

Faunal and Aquatic Assessment
Enertrag Jessa Cluster (Jessa M, Jessa S and
Jessa Z)– Beaufort West
March 2022

ENERTRAG JESSA Grid Connection

Client: David Hoare Consulting (Pty) Ltd

Postnet Suite #116
Private Bag X025
Lynnwood Ridge, 0040
Tel: (012) 804 2281
Fax: 086 550 2053
Cellular: 083 284 5111
e-mail: dhoare@lantic.net



Dr Wynand Vlok (Pr. Sci. Nat. 400109/95)
1 Assegai Close
Acorn Creek
Somerset West
7130
082 200 5312
wynand.vlok@gmail.com

Declaration of Independence

The Environmental Impact Assessment Regulations (Appendix 6 of the EIA regulations R326 as amended), requires that certain information is included in specialist reports. The terms of reference, purpose of the report, methodologies, assumptions and limitations, impact assessment and mitigation (where relevant to the scope of work) and summaries of consultations (where applicable) are included within the main report. Other relevant information is set out below:

Expertise of author:

- Working in the field of ecology since 1996 and in specific vegetation related assessments since 2000.
- Worked in the field of freshwater ecology and wetlands since 2000.
- Involved with visual assessments since 2009.
- Is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Reg. No. 400109/95).

Declaration of independence:

BioAssets is an independent consultant and hereby declare that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by BioAssets is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

Disclosure:

BioAssets undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to BioAssets by the client, and in addition to information obtained during the course of this study, BioAssets present the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practise.



Dr Wynand Vlok

08 March 2022

Date

ASSUMPTIONS AND LIMITATIONS

Availability of baseline information

Baseline information for the study of the site was obtained from historic maps, photographs and reports. The desktop survey provided adequate baseline information for the area and therefore this was not a constraint.

Constraints

The survey was conducted during daytime only. The exception was at the location of camera traps, which were in place continuously for a number of weeks. All the different habitat types at the site was investigated and it was therefore possible to complete a rapid survey and obtain information on the habitats that are present and the site, or that are likely to occur there.

Bio-physical constraints

Weather conditions during the period were warm with a moderate wind blowing. The region has received limited rainfall prior to the site visit and the vegetation was mostly dry as the survey was conducted towards the end of the dry season.

There was no standing water in the veld (except the permanent wetlands) during the time of the survey and this will have obvious implications on the biodiversity (not applicable for this study) that are likely to occur in the area. Nevertheless, the conditions during the survey were suitable for a survey of this nature.

Confidentially constraints

There were no confidentiality constraints.

Implications for the study

All the different habitat types were observed during the field surveys. There is sufficient good quality data available in the literature that partially negates the negative effect that the type of survey had on the quality of the assessment.

It is unlikely that more surveys would alter the outcome of this study radically.

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1 INTRODUCTION

ENERTRAG South Africa (Pty) Ltd ('ESA') has proposed construction of three (3) Wind Energy Facilities (WEFs) and associated grid connection infrastructure projects near Beaufort West in the Western Cape Province of South Africa. The above-mentioned WEF and associated grid connection infrastructure projects form part of a greater renewable energy project known as the 'Jessa Cluster', being proposed by ESA near the town of Beaufort West.

The Jessa Cluster consists of three (3) WEFs (including associated infrastructure) as well as three (3) associated grid connection infrastructure projects, as follows:

- Jessa M WEF – DFFE Reference Number: To be Allocated;
- Jessa M Grid Connection – DFFE Reference Number: To be Allocated;
- Jessa S WEF – DFFE Reference Number: To be Allocated;
- Jessa S M Grid Connection – DFFE Reference Number: To be Allocated;
- Jessa Z WEF – DFFE Reference Number: To be Allocated; and
- Jessa Z Grid Connection – DFFE Reference Number: To be Allocated.

Separate Basic Assessment (BA) processes are being undertaken for the above-mentioned WEF and grid connection projects which make up the Jessa Cluster.

This scope of work include the aquatic biodiversity assessment and faunal survey (excluding the assessment of birds and bats) (Figure 1 and 2).

1.1 Terms of Reference

BioAssets CC was appointed by David Hoare Consulting (Pty) Ltd to conduct a desktop assessment, the aquatic survey (Present Ecological Status (PES), Ecological Importance and Sensitivity (EIS)) and faunal survey (excluding avifauna and bats), the reports, maps and the data files as requested.

1.2 Objectives of the Survey

The objectives were:

- The desktop study of the powerline corridors and the areas of the proposed WEF sites (including substation sites, 33kVline, access roads and maintenance buildings).
- The field investigation will aim to effectively determine the aquatic areas and the potential impacts of the proposed developments.
- A rapid faunal survey, including the setting of camera traps for the *Bunolagus monticularis* component.

1.3 The Study Area

The locality map for the study area is depicted in Figure 1 and 2. The study site falls within the Beaufort West Municipality and forms part of the Central Karoo District Municipality (Western Cape Province).

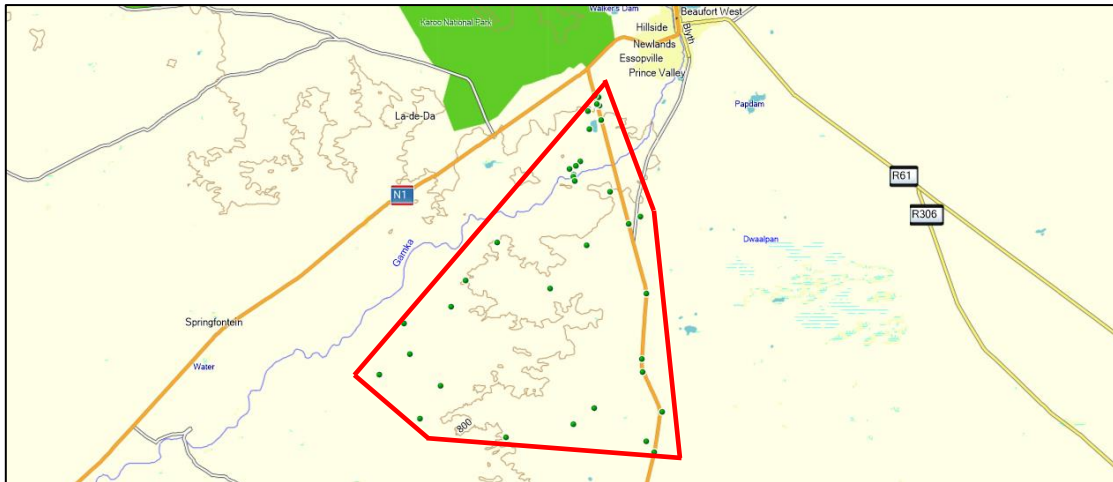


Figure 1: Broad outline of the project extent – green dots represent the outer boundaries of the affected farms with the red line just indication the larger study area.

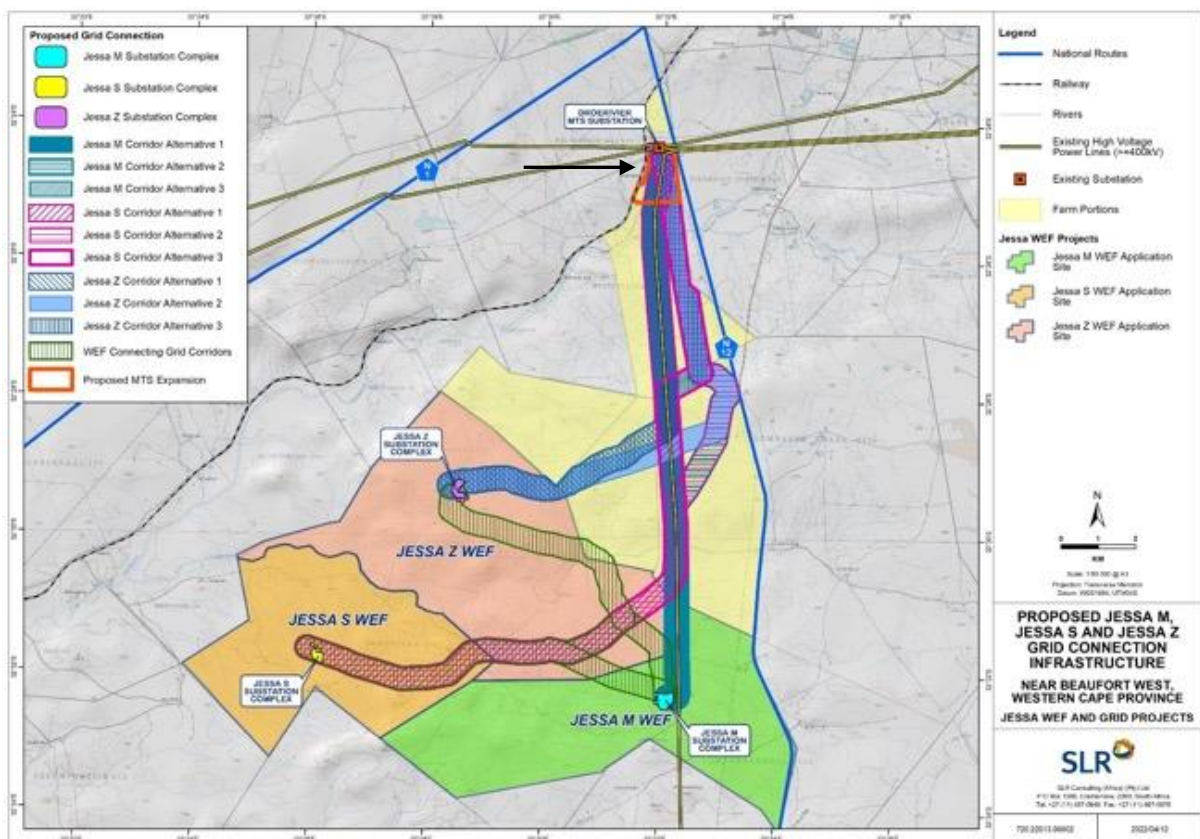


Figure 2: An aerial image of the study area showing the connecting power lines from the substation south of Beaufort West (Droërivier MTS - arrow), with the three wind energy farms to the south

2 METHODOLOGY

- Prior to the field surveys, the desktop assessment was conducted and included:
 - The screening tool (DFFE);
 - Relevant literature searches, reports and assessments (faunal component);
 - PES/EIS review related to the aquatic assessment;
 - The National Freshwater Ecosystem Priority Area (NFEPA) database (Figure 4)
 - “Fish Support Area and associated sub-quaternary catchment are fish sanctuaries in a good condition (A or B ecological category) were identified as FEPAs, and the whole associated sub-quaternary catchment is shown in dark green. The remaining fish sanctuaries in lower than an A or B ecological condition were identified as Fish Support Areas, and the associated sub-quaternary catchment is shown in medium green”;
 - “Upstream Management Areas, shown in very pale green, are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs and Fish Support Areas”; and
 - “The Phase 2 FEPAs were identified in moderately modified rivers (C ecological category), only in cases where it was not possible to meet biodiversity targets for river ecosystems in rivers that were still in good condition (A or B ecological category). River condition of these Phase 2 FEPAs should not be degraded further, as they may in future be considered for rehabilitation once FEPAs in good condition (A or B ecological category) are considered fully rehabilitated and well managed. Phase 2 FEPAs and their associated sub-quaternary catchments are shown in dark green with white dots”.
- A field survey was done to determine the current state of the habitat – taking into consideration the severe drought experienced in the area over the last few years (eight years of well below average rainfall);
- The aquatic biodiversity assessment focused on three rivers associated with the study area (Figure 3 and 4);
- For the mammals, reptiles, amphibians and other fauna the surveys comprised of day time surveys only (as part of the *Bunolagus monticularis* survey, cameras were deployed – some animals captured);
- Field work on fauna aimed to develop a broad characterisation of likely on-site faunal communities, with a particular focus on habitat suitability for species of conservation concern;
- Fauna sampling will be limited to opportunistic encounters and observations of faunal tracks, scats and burrows. No formal fauna trapping will be conducted with the exception of camera trapping (part of the *Bunolagus monticularis* study);
- No trapping for any small mammals, reptiles or scorpions were conducted;
- As part of the survey (highlighted in the screening tool assessment) cameras were deployed to determine if any *Bunolagus monticularis* is present. In the screening report it was noted that: “The Riverine Rabbit which is listed as Critically Endangered and is regarded as the most threatened mammal in South Africa is known to occur within the broad area. Based on the available information, the habitat at the site does not appear to be suitable for this species and there are no known records from the area, indicating that it is highly unlikely that it occurs

at the site. Should it occur in the area at all, it would most likely be associated with alluvial soils and riparian fringes along the Boeteka River”;

- According to the Endangered Wildlife Trust (EWT), the deployment of camera traps for an extended period is needed to determine if the proposed development falls within the mapped extant and that may have suitable Riverine Rabbit habitat present;
- As the project area falls within the distribution buffer of *Bunolagus monticularis*, the following approach is recommended:
 - Desktop mapping to evaluate the quality and extent of suitable habitat on site using aerial imagery.
 - It should be noted that habitat suitability will be confirmed and refined during the initial site visit.
 - Deployment of camera traps in accordance with the recommended Riverine Rabbit sampling protocols;
 - Due to the duration of that deployment, a mid-period check will be conducted to exchange memory cards and ensure battery functionality;
 - After the deployment period, the cameras will be collected and sorting and analysis of the images will be conducted; and
 - A chapter detailing the results of camera trapping and the potential implications for the project on Riverine Rabbit must be added for inclusion into the overall sensitivity mapping and terrestrial assessment of the study area.

3 DESCRIPTION OF THE ENVIRONMENT

- The Gamka River (secondary catchment J2) is a tributary of the Gourits River flowing in a south-westerly direction merging with the Dwyka River before flowing through the Groot Swartberge;
- In the Klein Karoo it merges with the Olifants River to become the Gourits River, before meeting the Groot River after which it dissects the Langeberg Mountains;
- The Gourits River crosses the coastal plain before draining into the Indian Ocean near Gouritsmond;
- The study area falls mainly within quaternary catchment J21B with a very small portion to the north falling within J21A and a small section in the south within J21C;
- No fish have been sampled in the Gamka River, while approximately 14 macro-invertebrate families are expected.
 - The Kwagga River is a tributary of the Gamka River merging in the north (J21A – Figure 3)
 - The Stols River is a smaller tributary joining from the northwest (J21A – Figure 3);
- The Boeteka River drains towards the west into the Gamka River (central section of the study area) and the 8 larger tributaries (3 from the north and 5 from the south) (J21B – Figure 3);
- The Steyns River is another tributary of the Gamka River that flows from the north and its confluence is to the north of the confluence with the Boeteka River (J21B – Figure 3);
- In the southern section of the study area (J21C) two smaller rivers join the Gamka River i.e. the Put and the Ongeluks rivers (Figure 3);

- From an ecological perspective, it is clear that the Gamka River and the larger tributaries provide refuge, migration corridors and habitat for foraging, resting and residence to a wide variety of mammals, reptiles and birds;
- The larger channel of the Gamka River is meandering with a sometimes wide and well defined channel (some braiding present in some areas) with a well-defined marginal and non-marginal zone;
- The marginal zone and in some areas the adjacent non-marginal areas consists of a vegetated thorn woodland with a variety of terrestrial shrubs;
- The lower section below the confluence of the Gamka and Boeteka rivers are listed as a “Critical Biodiversity Area”;
- The larger study area have numerous smaller ephemeral drainage lines present and these are too numerous to map;
- When looking at the Present ecological State of the different rivers, it is clear that some variation is present (Table 1);
- The Boeteka River passing through the study area is classed as “C” (Present Ecological State), with a “High” Ecological Importance. The area just above and below the confluence of the Gamka and Boeteka rivers are classed as “B” with the Ecological Importance rated as “High” and the Ecological Sensitivity as “Very High”;



Figure 3: The different rivers in the study area – the Gamka River in purple, with the tributaries map in blue.

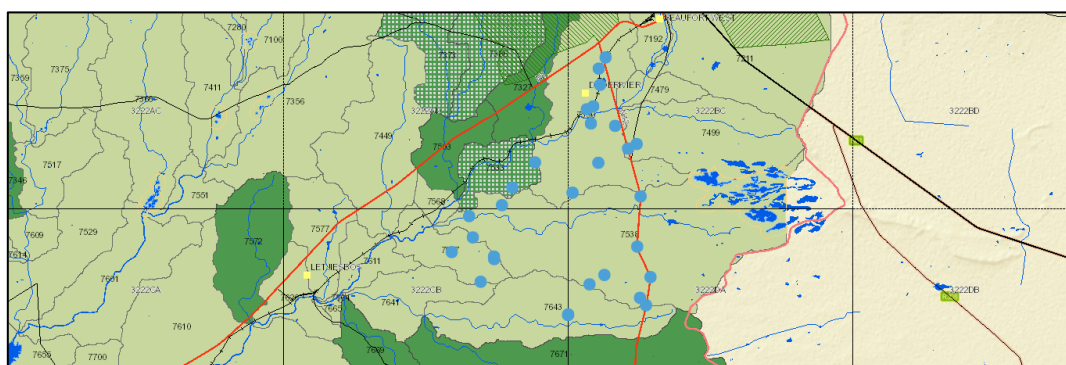


Figure 4: The NFEPA map associated with the study area – the blue dots represent the farm boundaries of the affected portions for the proposed development, the “upstream areas” in pale green, the “Phase 2 FEPA” in the dotted areas and the “fish support areas” in green.

4 RESULTS and DISCUSSION

4.1 Water resources

- With the recent long drought period experienced prior to the study, the Present Ecological State (PES) of the rivers and streams are maintained.
 - It was clear during the study that in areas the marginal and riparian vegetation were negatively affected by the current climatic conditions (extended drought).
 - One must further take into consideration that the region is prone to the drought/wet cycles and that the vegetation is adapted to the harsh environmental conditions.
 - Once the wet cycle return, it will be possible to complete an assessment that will indicate the current integrity of the riverine habitat.
- With regards to the National Freshwater Ecosystem Priority Area (NFEPA), the Gamka River falls partially in a Phase2 FEPA (Figure 3 – dotted area) with the larger percentage of the study area (pale green area) considered as an upstream support area for the system downstream. A small part (green area) is considered to be a fish support area and are the lower sections of the Stols and Steyns rivers just upstream of their confluence with the Gamka River (Figure 3 and 4).
 - Impacts on the NFEPA status of the river system downstream (Gamka River) will be related to siltation and limited water quality changes from the numerous ephemeral streams associated with the study area.
 - The likelihood of the erosion and siltation is high with the cutting and filling of new roads to accommodate the long transporter trucks and trailers needed to deliver the turbine pylons and blades.
- The main channel of the Gamka River is only impacted in the north (near the Droërivier MTS) (Figure 2) where the proposed new powerlines will cross to the site south.
 - It is recommended that no crossing of the Gamka River must be built for the construction of the proposed new powerlines.
 - Aerial stringing at the river crossing is recommended.
- In the west, the site, will be approximately 1.5 km from the Gamka River (Figure 2).
- The Boeteka River will be straddled by the site (Figure 2).
 - The main concern here will be the potential number of access roads constructed to the different zones in the proposed development area.
 - Apart from the main channel of the Boeteka River that will be affected, the numerous ephemeral drainage lines will be impacted.
 - The concern is the need for long, straight access to facilitate the transport of the turbine blades to the numerous turbine sites.
 - This will require the filling and cutting of troughs and ridges to ensure the long vehicles get access.
 - These activities will have a negative impact on the surface flow of water towards the water resources.
 - If water is channelled to a single culvert in long sections of the roads, erosion will occur downstream of the pinch point.
 - In addition, the distribution of water across the landscape will be disrupted and can result in loss of the natural vegetation in the area.

- Some of the larger tributaries of the Gamka and Boeteka river are directly impacted by the proposed development of the Grid Connections – including the numerous smaller ephemeral drainage lines that are present in the study area.
- Potential impacts on the Gamka River is erosion and siltation related to the river crossing (if constructed) on the farm Weltevreden south of the Droërivier MTS.
- The potential impacts to the Boeteka River include erosion, siltation, habitat modification (in-stream and stream banks) and loss of the riparian vegetation (numerous river and stream crossings to be constructed for transport of wind turbines).
- In the south of the grid, activities can have an impact on the Ongeluksrivier (farm Boeteka) and will include erosion and siltation, as some of the tributaries to this river are associated with the mountains in this area.

4.2 Faunal assessment (excluding bats and avifauna)

- The faunal assessment was conducted during day-time surveys and observations and signs of animals (burrows, scat and tracks) were noted.
- In addition, the images from the trap cameras (primarily deployed for the *Bunolagus monticularis* assessment) were viewed to determine if any additional species were seen.

4.2.1 Mammals

The following species are red data listed and a short discussion on each is given to indicate current and potential future threats if the proposed development is allowed.

- *Hippotragus equinus* (Roan Antelope) (EN). Although the species is listed for the study area, it must be noted that this area falls outside its natural distribution range and its presence are related to stocking by farmers for commercial purposes. Threats to the species in its natural distribution range is over exploitation and loss of migration opportunities (fences) between subpopulations (Kruger *et al.*, 2016).
- *Hippotragus niger niger* (Sable Antelope) (VU). A similar situation exist with this species, as the study area falls well outside its natural distribution range (Parrini *et al.*, 2016) and any animals present were introduced for commercial purposes.
- *Pelea capreolus* (Grey Rhebok) (NT). The species utilise rocky areas, slopes of mountain and hills and the plateau areas associated with the mountains and hills. The population is believed to be in decline and loss of habitat and illegal hunting are some of the most important contributing factors.
- *Felis nigripes* (Black-footed Cat) (VU). This species is a ground dwelling cat that is strictly crepuscular and nocturnal and are active throughout the night. It utilises the open short grassland and karroo shrub habitat and prefers to make its den in termite mounds (will use old burrows if present). Threats include, but not limited to, intraguild predation, diseases, declining Springhare populations and unsuitable farming practices. In the Karroo area, the species have a very low population density and therefore will be more vulnerable to the listed threats, especially a loss of foraging and living habitat and the associated loss of food. The species is known to be a prolific hunter of all rodents (Wilson *et al.*, 2016).
- *Crocuta crocuta* (Spotted Hyaena) (NT). The study area falls within the historic distribution range of the species. Long term hunting has dessimated the broad distribution and for many years the last remaining populations where restricted to large conservation areas in the north and northeast of South Africa. Some re-introduction have been done and the animals are contained in protected areas (some escapes occur). For the natural populations, threats are

persecution, poaching for the traditional medicine trade and trophy hunting (mostly illegal) (Hunnicut et al., 2016).

- *Hyaena brunnea* (Brown Hyaena) (NT). The species is widespread across southern Africa and is found in the following habitat types: desert areas with annual rainfall less than 100 mm (particularly along the Skeleton Coast in Namibia), semi-desert, open scrub and open woodland savannah. Outside protected areas it comes into conflict with humans where they are often shot, poisoned, trapped, snared and hunted with dogs in an attempt to reduce livestock predation events (Yarnell et al., 2016).
- *Bunolagus monticularis* (Riverine Rabbit) (CR). The study area falls outside the known (documented) distribution range of the species. The species inhabits dense the riparian growth along seasonal rivers in the central Karoo (Nama-Karoo shrubland) and prefer areas where the riverine vegetation occurs on alluvial soils adjacent to these water courses rivers. The habitat is highly fragmented and transformed. The main threats to the species are habitat quantity and quality decline as a result of overgrazing by livestock which results in reduced cover from predators and lack of sufficient forage. In addition the over grazing is changing the plant community structure (poor food resources as result) and a reduction in streamflow (construction of dams upstream) has reduced habitat quality (Collins et al., 2016).

As the farm is a working game farm, a number of species of Bovidae were observed and include *Antidorcas marsupialis* (Springbok), *Oryx gazelle* (Gemsbok), *Pelea capreolus* (Grey Rhebok) (NT), *Raphicerus campestris* (Steenbok), *Redunca fulvorufula* (Mountain Reedbuck), *Sylvicapra grimmia* (Common Duiker), *Taurotragus oryx* (Common Eland), *Hippotragus niger niger* (Roan Antelope) (VU - introduced to the area) and *Tragelaphus strepsiceros* (Greater Kudu). Other mammals noted were *Procavia capensis* (Rock Hyrax), *Chlorocebus pygerythrus* (Vervet Monkey), *Papio ursinus* (Chacma Baboon), *Cynictis penicillata* (Yellow Mongoose), *Herpestes pulverulentus* (Cape Grey Mongoose), *Suricata suricatta* (Meerkat), *Ictonyx striatus* (Striped Polecat) and *Lepus saxatilis* (Scrub Hare).

- For all species, the impact during construction will be related to increased activity (noise and traffic), illegal hunting (mostly snares), dust settling on plants (food sources), light pollution that can affect insect behaviour and a general loss of habitat. One must further factor in the long-term effects of climate change on the region which can affect the total food web in the area.
 - The isolated nature of the *Hippotragus niger niger* (Roan Antelope) and other similar species is a threat to inbreeding. Small populations limit the genepool and therefore inbreeding is a real problem if genetic material is not constantly exchanged. Only one (1) animal was noted in the camera trap footage.
 - For *Pelea capreolus* (Grey Rhebok) the development of wind turbine sites on the mountain ridges will result in a loss of habitat. In addition, there is no indication what the noise factor will be on a secretive species such as this.
 - For *Felis nigripes* (Black-footed Cat), impacts to these animals will be related to a negative impact of food resources and habitat as a result of access roads for the large transporter vehicles. The associated dust pollution can further impact on the species food resources.
 - *Crocuta crocuta* (Spotted Hyaena) can occur (introduced in the area) on site, but it is highly unlikely, as the areas where they are introduced are normally well fenced to keep the predators and other valued species contained.

- The natural distribution of *Hyaena brunnea* (Brown Hyaena) is over the larger region and free roaming animals are still present. Threats during the development of the proposed project will be loss of habitat and food resources (minimal).
- For *Bunolagus monticularis* (Riverine Rabbit) a detailed assessment was conducted and more detail is supplied in this assessment. When looking at the potential habitat and food sources, it is clear that the study site doesn't have the best resources to ensure that the species will occur. Concerns with its potential habitat is the impacts to drainage lines and river riparian vegetation when constructing the wide haul roads for the transporter vehicles.
- Some of the photographs (camera traps set for *Bunolagus monticularis* survey) showed rodents, but it is difficult to identify to species level. The rodents observed include some Muridae (most likely *Desmodillus auricularis*), Macroscelididae (most likely *Macroscelides proboscideus*) and Nesomyidae.
 - The construction of the wide roads to accommodate the long transport trucks and trailers will impact on habitat for the numerous rodents (important food resource to e.g. birds of prey and small canine species in the area (e.g. jackal, fox and cats).
- Activities of other mammals observed include *Cryptomys hottentotus* (Common Mole-rat), *Otocyon megalotis* (Bat-eared Fox), *Vulpes chama* (Cape Fox), *Proteles cristata* (Aardwolf) and *Hystrix africaeaustralis* (Porcupine) and the scat and burrows of a number of rodents were noted.
 - Impacts to these organisms will include loss of habitat and food resources.

3.2.2 Amphibians

- Due to the extreme dry conditions, no amphibians were observed.
- Most of the species listed, need flowing water or standing pools for a few weeks to ensure its life cycle can be completed. With the exception of a few small weirs in the Boeteka River, no other suitable habitat was noted in the study area.
 - The main impacts that can be listed to the frogs will be water quality changes e.g. siltation as a result of stream crossings (high probability) – high traffic volumes during the construction phase and water quality changes (low probability).
 - Although *Pyxicephalus adspersus* (African Bullfrog) is listed as possibly being present, no suitable habitat was observed during the survey. The species require shallow, grassy pans that will have water for at least 30 days (Minter et al., 2004).
 - The other species will be associated with the Gamka and Boeteka rivers.
 - If the developments are restricted to the higher areas (placement of wind turbines) impacts will be associated with river crossings e.g. erosion and siltation.
 - Some of the other species that are listed need the flowing habitats:
 - *Amietia fuscigula* (Cape River Frog) needs permanent water as breeding takes place throughout the year (Channing, 2004a) and its presence will therefore be very low on the study site.
 - Both *Cacosternum boettgeri* (Boettger's Caco) and *C. karoicum* (Karoo Caco) need seasonal water. *C. boettgeri* aestivates in mud banks, mud cracks, burrows of other animals, disused termitaria and under stones and needs 3 weeks to complete its life cycle (multiple spawning events if conditions allow) (Scott, 2004a). In the case of *C. karoicum* is an opportunistic breeder, taking advantage of rainfall of sufficient magnitude, regardless of the season in which it occurs and needs approximately 30 days to complete the life cycle in

the water environment (Scott, 2004b). A low to moderate probability of occurring in the Boeteka River and some of the weirs in it.

- *Tomopterna delalandii* (Delalande's Sand Frog) occurs along the seasonal streams or artificial impoundments (earth dams) and after aestivating underground during the dry season it will emerge with the onset of rains to spawn (Channing, 2004b). There is a low to moderate change of the species occurring in the Boeteka River and some of the earth impoundments on the study site.

3.2.3 Reptiles

- *Goggia braacki* (Karoo Dwarf Leaf-toed Gecko) (NT). The species occur in rocky areas in cracks and under the flakes of exfoliating rock. Threats are the loss of habitat related to grazing, as it occurs only in a narrow band in its distribution range (Bates et al., 2014). The study sites falls outside its formal distribution range to the north (Karoo National Park), but it can occur and therefore the construction of wind turbines on the hills and mountains will result in a potential loss of habitat. In addition, as many other nocturnal animals, it is attracted to lights where insects are present and this will increase predator pressure on the species.
- *Chersobius boulengeri* (Karoo Padloper) (EN). The species was listed as "Near Threatened" in 2014 (SARCA) but after a review the status was changed to "Endangered" (SANBI, 2016). Surveys conducted between 2005 and 2017 indicated that most localities (30 of 35) where populations previously occurred no longer harbour viable populations and that the species is no longer being found by farmers. Habitat destruction and degradation maps of South Africa show that nearly 50% of the range of *C. boulengeri* is either moderately or severely degraded, which may explain the species' decline. *Chersobius boulengeri* is associated with rocky outcrops in specific vegetation types, qualifying it as a habitat specialist, which increases its risk of extinction. The documented population declines will be exacerbated by the effects of climate change and associated vegetation change (Hofmeyer et al., 2017). It is therefore clear that the construction of the turbines and access roads will have a potential impact of the habitat of the species.
- The most specimens were observed in the rocky outcrops a mountain areas of the study with a few on the open sandy karroo areas and include *Agama aculeata aculeata* (Ground Agama), *Agama atra* (Southern Rock Agama), *Pedioplanis spp. (laticeps?)* (Cape Sand Lizard), *Pedioplanis lineocellata pulchella* (Common Sand Lizard), *Pedioplanis namaquensis* (Namaqua Sand Lizard), *Trachylepis sulcata sulcata* (Western Rock Skink), *Trachylepis variegata* (Variegated Skink) and *Stigmochelys pardalis* (Leopard Tortoise).
 - The rocky habitat types are the areas targeted for the construction of the turbines and will impact on the reptiles, including the snakes.
 - These habitats are important refugia and foraging areas as the prey of the reptiles mostly occur in these areas as well.
 - It must be noted that the mountains and rocky outcrops are the most important habitat for most of the reptiles e.g. crevices for habitation.
 - In addition, broad access roads will be constructed for the long vehicles and cranes for the transport and assembly of the turbines.
 - The activities will have a negative impact on the reptiles, as there will be habitat destruction (low impact).

4.3 *Bunolagus monticularis* (Riverine Rabbit) assessment

- During the desktop assessment, the potential habitat areas (related to suitable vegetation along the rivers) were identified.
- During the initial assessment of the habitat during the field survey, the potential sites/areas where *Bunolagus monticularis* may occur were visited.
- Three possible sites were identified (Figure 5):
 - Site one in the northwest of the study area near the western boundary of the proposed development – on the Boeteka River, at a permanent water point.
 - Site two was in a Boeteka River between Site 1 and 3 – dense vegetation and possible water.
 - Site 3 near the farm house on the farm Boeteka – on the Boeteka River with dense vegetation and a water source.
- Cameras were placed at these sites and left to determine if any *Bunolagus monticularis* were present.
- After the 5-week deployment, the captured images were downloaded and evaluated.
- No *Bunolagus monticularis* were seen – the Leporidae observed were all *Lepus saxatilis*.
- Although the screening tool listed the area as potential habitat for *Bunolagus monticularis*, the conclusion at this point is that the habitat associated with the proposed project is not suitable for the endangered species.
 - It however doesn't mean that the species are not present, but under the current climatic conditions, it was clear that suitable foraging material was absent along most of the water courses.
 - The development for the wind turbines at present exclude any areas near the river courses and will therefore have no direct impact on *Bunolagus monticularis*.
 - The impacts to the Boeteka River (most probable habitat) will be at crossings, but it will be important to lower any habitat modification (e.g. erosion and vegetation loss).



Figure 5: Aerial image of the three sites selected to deploy cameras traps to determine the presence/absence of *Bunolagus monticularis*.

5 GENERAL COMMENTS and RECOMMENDATIONS

5.1 Water resources

- With the recent long drought period experienced prior to the study, the Present Ecological State (PES) of the rivers and streams are maintained and it is recommended that if the project continues, a detailed assessment that will indicate the current integrity of the riverine habitat.
 - PES for the Boeteka River – maintained as class “C”, with a “High” Ecological Importance.
 - Above and below the confluence of the Gamka and Boeteka rivers - PES class “B”, Ecological Importance “High” and the Ecological Sensitivity “Very High”.
- NFEPA rating of the Gamka River is a Phase2 FEPA with the area to the northeast classified as an “upstream support area” for the river system downstream. A small section is rated as a “fish support area” - sections of the Stols and Steyns rivers just upstream of their confluence with the Gamka River.
 - Impacts on the NFEPA status of the river system downstream (Gamka River) will be related to siltation and limited water quality changes from the numerous ephemeral streams associated with the study area.
 - The likelihood of the erosion and siltation is high with the cutting and filling of new roads to accommodate the long transporter trucks and trailers needed to deliver the turbine pylons and blades.
- The main channel of the Gamka River is only impacted in the north (near the Droërivier MTS) where the proposed new powerlines will cross to the site south.
 - It is recommended that no crossing of the Gamka River must be built for the construction of the proposed new powerlines.
 - Aerial stringing at the river crossing is recommended.
- The Boeteka River will be straddled by the site.
 - Concern is the potential number of access roads constructed to the different zones and will include the main channel of the Boeteka River and the numerous ephemeral drainage lines that feeds into this channel.
 - The long, straight access to facilitate the transport of the turbine blades to the numerous turbine sites will impact the habitat and water courses, as this will require the filling and cutting of troughs and ridges to ensure the long vehicles get access.
 - This will have a negative impact on the surface flow of water drainage channels and where water is channelled to a single culvert in long sections of the roads, erosion will occur downstream of the pinch point.
 - The distribution of water across the landscape will be disrupted and can result in loss of the natural vegetation in the area.
- The potential impacts to the Boeteka River include erosion, siltation, habitat modification (in-stream and stream banks) and loss of the riparian vegetation (numerous river and stream crossings to be constructed for transport of wind turbines).
- In the south of the WEF grid, activities can have an impact on the Ongelukrivier (farm Boeteka) and will include erosion and siltation, as some of the tributaries to this river are associated with the mountains in this area.

5.2 Faunal assessment (excluding bats and avifauna)

5.2.1 Mammals

When evaluating the red data species, the following can be noted:

- As only one *Hippotragus niger niger* (Sable Antelope) was noted (camera trap) it is clear that this introduced species is not of concern to the conservation of the species.
- When assessing impacts on *Pelea capreolus* (Grey Rhebok), the development of wind turbine sites on the mountain ridges will result in a loss of habitat.
- Impacts to *Felis nigripes* (Black-footed Cat) will be related to a negative impact of food resources and habitat as a result of access roads for the large transporter vehicles. The associated dust pollution can further impact on the species food resources.
- *Crocuta crocuta* (Spotted Hyaena) can occur (introduced in the area) on site, but it is highly unlikely.
- *Hyaena brunnea* (Brown Hyaena) still occur (free roaming animals) and threats during the development of the proposed project will be loss of habitat and food resources (minimal).
- As no *Bunolagus monticularis* (Riverine Rabbit) were observed during the camera trapping programme, the impact is considered very low. The impacts if the species are present (highly unlikely) will relate to loss of potential habitat and food sources. Habitat loss will be related to impacts to drainage lines and river riparian vegetation when constructing the wide haul roads for the transporter vehicles.

5.2.2 Amphibians

- Due to the extreme dry conditions, no amphibians were observed. Most of the species listed, need flowing water or standing pools for a few weeks to ensure its life cycle can be completed. With the exception of a few small weirs in the Boeteka River, no other suitable habitat was noted in the study area.

5.2.3 Reptiles

- Two red data species are listed, i.e. *Goggia braacki* (Karoo Dwarf Leaf-toed Gecko) (NT) and *Chersobius boulengeri* (Karoo Padloper) (EN). The development will have a negative impacts to habitat and food resources as both species require rocky areas for foraging and habitation. The proposed wind turbines and access roads will have a direct impact on these areas.

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Table 1: From the Present Ecological State (PES) information the streams and rivers associated with the quaternary catchments J21A, J21 B and J21C.

SQ Reach	J21A-07479	J21A-07499	J21A-07390	J21A - 07327	J21B-07533	J21B-07503	J21B-07568	J21B-07538	J21B-07597	J21B-07611	J21C-07641	J21C-07643	J21D-07665
River name	Gamka	Kwagga	Gamka	Stols	Gamka	Steyns	Gamka	Boeteka	Gamka	Gamka	Put	Ongeluks	Gamka
Mean EI Class	High	High	High	Very High	High	High	High	High	High	High	High	High	High
Max EI Class	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High
Ecological Importance: Riparian-Wetland Vegetation, Vertebrates (Excl. Fish) Rating	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High
Ecological Importance: Riparian-Wetland-Instream Macroinvertebrate (Excluding Fish)	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area	Formal Conservation Area	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area	Critical Biodiversity Area
Riparian-Wetland Natural Vegetation Rating Based on % Natural Vegetation in 500m (100%=5)	High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High
Riparian-Wetland Natural Vegetation Importance Based on Expert Rating	High	High	High	High	High	High	High	Low	High	High	High	High	High
Ecological Importance: Riparian-Wetland Vegetation	Least disturbed braided river with well-established marginal and non-marginal vegetation. Non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.	Least disturbed naturally seasonal channel. Non-marginal zone dominated by <i>Vachellia karroo</i> .	Least disturbed braided river with well-established marginal and non-marginal vegetation. The non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.	Near Relatively undisturbed river with well-established marginal and non-marginal vegetation. The non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.	Least disturbed braided river with well-established marginal and non-marginal vegetation. The non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.	Extrapolated.	Least disturbed braided river with well-established marginal and non-marginal vegetation. The non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.	Non-marginal a narrow band along the channel margin as has been cleared for olive groves. Where present consists of <i>Searsia glauca</i> and <i>Vachellia karroo</i> .	Least disturbed braided river with well-established marginal and non-marginal vegetation. The non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.	Least disturbed braided river with well-established marginal and non-marginal vegetation. The non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.	A least disturbed seasonal channel with a well vegetated marginal and non-marginal zone.	The non-marginal zone consists of <i>Vachellia karroo</i> and <i>Searsia glauca</i> in patches and terrestrial grasses and karoid shrubs where absent.	Least disturbed braided river with well-established marginal and non-marginal vegetation. The non-marginal consists of a densely vegetated mixed thorn tree woodlands and terrestrial shrubs.

Table 2: A list of the amphibians associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	Genus and species	Common Name	Status
Bufonidae	<i>Vandijkophrynus gariensis gariensis</i>	Karoo Toad (subsp. gariensis)	Least concern
Pipidae	<i>Xenopus laevis</i>	Common Platanna	Least Concern
Pyxicephalidae	<i>Amietia fuscigula</i>	Cape River Frog	Least Concern (2017)
Pyxicephalidae	<i>Amietia poyntoni</i>	Poynton's River Frog	Least Concern (2017)
Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco	Least Concern (2013)
Pyxicephalidae	<i>Cacosternum karooicum</i>	Karoo Caco	Least Concern (2013)
Pyxicephalidae	<i>Pyxicephalus adspersus</i>	Giant Bull Frog	Least Concern
Pyxicephalidae	<i>Strongylopus grayii</i>	Clicking Stream Frog	Least Concern
Pyxicephalidae	<i>Tomopterna delalandii</i>	Cape Sand Frog	Least Concern

Table 3: A list of the mammals associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	Genus and species	Common Name	Status
Bathergidae	<i>Cryptomys hottentotus</i>	Southern African Mole-rat	Least Concern (2016)
Bovidae	<i>Aepyceros melampus</i>	Impala	Least Concern
Bovidae	<i>Alcelaphus buselaphus</i>	Hartebeest	Least Concern
Bovidae	<i>Alcelaphus buselaphus caama</i>	Red Hartebeest	Least Concern (2008)
Bovidae	<i>Antidorcas marsupialis</i>	Springbok	Least Concern (2016)
Bovidae	<i>Connochaetes gnou</i>	Black Wildebeest	Least Concern (2016)
Bovidae	<i>Damaliscus pygargus phillipsi</i>	Blesbok	Least Concern (2016)
Bovidae	<i>Hippotragus equinus</i>	Roan Antelope	Endangered (2016)
Bovidae	<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern (2016)
Bovidae	<i>Oryx gazella</i>	Gemsbok	Least Concern (2016)
Bovidae	<i>Pelea capreolus</i>	Vaal Rhebok	Near Threatened (2016)
Bovidae	<i>Raphicerus campestris</i>	Steenbok	Least Concern (2016)
Bovidae	<i>Redunca fulvorufula</i>	Mountain Reedbuck	Least Concern
Bovidae	<i>Sylvicapra grimmia</i>	Common Duiker	Least Concern
Bovidae	<i>Syncerus caffer</i>	African Buffalo	Least Concern (2008)
Bovidae	<i>Taurotragus oryx</i>	Common Eland	Least Concern (2016)
Bovidae	<i>Taurotragus oryx oryx</i>	Cape eland	Least Concern (2016)
Bovidae	<i>Tragelaphus scriptus</i>	Bushbuck	Least Concern
Bovidae	<i>Tragelaphus strepsiceros</i>	Greater Kudu	Least Concern (2016)
Canidae	<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern (2016)
Canidae	<i>Otocyon megalotis</i>	Bat-eared Fox	Least Concern (2016)
Canidae	<i>Vulpes chama</i>	Cape Fox	Least Concern (2016)

Cercopithecidae	<i>Chlorocebus pygerythrus</i>	Vervet Monkey	Least Concern (2016)
Cercopithecidae	<i>Papio ursinus</i>	Chacma Baboon	Least Concern (2016)
Chrysochloridae	<i>Chlorotalpa sclateri</i>	Sclater's Golden Mole	Least Concern (2016)
Elephantidae	<i>Loxodonta africana</i>	African Bush Elephant	Least Concern (2016)
Equidae	<i>Equus quagga</i>	Plains Zebra	Least Concern (2016)
Equidae	<i>Equus zebra zebra</i>	Cape Mountain Zebra	Least Concern (2016)
Felidae	<i>Caracal caracal</i>	Caracal	Least Concern (2016)
Felidae	<i>Felis nigripes</i>	Black-footed Cat	Vulnerable (2016)
Felidae	<i>Felis silvestris</i>	Wildcat	Least Concern (2016)
Felidae	<i>Panthera leo</i>	Lion	Least Concern (2016)
Gliridae	<i>Graphiurus (Graphiurus) ocularis</i>	Spectacled African Dormouse	Least Concern
Herpestidae	<i>Cynictis penicillata</i>	Yellow Mongoose	Least Concern (2016)
Herpestidae	<i>Herpestes pulverulentus</i>	Cape Gray Mongoose	Least Concern (2016)
Herpestidae	<i>Suricata suricatta</i>	Meerkat	Least Concern (2016)
Hyaenidae	<i>Crocuta crocuta</i>	Spotted Hyaena	Near Threatened (2016)
Hyaenidae	<i>Hyaena brunnea</i>	Brown Hyena	Near Threatened (2015)
Hyaenidae	<i>Proteles cristata</i>	Aardwolf	Least Concern (2016)
Hystricidae	<i>Hystrix africaeaustralis</i>	Cape Porcupine	Least Concern
Leporidae	<i>Bunolagus monticularis</i>	Riverine Rabbit	Critically Endangered (2016)
Leporidae	<i>Lepus capensis</i>	Cape Hare	Least Concern
Leporidae	<i>Lepus saxatilis</i>	Scrub Hare	Least Concern
Leporidae	<i>Pronolagus rupestris</i>	Smith's Red Rock Hare	Least Concern (2016)
Macroscelididae	<i>Elephantulus edwardii</i>	Cape Elephant Shrew	Least Concern (2016)
Macroscelididae	<i>Elephantulus rupestris</i>	Western Rock Elephant Shrew	Least Concern (2016)
Macroscelididae	<i>Macroscelides proboscideus</i>	Short-eared Elephant Shrew	Least Concern (2016)
Muridae	<i>Aethomys granti</i>	Grant's Rock Mouse	Least Concern
Muridae	<i>Aethomys namaquensis</i>	Namaqua Rock Mouse	Least Concern
Muridae	<i>Desmodillus auricularis</i>	Cape Short-tailed Gerbil	Least Concern (2016)
Muridae	<i>Gerbilliscus paeba</i>	Paeba Hairy-footed Gerbil	Least Concern (2016)
Muridae	<i>Mastomys natalensis</i>	Natal Mastomys	Least Concern (2016)
Muridae	<i>Otomys saundersiae</i>	Saunders' Vlei Rat	Least Concern
Muridae	<i>Otomys unisulcatus</i>	Karoo Bush Rat	Least Concern (2016)
Muridae	<i>Rhabdomys pumilio</i>	Xeric Four-striped Grass Rat	Least Concern (2016)
Mustelidae	<i>Ictonyx striatus</i>	Striped Polecat	Least Concern (2016)
Mustelidae	<i>Mellivora capensis</i>	Honey Badger	Least Concern (2016)
Nesomyidae	<i>Dendromus melanotis</i>	Gray African Climbing Mouse	Least Concern (2016)
Nesomyidae	<i>Malacothrix typica</i>	Large-eared African Desert Mouse	Least Concern (2016)
Nesomyidae	<i>Petromyscus collinus</i>	Pygmy Rock Mouse	Least Concern (2016)
Nesomyidae	<i>Saccostomus campestris</i>	Southern African Pouched Mouse	Least Concern (2016)

Procaviidae	<i>Procavia capensis</i>	Cape Rock Hyrax	Least Concern (2016)
Soricidae	<i>Myosorex varius</i>	Forest Shrew	Least Concern (2016)
Soricidae	<i>Suncus varilla</i>	Lesser Dwarf Shrew	Least Concern (2016)
Vespertilionidae	<i>Cistugo lesueuri</i>	Lesueur's Wing-gland Bat	Least Concern (2016)
Vespertilionidae	<i>Neoromicia capensis</i>	Cape Serotine	Least Concern (2016)
Vespertilionidae	<i>Pipistrellus melckorum</i>	Melcks' Serotine	Least Concern
Viverridae	<i>Genetta genetta</i>	Common Genet	Least Concern (2016)

Table 4: A list of the reptiles associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	Genus and species	Common Name	Status
Agamidae	<i>Agama aculeata aculeata</i>	Common Ground Agama	Least Concern (SARCA 2014)
Agamidae	<i>Agama atra</i>	Southern Rock Agama	Least Concern (SARCA 2014)
Chamaeleonidae	<i>Bradypodion ventrale</i>	Eastern Cape Dwarf Chameleon	Least Concern (SARCA 2014)
Chamaeleonidae	<i>Chamaeleo namaquensis</i>	Namaqua Chameleon	Least Concern (SARCA 2014)
Colubridae	<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	Least Concern (SARCA 2014)
Colubridae	<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Least Concern (SARCA 2014)
Colubridae	<i>Dipsina multimaculata</i>	Dwarf Beaked Snake	Least Concern (SARCA 2014)
Cordylidae	<i>Cordylus cordylus</i>	Cape Girdled Lizard	Least Concern (SARCA 2014)
Cordylidae	<i>Karusasaurus polyzonus</i>	Karoo Girdled Lizard	Least Concern (SARCA 2014)
Cordylidae	<i>Pseudocordylus microlepidotus namaquensis</i>	Nuweveldberg Crag Lizard	Least Concern (SARCA 2014)
Elapidae	<i>Aspidelaps lubricus lubricus</i>	Coral Shield Cobra	Least Concern
Elapidae	<i>Naja nivea</i>	Cape Cobra	Least Concern (SARCA 2014)
Gekkonidae	<i>Chondrodactylus angulifer angulifer</i>	Common Giant Ground Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Chondrodactylus bibronii</i>	Bibron's Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Goggia braacki</i>	Braack's Pygmy Gecko	Near Threatened (SARCA 2014)
Gekkonidae	<i>Lygodactylus capensis</i>	Common Dwarf Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus capensis</i>	Cape Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus geitje</i>	Ocellated Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus kladaroderma</i>	Thin-skinned Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus latirostris</i>	Quartz Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus maculatus</i>	Spotted Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus mariquensis</i>	Marico Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus oculatus</i>	Golden Spotted Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Pachydactylus purcelli</i>	Purcell's Gecko	Least Concern (SARCA 2014)
Gekkonidae	<i>Ptenopus garrulus maculatus</i>	Spotted Barking Gecko	Least Concern (SARCA 2014)
Gerrhosauridae	<i>Cordylasaurus subtessellatus</i>	Dwarf Plated Lizard	Least Concern (SARCA 2014)
Lacertidae	<i>Meroles suborbitalis</i>	Spotted Desert Lizard	Least Concern (SARCA 2014)

Lacertidae	<i>Nucras livida</i>	Karoo Sandveld Lizard	Least Concern (SARCA 2014)
Lacertidae	<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	Least Concern (SARCA 2014)
Lacertidae	<i>Pedioplanis laticeps</i>	Karoo Sand Lizard	Least Concern (SARCA 2014)
Lacertidae	<i>Pedioplanis lineoocellata pulchella</i>	Common Sand Lizard	Least Concern (SARCA 2014)
Lacertidae	<i>Pedioplanis namaquensis</i>	Namaqua Sand Lizard	Least Concern (SARCA 2014)
Lamprophiidae	<i>Boaedon capensis</i>	Brown House Snake	Least Concern (SARCA 2014)
Lamprophiidae	<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	Least Concern (SARCA 2014)
Lamprophiidae	<i>Psammophis crucifer</i>	Cross-marked Grass Snake	Least Concern (SARCA 2014)
Lamprophiidae	<i>Psammophis notostictus</i>	Karoo Sand Snake	Least Concern (SARCA 2014)
Lamprophiidae	<i>Pseudaspis cana</i>	Mole Snake	Least Concern (SARCA 2014)
Pelomedusidae	<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated
Scincidae	<i>Acontias meleagris</i>	Cape Legless Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis capensis</i>	Cape Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis homalocephala</i>	Red-sided Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis occidentalis</i>	Western Three-striped Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis sulcata sulcata</i>	Western Rock Skink	Least Concern (SARCA 2014)
Scincidae	<i>Trachylepis variegata</i>	Variiegated Skink	Least Concern (SARCA 2014)
Testudinidae	<i>Chersina angulata</i>	Angulate Tortoise	Least Concern (SARCA 2014)
Testudinidae	<i>Chersobius boulengeri</i>	Karoo Padloper	Endangered (SANBI 2016)
Testudinidae	<i>Homopus femoralis</i>	Greater Padloper	Least Concern (SARCA 2014)
Testudinidae	<i>Psammobates tentorius</i>	Tent Tortoise	Least Concern (SARCA 2014)
Testudinidae	<i>Stigmochelys pardalis</i>	Leopard Tortoise	Least Concern (SARCA 2014)
Varanidae	<i>Varanus albigularis albigularis</i>	Rock Monitor	Least Concern (SARCA 2014)
Viperidae	<i>Bitis arietans arietans</i>	Puff Adder	Least Concern (SARCA 2014)

Table 5: A list of the scorpions associated with the quarter degree squares 3222AD, BC, CB and DA.

Family	Genus and species	Common Name	Status
Buthidae	<i>Parabuthus capensis</i>	Cape Thicktail Scorpion	Least Concern
Buthidae	<i>Parabuthus schlechteri</i>	Burrowing Thick Tail Scorpion	Least Concern
Buthidae	<i>Uroplectes schlechteri</i>	Common Lesser-Thicktail Scorpion	Least Concern
Scorpionidae	<i>Opisthophthalmus austerus</i>		Least Concern
Scorpionidae	<i>Opisthophthalmus crassimanus</i>		Least Concern
Scorpionidae	<i>Opisthophthalmus karrooensis</i>	Karoo Burrower	Least Concern