of Kamfersdam where anthropogenic disturbance will be lower.

3.3 Site Ecological Importance and Overall Site Sensitivity

The site sensitivity was completed in the 2018 report and included the 500m buffer of the Kamfersdam for the flamingos, but the SEI assessment as prescribed by the species assessment guideline (SANBI, 2020) was not a prerequisite at that time.

The only trigger SCC that cannot be excluded is the African Marsh Harrier, the focus species for the site ecological importance (SEI) assessment (Table 6 and Plan 3) as per the of the Animal Species Environmental Assessment Guideline (SANBI, 2020). Although the Lesser Flamingo is not a listed SCC (SANBI, 2020), it has been incorporated into this SEI assessment as Kamfersdam is the only breeding site for this species in South Africa. The following is relevant:

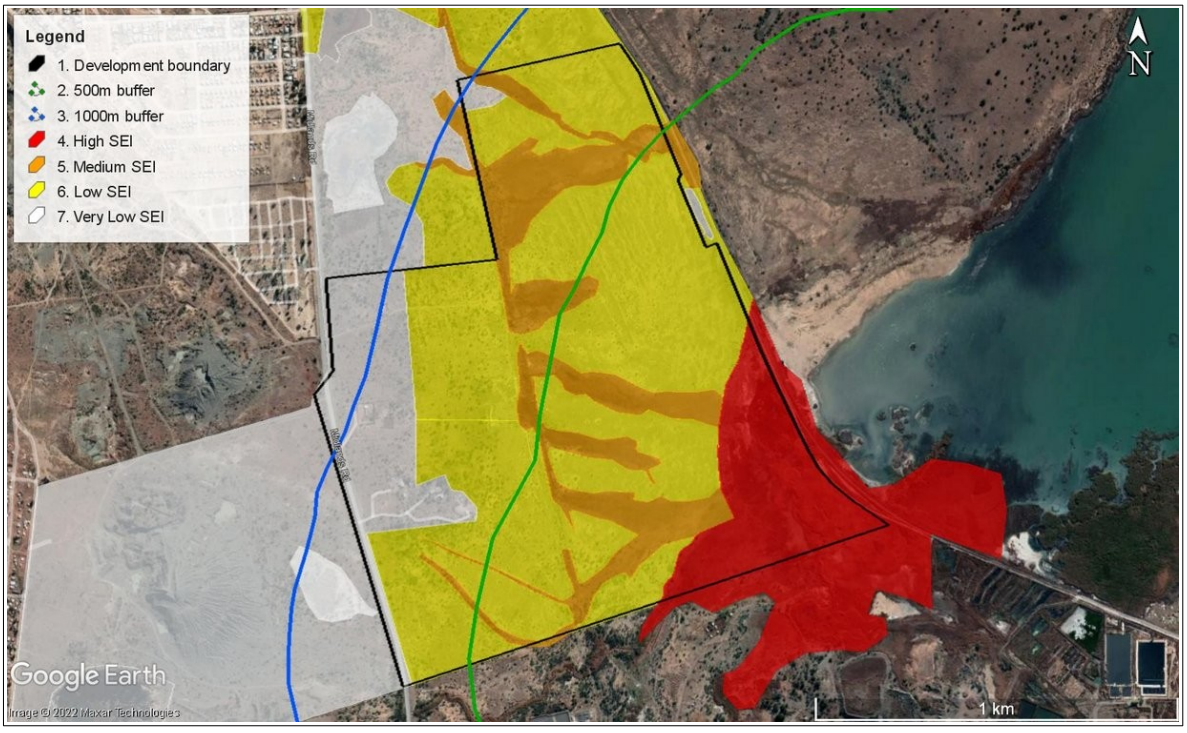
- Habitat units were extrapolated in part from the prior vegetation map (Bredenkamp *et al.* 2018) and Google Earth Imagery (June 2018). The updated wetland and flora reports should be consulted for final delineations of habitat units and their sensitivity plans incorporated into the overall terrestrial and aquatic biodiversity sensitivity plan.
- The disturbed shrubveld and degraded *Prosopis* shrubveld has been merged into a single bushveld habitat unit as no SCCs or TOPS would be associated specifically with either one or the other habitat unit.
- The reedy wetland, specifically around the Kamfersdam, has been evaluated as a separate habitat as this is the preferred habitat for the African Marsh Harrier.
- The quarries have also been mapped separately to other transformed / disturbed habitat units as these create man-made aquatic habitats.
- The estimated global population size for the African Marsh is unknown (IUCN); the SA numbers are <2500 mature individuals (Taylor *et al.*, 2015). A HIGH CI is given to the Reedy Wetlands unit.
- Although the Lesser Flamingo is only listed as Near Threatened (MEDIUM CI) the critical role of the Kamfersdam as a sole breeding site for the species in South Africa (and as a critical aquatic habitat for other species within the greater arid region), makes the dam critical in terms of conservation of the species and a HIGH CI is given to this aquatic habitat.
- Although wetlands on site and immediately connected to site cumulatively exceed 100ha (Very High FI), the wetlands are disconnected and not all the wetlands support reedy habitat. A HIGH FI is given to the Reedy Wetlands unit and Wetlands unit.
- The section of the dam on the property is minor, but as a habitat unit the Kamfersdam exceeds 100ha and a VERY HIGH FI is given to the Kamfersdam unit.
- As stated in the report, the African Marsh Harrier has not been observed on site since 1997 and even at that time it was estimated that only a couple of individuals were present. The

species is therefore clearly sensitive to surrounding anthropogenic impact and has a low likelihood of returning to site due to existing activities. However if the species still persists in the area then it has a higher tolerance to the surrounding activities. It is therefore difficult to rate the RR, and the MEDIUM rating has been selected for the Reedy Wetlands unit.

- The Lesser Flamingo is likely to continue using the dam. However, breeding of the species at the dam (approximate area of recent breeding indicated in Plan 3) will be impacted if the development proceeds within the 500m buffer or if the development does not actively manage runoff from site (impaired water quality and quantity which are listed threats for the Kamfersdam IBA). Declines in populations are expected, although cannot be fully quantified and a LOW RR is given to the Kamfersdam unit.

Table 6: Overall Site Ecological Importance (SEI) assessment

Evaluation unit	CI	FI	BI	RR	SEI
Disturbed bushveld	Low	Medium	Low	Medium	Low (Minimise & Restore)
Secondary grassland	Low	Medium	Low	Medium	Low (Minimise & Restore)
Wetlands	Medium	High	Medium	Medium	Medium (Minimise & Restore)
Reedy wetlands	High	High	High	Medium	High (Avoid & Minimise)
Kamfersdam	High	Very High	Very High	Low	Very High (Avoid)
Quarries	Low	Low	Low	High	Very Low (Minimise)
Transformed / disturbed	Very low	Very low	Very low	Very high	Very Low (Minimise)



Plan 3: Site Ecological Importance in terms of terrestrial fauna species of conservation concern overlaid onto Google Earth imagery (June 2018)

4. Fauna Impact Assessment & Management Plan

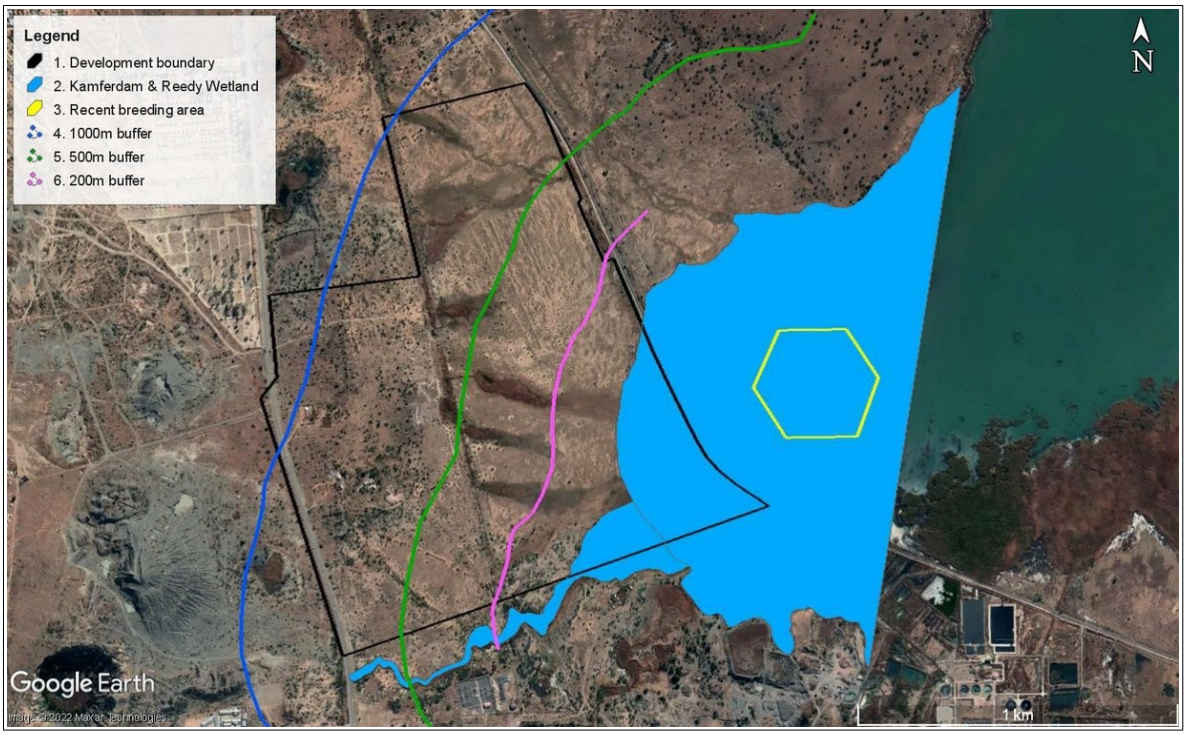
The impact assessment and proposed mitigation measures stipulated in the 2018 report are considered valid and address the main issues identified in terms of terrestrial fauna species and biodiversity. The impact assessment has therefore not been re-hashed, but the mitigation / management measures have been incorporated in the concluding Chapter 5 of this report.

4.1 Buffer Zones

The species assessment guidelines (SANBI, 2020) provide some guidelines on buffers for animal species. The avifauna species sensitive to disturbance is the relevant category in the guidelines in terms of the confirmed Lesser Flamingo and the potential African Marsh Harrier (included as a cautionary species). The entire Kamfersdam and the reedy wetlands in the south are relevant receptors as breeding and foraging areas for the two species. Noise and visual impacts are listed in the guidelines. Dust and particulate impacts also need consideration, but indirect impact to habitat (water levels and water quality) through poor quality runoff and increased quantity of runoff are considered significant impacts that must be managed in terms of this proposed development.

The likely buffer sizes are determined for high intensity impact (commercial and industrial development, removal of soil or vegetation, 10dB above ambient noise levels, overall noise level higher than 50dB) and low intensity impacts (housing and urban areas, tourism and recreational activities). High intensity impacts require a buffer of 500m or more; guidelines state a minimum of a 1000m for raptor nests and large-bodied SCCs, with smaller buffers for water birds (500m) and passerine nests (200m). The guidelines further stipulate that low intensity impacts may have smaller buffers, but at least 200m buffers for raptors in formally proclaimed conservation areas.

The approximate buffer zones from Kamfersdam and the reedy wetlands are indicated in Plan 4. The dam edge refers to the edge of the dam as represented in the wetland report and approximated in Plan 4. In terms of the proposed development, high intensity impact will be associated with the business node, taxi rank and high density residential areas where the bulk of the vegetation will be lost. Low intensity impacts are associated with the low-density residential areas. The 500m buffer must be respected as a minimum no-go area.



Plan 4: Kamfersdam edge and approximate buffer zones applicable to the development footprint overlaid onto Google Earth imagery (June, 2018)

An Environmental Officer (EO) must be appointed to ensure construction and operational activities are in line with environmental management plan and authorisation requirements, including the mitigation and management measures stipulated within the 2018 report and the additional measures stipulated in Chapter 5 of this report. Inspection, records of issues and corrective measures and sign-off will form part of the EO's responsibilities. In this specific circumstance, the ECO must be knowledgeable about conservation practices, ecology-related impacts and management and work closely with Kamfersdam conservation biologists.

5. Conclusion and Recommendations

In terms of all mapping in this report which has been estimated from Google Earth Imagery, a qualified GIS specialist must be contracted to finalise all the relevant areas and buffers as referred to in this report.

The 2018 report summarised their findings as follows (current author's comment underlined):

- Mammals and Herpetofauna (additional comment by current author underlined):
  - If any South African Hedgehogs (or other mammal species) are encountered or exposed during the construction phase and they do not freely move off site or are under direct threat by the activity, they should be removed and relocated to natural areas in the vicinity by permitted specialists.

- As an opportunistic breeder during the rainy season, the Giant Bullfrog (*Pyxicephalus adspersus*) cannot be excluded from site or neighbouring areas from where the species may swarm onto site during the breeding season. Active monitoring and adaptive management measures must be implemented to reduce potential impact to the species. The following is relevant:
  - If swarms are noted in construction areas consider ceasing activity in these areas until species resume hibernation. Activity periods are after rainfalls from November to January, inclusive.
  - Temporary walls can be erected to divert swarms away from construction areas, but monitoring must continue as species are adept burrowers.
- Measures will have to be taken to stop water pollution of the nearby Kamfersdam. Completing construction during the winter months would mitigate the environmental impact related to increased silt load and polluted runoff.
- The proposed 500m buffer will preserve the main herpetofauna habitats (terrestrial, wetland and arboreal habitat – natural rocky habitats do not occur in the proposed development area).
- The removal of invasive plants will increase the quality of habitat for animals.
- No alien invasive species are to be utilised in gardens and any formal landscaping must use local indigenous plants.
- Indigenous animals must not be disturbed, trapped, hunted or killed during the construction phase. Any animals that are inadvertently killed during earthmoving operations should be preserved as museum voucher specimens.
- Conservation-orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance.
- From a mammal and herpetofauna point of view, no objections can be raised against the proposed development.

- Birds (additional comment by current author underlined):
  - Development should be focused on areas of low sensitivity; in terms of the species guidelines (SANBI, 2020) areas identified as having Low and Very Low SEI should be targeted for development (taking into account the buffer zones and suitable development areas).
  - The spatial extent of construction activities must be minimized, and, as far as possible, must be restricted to the historically disturbed or transformed areas on which buildings, roads etc. will actually be located. Where isolated patches of undisturbed areas occur within the disturbed and transformed landscape, then these areas can also be incorporated into the development areas (pending the wetland and flora sensitivity mapping). Fragmented and small natural landscapes provide limited value for long-term conservation of terrestrial fauna.
  - Development should preferably make use of low-density stands (large erven and fewer stands).
    - The high density developments should only be targeted for areas outside the 1000m buffer zone to further secure the Kamfersdam buffer area.
  - Cluster development and avoid "spread" of settlements across landscape – labour and construction camps should preferably be located near town and not on site.
  - For all development areas, the hard-scaped footprint will be minimised and only that area impacted. All other areas will remain in tact; construction activities may not disturb vegetation or soil in these areas to provide for maximum infiltration as far as possible.

- The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area.
- Pollution, excess runoff and siltation of the dam and wetlands must be curbed. The following is recommended:
  - Great care must be taken that no storm water, pollutants, sewage or other waste pollute the area or enter the Kamfersdam during the construction or operational phases. Measures to rapidly deal with spills or floods must be put in place before construction commences.
  - Construction workers must be suitably trained to deal with any spills.
  - Storm water and sewer reticulation should make use of a bulk outfall system that is transported away from Kamfersdam – the development should not make use of the storm water and sewage system at Kamfersdam or any other system that lacks capacity.
  - A management and monitoring system should be implemented to carefully monitor the water quality and water levels of the Kamfersdam to benefit the ecological and habitat requirements of the water birds, in particular Lesser Flamingo.
  - Facilities to handle pollution and waste must be provided to residents, and adequate service delivery secured prior to construction.
  - All the wetland specialist's recommendations must be adhered to in order to prevent significant impact to wetlands and aquatic habitats.
  - The 500m buffer zone must, at least, be retained in its current state and kept clear of litter, waste and dumping of any material to ensure its buffering function is retained. No construction or earth material or any other material or equipment may be dumped or temporarily stored in the buffer zone.
- Construction activities should not take place when Lesser Flamingos are engaged in breeding activities, where the construction activities will cause noise, visual or dust-related impacts to the birds that could cause the birds to abandon nests or chicks.
- A noise assessment is required to further categorise high / low intensity impacts and proposed buffer zones as per appropriate noise levels stipulated in the guidelines.
  - The noise assessment will further inform the seasonality of the proposed construction activities. Construction activities will be permissible where they are in an appropriate direction and at a distance appropriate enough to ensure that the ambient noise levels at the dam edge (Plan 4) are not exceeded.
  - As per BirdLife South Africa and another recent report (Anderson, 2018), the Lesser Flamingo bred successfully on the South-Western mud flats of the dam, exposed by lower water levels at that time. The flamingos bred successfully and, in contrast to the historical breeding at the dam, completely unaided by any kind of human intervention. The area is next to the railway line and does suggest that the birds in Kamfersdam may have some tolerance to existing noise levels in that area and noise levels of ambient (SANBI guidelines consider less than Ambient + 10dB as low intensity impact) at the edge of the dam (Plan 4) is considered an adequate limit in terms of areas where construction activities must be seasonally restricted and which will be informed by the noise assessment.
  - This will be further dependent on the dust and emissions assessment and the visibility of the site to the birds, which will have to be screened by neutral camouflaged screens or shrubs, bushes and trees (will have the added benefit of noise reduction and reducing light pollution and trapping dust particulates).

        - Mitigation measures will need to consider noise reduction and noise buffers and the recommendations of the specialist must be implemented on site.
    - Disturbance by residents of birds breeding and foraging in the area should be minimized and controlled.
    - To avoid a loss of valley bottom wetland habitat, a 500m buffer is proposed. This area should be regarded as sensitive and a "no-go" area for any development or residents / contractors. Access to this area should be controlled and it should preferably be fenced.
    - The buffer zone is based on scientific literature and as a precautionary measure. However, the efficacy of mitigating against displacement of the Lesser Flamingo is unknown and should be monitored (and noted). Monitoring should be continuous (daily) during construction and monthly during operation. Monitoring of displacement in birds should be conducted by the ECO (daily) with frequent monitoring (on a regular basis – e.g. weekly) by delegates of the local conservation authority. If displacement is noticed, construction activities should cease, with the possibility that the layout plans will require drastic amendments.
    - Provide adequate briefing for site personnel and residents prior to construction / habitation.
    - Any bird nests that are found during the construction period must be reported to the Environmental Control Officer (ECO).
    - Create public awareness programmes.
    - Implement biodiversity monitoring protocols.
    - From an avifauna point of view, the 500m buffer zone must be retained as a no-go zone and the feasible development areas (further discussed below) consulted as part of the planning phase.

Additional measures of relevance include:

- Recommendations of the flora and aquatic biodiversity specialist must be implemented on site.
- Recommendation of the surface water specialists / hydrologists must be implemented on site.
- Do not feed wild life and ensure that all food and food waste, including domestic waste, is placed in sealed containers and not exposed on site. Ensure that the outside areas are kept clean and tidy and provide adequate waste removal services to prevent the attraction of rats and other alien scavenging species to the site.
- All resident / home-owners associations / body corporates should get involved with the Biodiversity Stewardship Programme proposed for the Kamfersdam which will further enforce land use and resident behaviour in the area (rules related to pets, lighting, noise, fireworks, drones) can be legally enforced.
- The managing body of the Kamfersdam IBA must be consulted during all phases of development and any additional mitigation measures incorporated into the EMP. Initial comment has been received from BirdLife SA and the following mitigation measures, that have not already been incorporated above, are also of relevance:
    - Alternative sites, or alternative layouts have not been provided, but the original fauna report very conclusively identified areas appropriate for development and not suitable for development (no-go areas). This summary report has further added to this and it is further discussed below.
    - Bird-life South Africa's requirements regarding the fencing and access restriction should be included in the development plan. They have recommended the construction of a boundary wall around the southern and eastern boundaries of the property, as well as a

ClearVu fence on the northern side of the railway line. BirdLife South Africa also requests to be involved in discussions about this aspect toward ensuring that there is a full commitment on the part of the developer and for the provision of potential exclusion mechanisms (such as the above) as a condition of authorisation. The following must however be noted:

- As much as it is understood that BirdLife SA wants to prevent access to the dam area to domesticated animals, the restriction of wildlife can be detrimental (such as restricting species from escaping veld fires). In terms of this, such fences / walls can only be considered if there is full connectivity and unlimited movement for fauna around the western side of the dam (the south-eastern area is dominated by wetlands and will not be utilised by terrestrial fauna). Otherwise, openings must be left for the movement of animals.
- Domesticated animals will need to be managed within the residential areas as pet-free or cat-free areas with specific regulations on the treatment of pets and associated penalties for failure to comply.
- Where ClearVu fencing or walls are erected then this must be immediately adjacent to the development line (for example the boundary of the eastern-most residential unit) and not between sections of open space.
- There will be no access (no gates) from the development footprint to the open space around the dam for residents or their domestic animals. The area is not to be utilised for walks or any other purpose by residents.
- Any overhead lines, electric fencing, or barbed wire utilised in the development footprint will be clearly marked with bird-flappers. This should also be done in conjunction with BirdLife South Africa representatives who will have the necessary local knowledge on the more successful deterrents to prevent collisions by birds.
- Understanding that many domesticated animals harm / kill the birds with no biological advantage (food or territory), it must also be understood that a certain level of predation is required to maintain healthy wild populations, and striving for predation-free populations will be harmful to the population in the long-term.

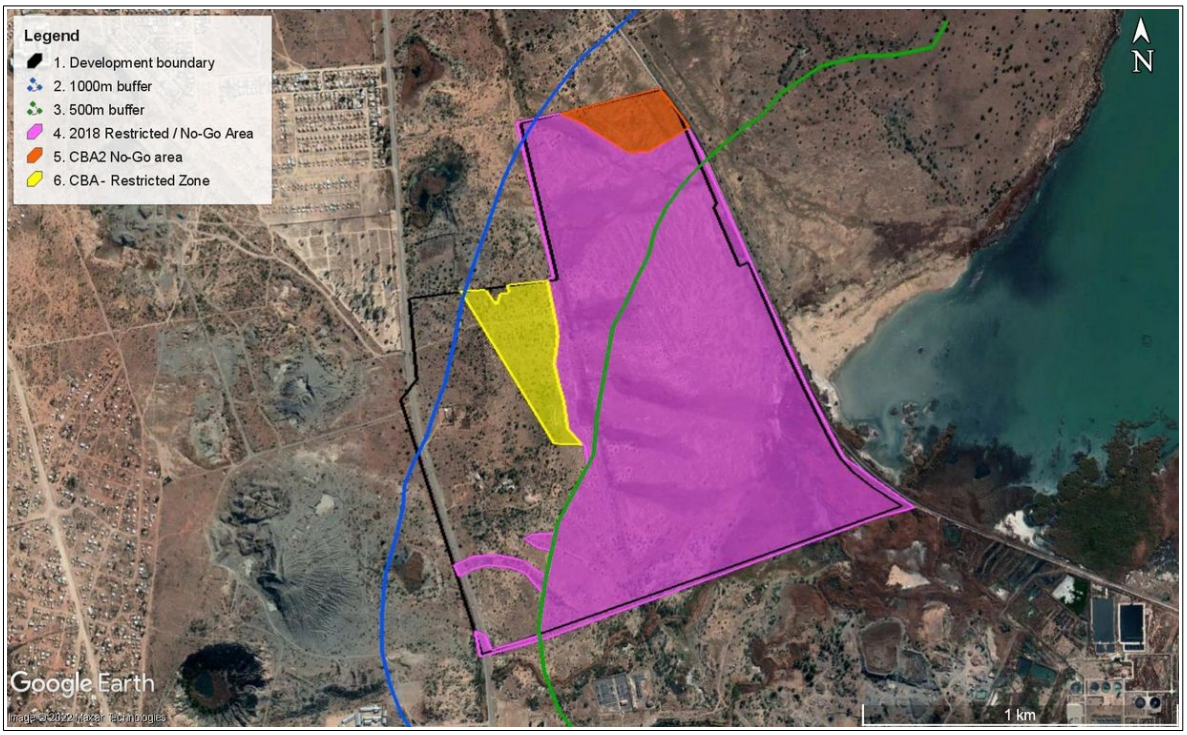
- The sewage is a severe issue in many parts of South Africa, not confined to Homevale Waste-Water Treatments Works and the Kamfersdam. It must be **stressed** that the sewage effluent contributes to the rich algal food source in the Kamfersdam for the Lesser Flamingo and also other aquatic birds (also understanding that too much sewage effluent could cause severe impact on algal food and exacerbate harmful bacteria) and must be carefully manage. That been said the Homevale sewage treatment facility is clearly overcapacity and the development cannot rely on the municipal facility and must consider alternatives as per the comments received from BirdLife South Africa. The sewage package plants must be considered, or the possibility of including a sewage treatment facility for the specific property as a small business should be considered. Any such systems must be constructed outside the 500m buffer zone.
- The lighting within the 500-1000m buffer zone will need to be carefully planned. Road lights, where needed, will be on low poles (at average shrub/tree height) with directional lights utilising the softer orange and yellow lights. Complexes will apply the same principals to their lighting and harsh and strong white lights will be avoided at all costs. Where possible lights will face away from the dam; where not diffuse light or a buffer between the light and dam will be considered (line of trees or screen).
- Conditions in complexes' codes of conducts / rules will have to include for conditions on the placement and use of external lighting and also ban the use of strobe lights and

fireworks within the complex grounds. Also, the use of drones within the complex or around the dam will have to be restricted to the non-breeding season only.

The development plan as depicted in the 2018 report is still considered relevant and valid and has been incorporated as a No-Go zone (Plan 5). In addition, it is proposed to exclude the northern-most CBA2 area as part of the No-Go zone.

A second CBA2 (yellow shaded area on Plan 5), which was not excluded from the 2018 development zone, occupies an area with secondary grassland and a highly transformed habitat in the savanna bushveld setting. This CBA will provide little in terms of terrestrial fauna conservation and low density development can be considered (pending wetland and flora sensitivity findings). Consideration should be given to establishing the site as a park and open space retaining the natural indigenous setting (garden, park, playground, braai area and entertainment area for the residential area) as far as possible.

The remaining area between the 500m and 1000m buffer zone should preferably be low density development (as per the 2018 report). Medium density development can be considered at the discretion of the Environmental Department for the 800m-1000m buffer zone, pending the findings of the noise study and ensuring that average ambient noise levels at the dam edge are not exceeded during construction and occupation. High density development should be targeted outside the 1000m buffer.



Plan 5: Updated development restriction plan overlaid onto Google Earth imagery (July 2021)

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6.2 Internet Sources

- ewt.org.za/reddata: Endangered Wildlife Trust for information pertaining to Red-listed mammals.
- inaturalist.org: For supplementary information on species distribution (accessed 2021-04-23).
- iucnredlist.org: For the IUCN Red List status of species.
- SANBI.org.za: For geographic information related to protected and sensitive ecosystems and environments, such as National Freshwater Priority Areas (NFEPA), Fish Sanctuaries and important catchments under NFEPA, Biodiversity and Conservation Plans, Important Bird Areas (IBA).
- saramsar.com: For information on SA RAMSAR sites

- vmus.adu.org.za/: Animal Demography Unit, Virtual Museum:
  - FitzPatrick Institute of African Ornithology (2021). LepiMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=LepiMAP on 2021-04-06.
  - FitzPatrick Institute of African Ornithology (2021). OdonataMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=OdonataMAP on 2021-04-06.
  - FitzPatrick Institute of African Ornithology (2021). ScorpionMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=ScorpionMAP on 2021-04-06.
  - FitzPatrick Institute of African Ornithology (2021). SpiderMAP Virtual Museum. Accessed at http://vmus.adu.org.za/?vm=SpiderMAP on 2021-04-06.
- whc.unesco.org: for information on SA World Heritage Site

Appendix A: CV, Qualification, SACNASP registration

Curriculum Vitae

BARBARA KASL

Personal Information

- Full Name: Barbara Kasl
- Qualifications: PhD (Animal, Plant and Environmental Science)
- E-mail: bk.zoology@gmail.com

Education – ±10 years

Tertiary Institute: University of the Witwatersrand

- 2002-2004: PhD (Animal, Plant and Environmental Sciences)
- 1999-2001: MSc (upgraded to PhD)
- 1998: B.Sc. Hon. (Zoology and Botany)
- 1995-1998: BSc (Zoology and Botany)

MSc AND PhD - South African Sugar Experiment Station (SAHRA) – On site research for MSc and PhD degree to determine habitat management strategies to control sugarcane borer (*Eldana saccharina*) in South African sugarcane (Mnt. Edgecombe, R. S. A.).

- Systematic and orderly work habits, which extended into the field, greenhouse and laboratory experiments, and associated data capturing.
- Gained competency on statistical programmes (Statistica, Origin and Excel).
- Data assessment, presentation and discussion of findings through written reports, presentations and posters.
- Good computer literacy and fully competent in MS Office.

Professional Experience – ±12 years

02/2017 - Current: Self-employed as fauna specialist & environmental consultant

- Fauna impact assessments and management and monitoring plans for various developments requiring NEMA authorisation.
- Terrestrial alien invasive fauna management plans.
- Working closely with ecologists on a variety of projects requiring specialists terrestrial fauna input.
- Gauteng & North West Provincial Biodiversity Outlook Reports – Terrestrial Fauna input.
- Generic environmental management plans for the Working for Ecosystems and Landcare projects (ongoing).
- Consulting on projects requiring Environmental Authorisation, including Mineral Authorisations.

- Review of various environmental documentation.

01/2008 – 02/2017: CABANGA CONCEPTS: Environmental Scientist / Principal Consultant

Requested to join the company as an environmental consultant specialising in all environmental authorisation processes and related documents. I am one of three principal members/shareholders of Cabanga Concepts.

- One of two **principal report reviewers** of external reports supplied by subcontractors [soil assessments, ecological (terrestrial and aquatic) assessments groundwater and surface water assessments, heritage and cultural resource assessments to name a few] and internal reports compiled by staff.
- Overall **project manager** regarding mineral rights application processes as well as environmental authorisation processes in South Africa, including **management of a team** of external (sub-consultants) and internal specialists. Including **overview of budget** and spending of the budget during the life of the project.
- **Compilation of proposals and associated budgets** for various environmental requirements made by new and existing clients.
- Principal EMP report compiler and reviewer for a **World Bank mining project** in Rwanda, including review of external specialist reports. Familiar with **IFC, Equator Principals.** .
- Compilation of **environmental applications and documents** required under the various environmental acts (environmental act, waste act, air quality act and water act) in South Africa. This includes scoping reports, impact assessment reports, environmental management plans, environmental monitoring reports, environmental pre-feasibility reports and bankable feasibility studies, integrated water and waste management plans, audit reports, due diligence assessments, reports on monitoring findings (water quality, dust levels, ambient noise).
- Compilation of various **audit reports** including EMP Audits, Legal Compliance Audits, Due Diligences, Integrated Water and Waste Management Plan Audits, Licence and Permitting Audits.
- Compilation of draft sensitivity plans for internal GIS specialists to refine.
- Compiled a detailed and comprehensive **alien invasive management plan** for principal invasive plant species in the Highveld region of South Africa.
- Keep up-to-date with **environmental legislation** and relevant application processes.
- Keep up-to-date on various **standards, norms** and management requirements released through official organisations and institutes.

09/2004 – 11/2007: DIGBY WELLS & ASSOCIATES (Now DIGBY WELLS ENVIRONMENTAL): Unit Manager / Acting Department Head: Biophysical Department

- Initially hired as entomologist and fauna specialist.
- Responsible in **completion of full fauna assessments** and eventually **compilation of overall ecological reports**.
- Received training in full **environmental authorisation processes** including compilation of EIA and EMP reports.
- Various **sub-Saharan environmental projects** included Etoile Mine in DRC, Randgold Mine in Mali, Valencia uranium green-field mine in Namibia, Mmamabula coal mine and power plant in Botswana.
- **Unit Manager** for the Ecology Unit including management of a flora and wetland specialist.
- **Acting Department Head** and management of the Biophysical Department which included the Ecology Unit and Atmospheric Environment Unit.

2001-2003: Various University and Temp Research Jobs in Entomology

2001: Private Tutor - Private tutoring for first year student.

1993-1998: Part-Time Jobs

Professional Memberships and Affiliations

- **2011 – current:** Registered Professional Environmental And Ecological Scientist
- **2015 – 2017**: EAPSA Certified Environmental Assessment Practitioner
- **1999, 2001 & 2008 – current:** Entomological Society of South Africa
- **2008-2011:** International Association for Impact Assessment
- **1998:** Zoological Society of Southern Africa

Courses Attended

April 2017:	Alien invasive species identification and management course in KZN organised through Kay Montgomery.
October 2010:	NEM: Air Quality Act course through IMBEWU Sustainability Legal Specialists (Pty) Ltd
August 2009:	NEMA and NEMWA course through ECOLAW
November 2007:	Environmental Impact Assessment Training
February/March 2007:	Project Management for Non-Project Managers Course through Astro Tech
September 2006:	Unilever Introduction to Managing Environmental Water Quality - Practical, Theoretical and Policy; through Institute for Water Research – RHODES University.
September 2005:	Non-credited course in River health and SASS5 rapid methodology of water quality assessment through NEPID Consultants
May 2005:	Snake Identification and Snakebite Treatment Course

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Barbara Kasl

Registration Number: 400257/09

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)
Environmental Science (Professional Natural Scientist)

Effective **11 November 2009** Expires **31 March 2022**

Botha
Chairperson

Chief Executive Officer

To verify this certificate scan this code

UNIVERSITY OF THE WITWATERSRAND,
JOHANNESBURG

At a congregation of the University

held on 25 November 2004

Barbara Kasl

was admitted to the Degree of

Doctor of Philosophy

SUID-AFRIKAANSE POLISIEDIENS
KLIËNTE DIENS SENTRUM
2010 -03- 22
SOUTH AFRICAN POLICE SERVICE

Dean, Faculty of Science

Vice-Chancellor and Principal

Registrar

Appendix B: 2018 Ecological Report (Bredenkamp *et al.*, 2018)