

# DPR

**Ecologists & Environmental Services**

## **Report on the biodiversity and ecological assessment of the proposed establishment of a hotel development on Erf 5206 in Springbok, Northern Cape Province.**

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## Executive Summary

The site proposed for the hotel development has been rated as being not-preferred for the development. However, due to the lower diversity of species compared to the surrounding hills, small extent of the proposed development, existing adjacent development and current land use zoning it is recommended that the proposed site be utilised for the development.

The proposed hotel development will occur on Erf 5206 which is situated on the south eastern outskirts of the town of Springbok (Map 1). The extent of the area to be developed is approximately 1.4 hectares in size. The site is situated in the Succulent Karoo Biome and the vegetation therefore consists of karroid shrubs but with a large component of succulent species. The succulent component is lower as a result of the topography and would be much higher in the surrounding hills and rocky areas. The site consists of a moderate to gentle slope from east to west and is dominated by a sandy substrate. The site consists primarily of natural vegetation although some disturbance is evident. The site is bordered by a dirt road on the western and northern borders and a tourism accommodation facility on the southern border. These cause local disturbance of the site along the borders. Some disturbance on the site is evident where small portions of vegetation has been cleared and a limited amount of littering also indicate some human impacts on the site. However, overall the site can still be regarded as largely natural with few impacts.

The vegetation type on the site, Namaqualand Klipkoppe Shrubland, is not currently under any significant threat, is listed as being of Least Concern and therefore not of high conservation value (Map 2). In addition, no wetland, watercourse or other related watersource is located on or near the site. The site is also located on the outskirts of the town of Springbok and is therefore ideally situated for the proposed development. However, the Namakwa District Biodiversity Sector Plan (2008) has been developed to identify areas of high conservation value and the site has been identified as being situated in a Critical Biodiversity Area 1 (Map 3). The reason for this being that the area surrounding Springbok contains the most endemics per quarter degree square in the Succulent Karoo and therefore has a high conservation value. This is however more applicable to the surrounding hills which have a higher species diversity than the lower lying areas. Furthermore, the site has also already been zoned for resort development and it is unlikely that it will remain undeveloped, especially as the neighbouring erven has already been developed for tourist accommodation.

The species composition and vegetation structure should indicate that the site is still largely natural although a small amount of disturbance is noticeable. As can be seen the site contains a high amount of protected species as listed in the Northern Cape Nature Conservation Act (Act 9 of 2009) (Appendix B & C). These are however all widespread and not considered rare or endangered and are therefore not of high conservation value. They do however still retain some conservation value as protected species. As a result it is recommended that permits be obtained to remove these plants and that a significant portion of them be transplanted and utilised in the landscaping of the hotel development. This will ensure that a portion is retained in the area and exchange of genetic material is still possible with the surrounding natural areas. In addition, the species, *Othonna sp. nova*, is scattered on the site. This species is listed in Snijman (2003) as *Othonna sp. A*, a newly discovered species which is abundant around Springbok but localised to the area. As a result it is also considered to be of some conservation value and recommended that it should also be transplanted and incorporated into the landscaping of the development (Appendix C).


It is recommended that a walkthrough of the site be done prior to construction to mark and map all protected plants on the site. Several of these species are also cryptic and well camouflaged and it is recommended that a suitably qualified ecologist/botanist perform the walkthrough. Furthermore, the geophytic species will only be visible during the rainy season and should be kept in mind with regard to the season of the walkthrough. Following this transplanting of succulent and geophytic species should be done adequately and establishment overseen by an ecologist or person with suitable qualifications. These transplanted specimens should be utilised in the landscaping of the development. In these areas they will remain within the natural genetic population, will be protected, will enable exchange of genetic material with adjacent populations and will provide a population for the possible re-distribution of propagules.

The impact significance has been determined and the loss of vegetation and habitat is considered moderate. This impact cannot be mitigated and is expected to remain moderate. The only other significant impact is the loss of protected species but through adequate mitigation this impact can be decreased to low-moderate.

In conclusion the site is considered to be largely natural with few impacts and contains a significant diversity of species of which a high proportion are protected (Appendix B & C). However, these do not include any rare or endangered species which are of high conservation significance. The site is also considered to form part of a Critical Biodiversity Area (CBA 1) as a result of the high species diversity in the hills around Springbok (Map 3). The site itself is however situated in the lower lying areas where the diversity is much lower and the conservation value therefore not as high. The site has also already been zoned for resort development and is situated adjacent to an existing accommodation development and therefore is unlikely to remain undeveloped. Due to the lower diversity of species, small extent of the proposed development, existing adjacent development and current land use zoning it is recommended that the proposed site be utilised for the development. It is unlikely that this development will affect the integrity of the Critical Biodiversity Area, decrease species diversity or impact on any rare or endangered species. Despite this the site still contains a high proportion of protected species and it is recommended that adequate mitigation, including transplanting a significant portion of these protected species, be adhered to (Appendix B & C).

### DECLARATION OF INDEPENDENCE

DPR Ecologists and Environmental Services is an independent company and has no financial, personal or other interest in the proposed project, apart from fair remuneration for work performed in the delivery of ecological services. There are no circumstances that compromise the objectivity of the study.

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## **Vegetation and ecological assessment.**

### **1. INTRODUCTION**

#### **1.1 Background**

Natural vegetation is an important component of ecosystems. Some of the vegetation units in a region can be more sensitive than others, usually as a result of a variety of environmental factors and species composition. These units are often associated with water bodies, water transferring bodies or moisture sinks. These systems are always connected to each other through a complex pattern. Degradation of a link in this larger system, e.g. tributary, pan, wetland, usually leads to the degradation of the larger system. Therefore, degradation of such a water related system should be prevented.

Though vegetation may seem to be uniform and low in diversity it may still contain species that are rare and endangered. The occurrence of such a species may render the development unviable. Should such a species be encountered the development should be moved to another location or cease altogether.

South Africa has a large amount of endemic species and in terms of biological diversity ranks third in the world. This has the result that many of the species are rare, highly localised and consequently endangered. It is our duty to protect our diverse natural resources.

South Africa contains 19 known centres of endemism. These areas contain a high number of species endemic to this specific area. Due to the limited range of most of these species many are rare, protected or endangered. The proposed hotel development is situated within the Gariep Centre of Endemism. Many species occurring within this centre is unique and localised to this area. Development in such centres of endemism should be done with careful investigation of the biodiversity and species composition of the area. Areas with rare, endangered or endemic species and areas with a high biodiversity should be avoided when planning a development.

Development around cities and towns are necessary to accommodate an ever-growing population. Areas along the boundaries of cities and towns are usually in a degraded state due to the impact of the large population these areas house. Though this may be the case in most situations there may still be areas that consist of sensitive habitats such as water courses, wetlands or rare vegetation types that need to be conserved. These areas may also contain endangered fauna and flora.

The proposed hotel development will occur on Erf 5206 which is situated on the south eastern outskirts of the town of Springbok (Map 1). The extent of the area to be developed is approximately 1.4 hectares in size. The site consists of natural vegetation although disturbance is notable due to the adjacent development and proximity of urban areas and the impacts associated with such areas.

A site visit was conducted on 4 October 2017. The entire footprint of the hotel development was surveyed over the period of one day. The Namaqualand is experiencing a severe drought and consequently annuals were not well represented although the time of the survey is still considered optimal in terms of seasonality as this is at the end of the rainy season for the region and therefore sufficient for the identification of species.

For the above reasons it is necessary to conduct a vegetation and ecological assessment of an area proposed for development.

The report together with its recommendations and mitigation measures should be used to minimise the impact of the proposed development.

## **1.2 The value of biodiversity**

The diversity of life forms and their interaction with each other and the environment has made Earth a uniquely habitable place for humans. Biodiversity sustains human livelihoods and life itself. Although our dependence on biodiversity has become less tangible and apparent, it remains critically important.

The balancing of atmospheric gases through photosynthesis and carbon sequestration is reliant on biodiversity, while an estimated 40% of the global economy is based on biological products and processes.

Biodiversity is the basis of innumerable environmental services that keep us and the natural environment alive. These services range from the provision of clean water and watershed services to the recycling of nutrients and pollution. These ecosystem services include:

- Soil formation and maintenance of soil fertility.
- Primary production through photosynthesis as the supportive foundation for all life.
- Provision of food, fuel and fibre.
- Provision of shelter and building materials.
- Regulation of water flows and the maintenance of water quality.
- Regulation and purification of atmospheric gases.
- Moderation of climate and weather.
- Detoxification and decomposition of wastes.
- Pollination of plants, including many crops.
- Control of pests and diseases.
- Maintenance of genetic resources.

## **2. SCOPE AND LIMITATIONS**

- To evaluate the present state of the vegetation and ecological functioning of the area proposed for the hotel development.
- To identify possible negative impacts that could be caused by the proposed construction of a hotel development.

### **2.1 Vegetation**

Aspects of the vegetation that will be assessed include:

- The vegetation types of the region with their relevance to the proposed site.
- The overall status of the vegetation on site.
- Species composition with the emphasis on dominant-, rare- and endangered species.

The amount of disturbance present on the site assessed according to:

- The amount of grazing impacts.
- Disturbance caused by human impacts.
- Other disturbances.

### **2.2 Fauna**

Aspects of the fauna that will be assessed include:

- A basic survey of the fauna occurring in the region using visual observations of species as well as evidence of their occurrence in the region (burrows, excavations, animal tracks, etc.).
- The overall condition of the habitat.
- A list of species that may occur in the region (desktop study).

### **2.3 Limitations**

Several bulbous and herbaceous species may have finished flowering or has not yet flowered and may have been overlooked or not identifiable.

The current severe drought in the region may have caused the absence of some annual species and they would have been overlooked.

Some animal species may not have been observed as a result of their nocturnal and/or shy habits.



### **3. METHODOLOGY**

#### **3.1 Several literature works were used for additional information.**

Vegetation:

Red Data List (Raymondo *et al.* 2009)

Vegetation types (Mucina & Rutherford 2006)

Field guides used for species identification (Bromilow 1995, 2010, Coates-Palgrave 2002, Court 2010, Frandsen 2017, Hartmann 2001, Le Roux 2005, Manning 2009, Roberts & Fourie 1975, Smith *et al.* 1998, Smith & Crouch 2009, Smith & Van Wyk 2003, Van Oudtshoorn 2004, Van Wyk & Van Wyk 1997).

Terrestrial fauna:

Field guides for species identification (Smithers 1986a).

#### **3.2 Survey**

The site was assessed by means of transects and sample plots.

Noted species include rare and dominant species.

The broad vegetation types present on the site were determined.

The state of the environment was assessed in terms of condition, grazing impacts, disturbance by humans, erosion and presence of invader and exotic species.

Animal species were also noted as well as the probability of other species occurring on or near the site according to their distribution areas and habitat requirements.

The state of the habitat was also assessed.

#### **3.3 Criteria used to assess sites**

Several criteria were used to assess the site and determine the overall status of the environment.

##### **Vegetation characteristics**

Characteristics of the vegetation in its current state. The diversity of species, sensitivity of habitats and importance of the ecology as a whole.

Habitat diversity and species richness: normally a function of locality, habitat diversity and climatic conditions.

Scoring: Wide variety of species occupying a variety of niches – 1, Variety of species occupying a single nich – 2, Single species dominance over a large area containing a low diversity of species – 3.

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species can potentially be a fatal flaw.

Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely – 3.

Ecological function: All plant communities play a role in the ecosystem. The ecological importance of all areas though, can vary significantly e.g. wetlands, drainage lines, ecotones, etc.

Scoring: Ecological function critical for greater system – 1, Ecological function of medium importance – 2, No special ecological function (system will not fail if absent) – 3.

Degree of rarity/conservation value:

Scoring: Very rare and/or in pristine condition – 1, Fair to good condition and/or relatively rare – 2, Not rare, degraded and/or poorly conserved – 3.

### **Vegetation condition**

The sites are compared to a benchmark site in a good to excellent condition. Vegetation management practises (e.g. grazing regime, fire, management, etc.) can have a marked impact on the condition of the vegetation.

Percentage ground cover: Ground cover is under normal and natural conditions a function of climate and biophysical characteristics. Under poor grazing management, ground cover is one of the first signs of vegetation degradation.

Scoring: Good to excellent – 1, Fair – 2, Poor – 3.

Vegetation structure: This is the ratio between tree, shrub, sub-shrubs and grass layers. The ratio could be affected by grazing and browsing by animals.

Scoring: All layers still intact and showing specimens of all age classes – 1, Sub-shrubs and/or grass layers highly grazed while tree layer still fairly intact (bush partly opened up) – 2, Mono-layered structure often dominated by a few unpalatable species (presence of barren patches notable) – 3.

Infestation with exotic weeds and invader plants or encroachers:

Scoring: No or very slight infestation levels by weeds and invaders – 1, Medium infestation by one or more species – 2, Several weed and invader species present and high occurrence of one or more species – 3.

Degree of grazing/browsing impact:

Scoring: No or very slight notable signs of browsing and/or grazing – 1, Some browse lines evident, shrubs shows signs of browsing, grass layer grazed though still intact – 2, Clear browse line on trees, shrubs heavily pruned and grass layer almost absent – 3.

Signs of erosion: The formation of erosion scars can often give an indication of the severity and/or duration of vegetation degradation.

Scoring: No or very little signs of soil erosion – 1, Small erosion gullies present and/or evidence of slight sheet erosion – 2, Gully erosion well developed (medium to large dongas) and/or sheet erosion removed the topsoil over large areas – 3.

### **Faunal characteristics**

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species or very unique and sensitive habitats can potentially be a fatal flaw.

Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely.

### 3.4 Biodiversity sensitivity rating (BSR)

The total scores for the criteria above were used to determine the biodiversity sensitivity ranking for the sites. On a scale of 0 – 30, six different classes are described to assess the suitability of the sites to be developed. The different classes are described in the table below:

Table 1: Biodiversity sensitivity ranking

| BSR               | BSR general floral description  | Floral score equating to BSR class |
|-------------------|---|------------------------------------|
| Ideal (5)         | Vegetation is totally transformed or in a highly degraded state, generally has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area has lost its inherent ecological function. The area has no conservation value and potential for successful rehabilitation is very low. The site is ideal for the proposed development.  | 29 – 30                            |
| Preferred (4)     | Vegetation is in an advanced state of degradation, has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area's ecological function is seriously hampered, has a very low conservation value and the potential for successful rehabilitation is low. The area is preferred for the proposed development.  | 26 – 28                            |
| Acceptable (3)    | Vegetation is notably degraded, has a medium level of species diversity although no species of concern are present. Invasive plants are present but are still controllable. The area's ecological function is still intact but may be hampered by the current levels of degradation. Successful rehabilitation of the area is possible. The conservation value is regarded as low. The area is acceptable for the proposed development. | 21 – 25                            |
| Not preferred (2) | The area is in a good condition although signs of disturbance are present. Species diversity is high and species of concern may be present. The ecological function is intact and very little rehabilitation is needed. The area is of medium conservation importance. The area is not preferred for the proposed development.  | 11 – 20                            |
| Sensitive (1)     | The vegetation is in a pristine or near pristine condition. Very little signs of disturbance other than those needed for successful management are present. The species diversity is very high with several species of concern known to be present. Ecological functioning is intact and the conservation importance is high. The area is regarded as sensitive and not suitable for the proposed development.                          | 0 - 10                             |

## 4. ECOLOGICAL OVERVIEW OF THE SITE

### 4.1 Overview of ecology and vegetation types (Mucina & Rutherford 2006)

Refer to the list of species encountered on the site in Appendix B.

According to Mucina & Rutherford (2006) the area consists of Namaqualand Klipkoppe Shrubland (SKn 1). This vegetation type is listed as being of Least Concern (LC) within the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) (Map 2). It is not currently subjected to any pronounced development pressures.

The site consists primarily of natural vegetation although some disturbance is evident. The site is bordered by a dirt road on the western and northern borders and a tourism accommodation facility on the southern border. These cause local disturbance of the site along the borders. Some disturbance on the site is evident where small portions of vegetation has been cleared and a limited amount of littering also indicate some human impacts on the site. However, overall the site can still be regarded as largely natural with few impacts.

The proposed hotel development will occur on Erf 5206 which is situated on the south eastern outskirts of the town of Springbok (Map 1). The extent of the area to be developed is approximately 1.4 hectares in size. The site consists of natural vegetation with relatively few impacts. The site is situated in the Succulent Karoo Biome and the vegetation therefore consists of karroid shrubs but with a large component of succulent species. The vegetation structure is still largely intact and close to the natural condition. The succulent component is lower as a result of the topography and would be much higher in the surrounding hills and rocky areas. The site consists of a moderate to gentle slope from east to west and is dominated by a sandy substrate.

The topography of the site consists of a moderate to gentle slope from east to west. The site is dominated by a sandy substrate with only a few outcroppings of granite. Being situated in the Namaqualand Klipkoppe Shrubland the surrounding topography is dominated by quartzite and granite hills. The site does however not consist of hill terrain but rather the sandy bottomlands and the site itself consists more of the footslopes with large hills occurring approximately 200 meters to the east of the site. The site does not contain any watercourse, wetland or impoundment and surface runoff drains from east to west without forming any concentrated channel or flowpath. The slope of the site varies in elevation from 899 m in the east to 883 m in the west and also illustrates the slope of the site. The large hill to the east has an elevation of 990 m and illustrates the low elevation of the site compared to the surrounding hills.

The climate in the area consist of winter rainfall with a mean value of 160 mm and episodic droughts usually lasting about two years. The mean annual temperature is 16.6°C and summers can be hot with a mean maximum of 30°C. Frosts occur but are rare.

Ae and Ib land types occur in the area. Ae land types are characterised by red, high base status soils which are deeper than 300 mm and no dunes are present while Ib land types consist of exposed rock covering 60-80% of the surface.

The vegetation is dominated by karroid shrubs averaging 0.5 to 1 meters in height and is dominated by woody shrubs although succulent species also make out a significant portion. An

herbaceous layer is present and dominated by annual asteraceous species. Several geophytic species are also present but scattered on the site.

The shrub layer is dominated by the following woody species *Didelta spinosa*, *Zygophyllum retrofractum*, *Hermannia disermifolia*, *Eriocephalus brevifolius*, *E. ericoides*, *Pteronia divaricata*, *Pentzia incana*, *Leysera gnaphaloides*, *Galenia africana* and *Osteospermum oppositifolium*. The succulent shrub component in this layer is composed of *Ruschia cf. erecta*, *Othonna sp. nova*, *Euphorbia mauritanica*, *E. rhombifolia* and *Tylecodon wallichii* subsp. *ecklonianus*. Of these almost all are protected species (Appendix B & C). The lower herbaceous vegetation layer is dominated by *Prenia pallens*, *Gazania heterochaeta*, *Drosanthemum hispidum*, *Oncosiphon suffruticosum*, *Aizoon canariense*, *Osteospermum hyoseroides*, *Gorteria diffusa* subsp. *diffusa*, *Crassula muscosa* and *Aptosimum indivisum*. Again, of these the succulent species are protected and include *P. pallens*, *D. hispidum* and *C. muscosa* (Appendix B & C). The grass species *Schmidtia kalahariensis*, *Fingerhuthia africana* and *Bromus pectinatus* are also present in this vegetation layer although not abundant. A couple of geophytic species are also present on the site and these include *Trachyandra falcata*, *Chlorophytum crassinerve*, *Lapeirousia silenoides*, *Oxalis pes-carpae*, *O. sp. Babiana dregei* and *Bulbine alooides*. All of these, except *C. crassinerve*, are protected species (Appendix B & C). As mentioned a few small rocky outcrops occur on the site. Here the vegetation structure is much the same but the species composition does differ somewhat from the remainder of the site. These species include *Searsia undulata*, *Asparagus rubicundus*, *Euclea tomentosa* and *Pelargonium pulchellum*. Of these *P. pulchellum* is listed as a Specially Protected species under the Northern Cape Nature Conservation Act (Act 9 of 2009) (Appendix C). The site is largely free of exotic species with *Salsola kali* the only exotic weed occurring and not abundant on the site.

The species composition and vegetation structure should indicate that the site is still largely natural although a small amount of disturbance is noticeable. As can be seen the site contains a high amount of protected species as listed in the Northern Cape Nature Conservation Act (Act 9 of 2009) (APPendix B & C). These are however all widespread and not considered rare or endangered and are therefore not of high conservation value. They do however still retain some conservation value as protected species. As a result it is recommended that permits be obtained to remove these plants and that a significant portion of them be transplanted and utilised in the landscaping of the hotel development. This will ensure that a portion is retained in the area and exchange of genetic material is still possible with the surrounding natural areas. In addition, the species, *Othonna sp. nova*, is scattered on the site. This species is listed in Snijman (2003) as *Othonna sp. A*, a newly discovered species which is abundant around Springbok but localised to the area. As a result it is also considered to be of some conservation value and recommended that it should also be transplanted and incorporated into the landscaping of the development (Appendix C).

The vegetation type on the site, Namaqualand Klipkoppe Shrubland, is not currently under any significant threat, is listed as being of Least Concern, and therefore not of high conservation value (Map 2). In addition, no wetland, watercourse or other related watersource is located on or near the site. The site is also located on the outskirts of the town of Springbok and is therefore ideally situated for the proposed development. However, the Namakwa District Biodiversity Sector Plan (2008) has been developed to identify areas of high conservation value and the site has been identified as being situated in a Critical Biodiversity Area 1 (Map 3). The reason for this being that the area surrounding Springbok contains the most endemics per quarter degree square in the Succulent Karoo and therefore has a high conservation value. This is however more applicable to the surrounding hills which have a higher species diversity

than the lower lying areas. Furthermore, the site has also already been zoned for resort development and it is unlikely that it will remain undeveloped, especially as the neighbouring erven has already been developed for tourist accommodation. Despite this the site still contains a significant diversity of species with a high proportion being protected and therefore of some conservation significance (Appendix B & C). The necessary mitigation, including transplanting a portion of them, must therefore be adhered to. None of these are however listed as being rare or endangered.

In conclusion the site is considered to be largely natural with few impacts and contains a significant diversity of species of which a high proportion are protected (Appendix B & C). However, these do not include any rare or endangered species which are of high conservation significance. The site is also considered to form part of a Critical Biodiversity Area (CBA 1) as a result of the high species diversity in the hills around Springbok (Map 3). The site itself is however situated in the lower lying areas where the diversity is much lower and the conservation value therefore not as high. The site has also already been zoned for resort development and is situated adjacent to an existing accommodation development and therefore is unlikely to remain undeveloped. Due to the lower diversity of species, small extent of the proposed development, existing adjacent development and current land use zoning it is recommended that the proposed site be utilised for the development. It is unlikely that this development will affect the integrity of the Critical Biodiversity Area, decrease species diversity or impact on any rare or endangered species. Despite this the site still contains a high proportion of protected species and it is recommended that adequate mitigation, including transplanting a significant portion of these protected species, be adhered to (Appendix B & C).

#### **4.2 Overview of terrestrial fauna (actual & possible)**

The site contains a significant mammal population but with a somewhat lower diversity. The proximity of adjacent roads and the neighbouring accommodation facility will dissuade many species from inhabiting the area. Despite this the site does contain a large population of mammals although only smaller species which are not affected by the roads and neighbouring development. These consist of the Common Mole Rat (*Cryptomys hottentottus*) which were identified by a high number of burrow excavations and a small unidentified rodent identified by an extensive burrow network.

The impact that the proposed development will have is mainly the loss of habitat which will decrease the available habitat for faunal species. However, the development will be of such low extent (approximately 1.4 hectares) that this impact cannot be considered as high. It is anticipated that the mammal population will vacate the site during construction into adjacent natural areas.

Despite this the site will still contain some mammals during construction. Care should therefore be taken to ensure none of the faunal species on site is harmed. The hunting, capturing or harming in any way of mammals on the site should not be allowed.

Table 2: Likely faunal species in the area.

| Order                | Common name                      | Scientific name                   |
|----------------------|----------------------------------|-----------------------------------|
| <b>Mammalia</b>      |                                  |                                   |
| Afrosoricida         | Cape Golden Mole                 | <i>Macroscelides proboscideus</i> |
| Macroscleidea        | Round-eared Sengi                | <i>Macroscelides proboscideus</i> |
|                      | Western Rock Sengi               | <i>Elephantulus rupestris</i>     |
|                      | Cape Rock Sengi                  | <i>Elephantulus edwardii</i>      |
| Eulipotyphla         | Reddish-grey Musk Shrew          | <i>Crocidura cyanea</i>           |
| Chiroptera           | Egyptian Slit-faced Bat          | <i>Nycteris thebaica</i>          |
|                      | Geoffroy's Horseshoe Bat         | <i>Rhinolophus clivosus</i>       |
|                      | Cape Serotine Bat                | <i>Neoromicia capensis</i>        |
|                      | Egyptian Free-tailed Bat         | <i>Tadarida aegyptiaca</i>        |
| Primates             | Savanna Baboon                   | <i>Papio cynocephalus ursinus</i> |
| Lagomorpha           | Cape Hare                        | <i>Lepus capensis</i>             |
|                      | Scrub Hare                       | <i>Lepus saxatilis</i>            |
|                      | Smith's Red Rock Rabbit          | <i>Pronolagus rupestris</i>       |
| Rodentia             | Southern African Ground Squirrel | <i>Xerus inauris</i>              |
|                      | Spectacled Dormouse              | <i>Graphiurus ocularis</i>        |
|                      | Common (African) Mole-rat        | <i>Cryptomys hottentotus</i>      |
|                      | Cape Porcupine                   | <i>Hystrix africae australis</i>  |
|                      | Dassie Rat                       | <i>Petromus typicus</i>           |
|                      | Large-eared or Gerbil Mouse      | <i>Malacothrix typica</i>         |
|                      | Cape Short-tailed Gerbil         | <i>Desmodillus auricularis</i>    |
|                      | Hairy-footed Gerbil              | <i>Gerbillurus paeba</i>          |
|                      | Namaqua Rock Mouse               | <i>Micaelamys namaquensis</i>     |
|                      | Four-striped Grass Mouse         | <i>Rhabdomys pumilio</i>          |
|                      | Pygmy Mouse                      | <i>Mus minutoides</i>             |
|                      | Brants's Whistling Rat           | <i>Parotomys brantsii</i>         |
|                      | Littledale's Whistling Rat       | <i>Parotomys littledalei</i>      |
|                      | Pygmy Rock Mouse                 | <i>Petromyscus collinus</i>       |
|                      | Barbour's Pygmy Rock Mouse       | <i>Petromyscus barbouri</i>       |
|                      | Carnivora                        | Cape Fox                          |
| Bat-eared Fox        |                                  | <i>Otocyon megalotis</i>          |
| Black-backed Jackal  |                                  | <i>Canis mesomelas</i>            |
| Honey Badger (Ratel) |                                  | <i>Mellivora capensis</i>         |
| Striped Polecat      |                                  | <i>Ictonyx striatus</i>           |
| Small Grey Mongoose  |                                  | <i>Galerella pulverulenta</i>     |
| Yellow Mongoose      |                                  | <i>Cynictis penicillata</i>       |
| Suricate (Meerkat)   |                                  | <i>Suricata suricatta</i>         |
| Small-spotted Genet  |                                  | <i>Genetta genetta</i>            |
| Aardwolf             |                                  | <i>Proteles cristatus</i>         |
| African Wild Cat     |                                  | <i>Felis silvestris lybica</i>    |
| Caracal              |                                  | <i>Caracal caracal</i>            |
| Tubulidentata        | Aardvark                         | <i>Orycteropus afer</i>           |
| Hyracoidea           | Rock Dassie (Hyrax)              | <i>Procavia capensis</i>          |

|                     |                                |                                  |
|---------------------|--------------------------------|----------------------------------|
| Perissodactyla      | Hartmann's Mountain Zebra      | <i>Equus zebra hartmannae</i>    |
| Ruminantia          | Gemsbok (Oryx)                 | <i>Oryx gazella</i>              |
|                     | Grey Rhebok                    | <i>Pelea capreolus</i>           |
|                     | Springbok                      | <i>Antidorcas marsupialis</i>    |
|                     | Klipspringer                   | <i>Oreotragus oreotragus</i>     |
|                     | Steenbok                       | <i>Raphicerus campestris</i>     |
|                     | Common Duiker                  | <i>Sylvicapra grimmia</i>        |
| <b>Reptilia</b>     |                                |                                  |
| Testudines          | Angulate Tortoise              | <i>Chersina angulata</i>         |
|                     | Speckled Padloper              | <i>Homopus signatus</i>          |
|                     | Karoo Tent Tortoise            | <i>Psammobates tentorius</i>     |
|                     | Marsh Terrapin                 | <i>Pelomedusa subrufa</i>        |
| Squamata            | Puff Adder                     | <i>Bitis arietans</i>            |
|                     | Many-horned Adder              | <i>Bitis cornuta</i>             |
|                     | Horned Adder                   | <i>Bitis caudalis</i>            |
|                     | Cape Cobra                     | <i>Naja nivea</i>                |
|                     | Black-necked Spitting Cobra    | <i>Naja nigricollis</i>          |
|                     | Coral Snake                    | <i>Aspidelaps lubricus</i>       |
|                     | Dwarf Beaked Snake             | <i>Dipsina multimaculata</i>     |
|                     | Karoo Whip Snake               | <i>Psammophis notostictus</i>    |
|                     | Namib Sand Snake               | <i>Psammophis namibensis</i>     |
|                     | Beetz's Tiger Snake            | <i>Telescopus beetzii</i>        |
|                     | Brown House Snake              | <i>Lamprophis capensis</i>       |
|                     | Spotted Rock Snake             | <i>Lamprophis guttatus</i>       |
|                     | Fisk's House Snake             | <i>Lamprophis fiskii</i>         |
|                     | Mole Snake                     | <i>Pseudaspis cana</i>           |
|                     | South-western Shovel-snout     | <i>Prosymna frontalis</i>        |
|                     | Spotted Bush Snake             | <i>Philothamnus semivariatus</i> |
|                     | Common Egg-eater               | <i>Dasypeltis scabra</i>         |
|                     | Delalande's Beaked Blind Snake | <i>Rhinotyphlops lalandei</i>    |
|                     | Schinz's Beaked Blind Snake    | <i>Rhinotyphlops schinzi</i>     |
|                     | Striped Legless Skink          | <i>Acontias lineatus</i>         |
|                     | Striped Dwarf Burrowing Skink  | <i>Scelotes sexlineatus</i>      |
|                     | Cape Skink                     | <i>Trachylepis capensis</i>      |
|                     | Western Three-striped Skink    | <i>Trachylepis occidentalis</i>  |
|                     | Western Rock Skink             | <i>Trachylepis sulcata</i>       |
|                     | Variagated Skink               | <i>Trachylepis variegata</i>     |
|                     | Knox's Desert Lizard           | <i>Meroles knoxii</i>            |
|                     | Spotted Desert Lizard          | <i>Meroles suborbitalis</i>      |
|                     | Western Sandveld Lizard        | <i>Nucras tessellata</i>         |
|                     | Cape Sand Lizard               | <i>Pedioplanis laticeps</i>      |
|                     | Spotted Sand Lizard            | <i>Pedioplanis lineocellata</i>  |
| Namaqua Sand Lizard | <i>Pedioplanis namaquensis</i> |                                  |



|                 |                                       |   |
|-----------------|---------------------------------------|---|
|                 | Plain Sand Lizard                     | <i>Pedioplanis inornata</i>               |
|                 | Dwarf Plated Lizard                   | <i>Cordylus subbessellatus</i>            |
|                 | Namaqua Plated Lizard                 | <i>Gerrhosaurus typicus</i>               |
|                 | Armadillo Girdled Lizard              | <i>Ouroborus cataphractus</i>             |
|                 | Peer's Girdled Lizard                 | <i>Cordylus peersi</i>                    |
|                 | Karoo Girdled Lizard                  | <i>Cordylus polyzonus</i>                 |
|                 | Ground Agama                          | <i>Agama aculeata</i>                     |
|                 | Anchieta's Agama                      | <i>Agama anchieta</i>                     |
|                 | Southern Rock Agama                   | <i>Agama atra</i>                         |
|                 | Southern Spiny Agama                  | <i>Agama hispida</i>                      |
|                 | Western Dwarf Chameleon               | <i>Bradypodion occidentale</i>            |
|                 | Namaqua Chameleon                     | <i>Chamaeleo namaquensis</i>              |
|                 | African Flat Gecko                    | <i>Afroedura africana</i>                 |
|                 | Giant Ground Gecko                    | <i>Chondrodactylus angulifer</i>          |
|                 | Striped Dwarf Leaf-toed Gecko         | <i>Goggia lineata</i>                     |
|                 | Bibron's Thick-toed Gecko             | <i>Chondrodactylus bibronii</i>           |
|                 | Western Cape Thick-toed Gecko         | <i>Pachydactylus labialis</i>             |
|                 | Namaqua Thick-toed Gecko              | <i>Pachydactylus namaquensis</i>          |
|                 | Rough Thick-toed Gecko                | <i>Pachydactylus rugosus</i>              |
|                 | Namaqua Day Gecko                     | <i>Phelsuma ocellata</i>                  |
|                 | Common Barking Gecko                  | <i>Ptenopus garrulus</i>                  |
| <b>Amphibia</b> |                                       |   |
| Anura           | Karoo Toad                            | <i>Vandijkophrynus (Bufo) gariepensis</i> |
|                 | Paradise Toad                         | <i>Vandijkophrynus (Bufo) robinsoni</i>   |
|                 | Namaqua Rain Frog                     | <i>Breviceps namaquensis</i>              |
|                 | Common Platanna (African Clawed Frog) | <i>Xenopus laevis</i>                     |
|                 | Cape River Frog                       | <i>Amietia (Afrana) fuscigula</i>         |
|                 | Namaqua Caco                          | <i>Cacosternum namaquensis</i>            |
|                 | Namaqua Stream Frog                   | <i>Strongylopus springbokensis</i>        |
|                 | Cape Sand Frog                        | <i>Tomopterna delalandii</i>              |

## 5. ANTICIPATED IMPACTS

The proposed hotel development will have several impacts on the ecology and biodiversity. However, due to the limited extent of the development these will remain local, i.e. won't affect the surrounding areas and cannot be considered as significant due to the small extent.

The development will entail the loss of habitat and vegetation. The site is largely natural and the vegetation structure and species composition is unaltered. The vegetation type on the site, Namaqualand Klipkoppe Shrubland, is listed as being of Least Concern (LC) and is not currently subjected to any pronounced developmental pressures (Map 2). It can therefore not be considered to be of high conservation value. However, it does form part of a Critical Biodiversity Area (CBA 1) which considerably increases its conservation value (Map 3). The extent of the development (Approximately 1.4 hectares) is not large and the loss of habitat and vegetation can only be considered to be moderate.

The site also contains a high amount of protected species and the proposed development will therefore entail the loss of these species (Appendix B & C). They are all relatively widespread and common and no rare or endangered species occur on the site but as protected species they do retain some conservation value. As a result it is recommended that permits be obtained to remove these plants and that a significant portion of them be transplanted and utilised in the landscaping of the hotel development. This will ensure that a portion is retained in the area and exchange of genetic material is still possible with the surrounding natural areas. In addition, the species, *Othonna sp. nova*, is scattered on the site. This species is listed in Snijman (2003) as *Othonna sp. A*, a newly discovered species which is abundant around Springbok but localised to the area. As a result it is also considered to be of some conservation value and recommended that it should also be transplanted and incorporated into the landscaping of the development (Appendix C). Keeping to this recommended mitigation measure will ensure that this impact be kept relatively low.

It is recommended that a walkthrough of the site be done prior to construction to mark and map all protected plants on the site. Several of these species are also cryptic and well camouflaged and it is recommended that a suitably qualified ecologist/botanist perform the walkthrough. Furthermore, the geophytic species will only be visible during the rainy season and should be kept in mind with regard to the season of the walkthrough. Following this transplanting of succulent and geophytic species should be done adequately and establishment overseen by an ecologist or person with suitable qualifications. These transplanted specimens should be utilised in the landscaping of the development. In these areas they will remain within the natural genetic population, will be protected, will enable exchange of genetic material with adjacent populations and will provide a population for the possible re-distribution of propagules.

The site does not contain any watercourses, drainage lines, wetlands or any other water source and consequently the impact will be negligible. The development should however still incorporate an adequate storm water system which should manage any surface runoff on the site and release storm water into the natural drainage pattern.

Although the site does not contain any significant infestation by exotic weeds and invaders the disturbance caused by construction can likely cause the establishment of such species. As a result monitoring of weed establishment should be practised and eradication of any establishment undertaken. Where category 1 and 2 weeds occur they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983

and National Environmental Management: Biodiversity Act, No. 10 of 2004. Keeping to these mitigation measures will ensure this impact remains low.

The impact that the proposed development will have on the faunal population is mainly the loss of habitat which will decrease the available habitat for faunal species. However, the development will be of such low extent (approximately 1.4 hectares) that this impact cannot be considered as high. It is anticipated that the mammal population will vacate the site during construction into adjacent natural areas. The direct impact due to hunting, capturing and trapping of fauna should be prevented by making this a punishable offense during the construction phase.

The impact significance has been determined and the loss of vegetation and habitat is considered moderate. This impact cannot be mitigated and is expected to remain moderate. The only other significant impact is the loss of protected species but through adequate mitigation this impact can be decreased to low-moderate.

Please refer to Appendix D for the impact methodology.

**Significance of the impact:**

| Impact   | Severity | Duration | Extent | Consequence | Probability | Frequency | Likelihood | Significance |
|--|----------|----------|--------|-------------|-------------|-----------|------------|--------------|
| <b>Before Mitigation</b>                           |          |          |        |             |             |           |            |              |
| Loss of vegetation type and clearing of vegetation | 3        | 5        | 1      | 3           | 5           | 4         | 4.5        | 13.5         |
| Loss of protected species                          | 4        | 5        | 1      | 3.3         | 5           | 5         | 5          | 16.5         |
| Loss of watercourses                               | 1        | 5        | 1      | 2.3         | 1           | 1         | 1          | 2.3          |
| Infestation with weeds and invaders                | 3        | 3        | 2      | 2.6         | 4           | 4         | 4          | 10.4         |
| Impact on Terrestrial fauna                        | 2        | 4        | 1      | 2.3         | 3           | 3         | 3          | 7            |
| <b>After Mitigation</b>                            |          |          |        |             |             |           |            |              |
| Loss of vegetation type and clearing of vegetation | 3        | 5        | 1      | 3           | 5           | 4         | 4.5        | 13.5         |
| Loss of protected species                          | 2        | 5        | 1      | 2.6         | 2           | 3         | 2.5        | 6.5          |
| Loss of watercourses                               | 1        | 5        | 1      | 2.3         | 1           | 1         | 1          | 2.3          |
| Infestation with weeds and invaders                | 3        | 3        | 2      | 2.6         | 2           | 3         | 2.5        | 6.5          |
| Impact on Terrestrial fauna                        | 2        | 4        | 1      | 2.3         | 3           | 3         | 3          | 7            |

## 6. SITE SPECIFIC RESULTS

### **Habitat diversity and species richness:**

Habitat diversity is considered relatively uniform and low. The substrate is dominantly sandy with a few rocky outcroppings which increase the habitat but not significantly. Despite this the area is known for a high diversity and the diversity of species on the site is also significant. This is however significantly lower than the surrounding hills which contain the highest diversity of species.

### **Presence of rare and endangered species:**

The site contains a high number of protected species (Appendix B & C). These are however all widespread and not considered rare or endangered and are therefore not of high conservation value. They do however still retain some conservation value as protected species. As a result it is recommended that permits be obtained to remove these plants and that a significant portion of them be transplanted and utilised in the landscaping of the hotel development. This will ensure that a portion is retained in the area and exchange of genetic material is still possible with the surrounding natural areas. In addition, the species, *Othonna sp. nova*, is scattered on the site. This species is listed in Snijman (2003) as *Othonna sp. A*, a newly discovered species which is abundant around Springbok but localised to the area. As a result it is also considered to be of some conservation value and recommended that it should also be transplanted and incorporated into the landscaping of the development (Appendix C). No rare or endangered species could be identified on the site.

### **Ecological function:**

The ecological function of the site is still largely intact and still provides natural habitat to fauna and flora and supports a significant diversity of plant species. However, it does not provide any vital function in terms of ecosystem services and the continued ecological functioning of the surrounding area is also not dependent on the site and therefore development of the site would not impact on any surrounding ecological functions.

### **Degree of rarity/conservation value:**

The site is largely natural and the vegetation structure and species composition is unaltered. The vegetation type on the site, Namaqualand Klipkoppe Shrubland, is listed as being of Least Concern (LC) and is not currently subjected to any pronounced developmental pressures (Map 2). It can therefore not be considered to be of high conservation value. However, it does form part of a Critical Biodiversity Area (CBA 1) which considerably increases its conservation value (Map 3). The extent of the development (Approximately 1.4 hecatres) is not large and the loss of habitat and vegetation can only be considered to be moderate.

The high amount of protected species on the site has a significant conservation value (Appendix B & C). They are all widespread and relatively common but as protected species still retain some conservation value.

### **Percentage ground cover:**

The percentage vegetation cover is moderate at the end of the rainy season but will significantly increase in years of higher rainfall due to the annual herbaceous layer which was largely absent during the current survey. This is however still considered natural to the area.

**Vegetation structure:**

The vegetation is still largely intact and close to the natural condition. It is dominated by a low shrub layer with a significant succulent component as well as an annual herbaceous layer. The succulent component is lower as a result of the topography and would be much higher in the surrounding hills and rocky areas.

**Infestation with exotic weeds and invader plants:**

The site is largely natural with very little exotic weeds present on the site.

**Degree of grazing/browsing impact:**

As far as could be observed the site is not subjected to any pronounced grazing or browsing pressures.

**Signs of erosion:**

Due to the sandy substrate and slope of the site some erosion is present but not yet pronounced.

**Terrestrial animals:**

The site contains a significant mammal population but with a somewhat lower diversity. The proximity of adjacent roads and the neighbouring accommodation facility will dissuade many species from inhabiting the area. Despite this the site does contain a large population of mammals although only smaller species which are not affected by the roads and neighbouring development. These consist of the Common Mole Rat (*Cryptomys hottentottus*) which were identified by a high number of burrow excavations and a small unidentified rodent identified by an extensive burrow network.

Table 2: Biodiversity Sensitivity Rating for the proposed hotel development.

|   | Low (3) | Medium (2) | High (1) |
|---|---------|------------|----------|
| Vegetation characteristics                                      |         |            |          |
| Habitat diversity & Species richness                            |         | 2          |          |
| Presence of rare and endangered species                         |         | 2          |          |
| Ecological function   | 3       |            |          |
| Uniqueness/conservation value                                   |         | 2          |          |
|   |         |            |          |
| Vegetation condition  |         |            |          |
| Percentage ground cover   |         |            | 1        |
| Vegetation structure  |         |            | 1        |
| Infestation with exotic weeds and invader plants or encroachers |         |            | 1        |
| Degree of grazing/browsing impact                               |         |            | 1        |
| Signs of erosion  |         | 2          |          |
|   |         |            |          |
| Terrestrial animal characteristics                              |         |            |          |
| Presence of rare and endangered species                         |         | 2          |          |
| Sub total   | 3       | 10         | 4        |
| Total   |         | 17         |          |

## 7. BIODIVERSITY SENSITIVITY RATING (BSR) INTERPRETATION

Table 3: Interpretation of Biodiversity Sensitivity Rating.

| Site              | Score | Site Preference Rating | Value |
|-------------------|-------|------------------------|-------|
| Hotel development | 17    | Not-Preferred          | 2     |

## 8. DISCUSSION AND CONCLUSION

The site proposed for the hotel development has been rated as being not-preferred for the development. However, due to the lower diversity of species compared to the surrounding hills, small extent of the proposed development, existing adjacent development and current land use zoning it is recommended that the proposed site be utilised for the development.

According to Mucina & Rutherford (2006) the area consists of Namaqualand Klipkoppe Shrubland (SKn 1). This vegetation type is listed as being of Least Concern (LC) within the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) (Map 2). It is not currently subjected to any pronounced development pressures.

The proposed hotel development will occur on Erf 5206 which is situated on the south eastern outskirts of the town of Springbok (Map 1). The extent of the area to be developed is approximately 1.4 hectares in size. The site is situated in the Succulent Karoo Biome and the vegetation therefore consists of karroid shrubs but with a large component of succulent species. The succulent component is lower as a result of the topography and would be much higher in the surrounding hills and rocky areas. The site consists of a moderate to gentle slope from east to west and is dominated by a sandy substrate. The site consists primarily of natural vegetation although some disturbance is evident. The site is bordered by a dirt road on the western and northern borders and a tourism accommodation facility on the southern border. These cause local disturbance of the site along the borders. Some disturbance on the site is evident where small portions of vegetation has been cleared and a limited amount of littering also indicate some human impacts on the site. However, overall the site can still be regarded as largely natural with few impacts.

The proposed hotel development will have several impacts on the ecology and biodiversity. However, due to the limited extent of the development these will remain local, i.e. won't affect the surrounding areas and cannot be considered as significant due to the small extent.

The vegetation type on the site, Namaqualand Klipkoppe Shrubland, is not currently under any significant threat, is listed as being of Least Concern and therefore not of high conservation value (Map 2). In addition, no wetland, watercourse or other related watersource is located on or near the site. The site is also located on the outskirts of the town of Springbok and is therefore ideally situated for the proposed development. However, the Namakwa District Biodiversity Sector Plan (2008) has been developed to identify areas of high conservation value and the site has been identified as being situated in a Critical Biodiversity Area 1 (Map 3). The reason for this being that the area surrounding Springbok contains the most endemics per quarter degree square in the Succulent Karoo and therefore has a high conservation value. This is however more applicable to the surrounding hills which have a higher species diversity than the lower lying areas. Furthermore, the site has also already been zoned for resort development and it is unlikely that it will remain undeveloped, especially as the neighbouring erven has already been developed for tourist accommodation.

The species composition and vegetation structure should indicate that the site is still largely natural although a small amount of disturbance is noticeable. As can be seen the site contains a high amount of protected species as listed in the Northern Cape Nature Conservation Act (Act 9 of 2009) (Appendix B & C). These are however all widespread and not considered rare or endangered and are therefore not of high conservation value. They do however still retain some conservation value as protected species. As a result it is recommended that permits be obtained to remove these plants and that a significant portion of them be transplanted and utilised in the landscaping of the hotel development. This will ensure that a portion is retained in the area and exchange of genetic material is still possible with the surrounding natural areas. In addition, the species, *Othonna sp. nova*, is scattered on the site. This species is listed in Snijman (2003) as *Othonna sp. A*, a newly discovered species which is abundant around Springbok but localised to the area. As a result it is also considered to be of some conservation value and recommended that it should also be transplanted and incorporated into the landscaping of the development (Appendix C).

It is recommended that a walkthrough of the site be done prior to construction to mark and map all protected plants on the site. Several of these species are also cryptic and well camouflaged and it is recommended that a suitably qualified ecologist/botanist perform the walkthrough. Furthermore, the geophytic species will only be visible during the rainy season and should be kept in mind with regard to the season of the walkthrough. Following this transplanting of succulent and geophytic species should be done adequately and establishment overseen by an ecologist or person with suitable qualifications. These transplanted specimens should be utilised in the landscaping of the development. In these areas they will remain within the natural genetic population, will be protected, will enable exchange of genetic material with adjacent populations and will provide a population for the possible re-distribution of propagules.

The impact significance has been determined and the loss of vegetation and habitat is considered moderate. This impact cannot be mitigated and is expected to remain moderate. The only other significant impact is the loss of protected species but through adequate mitigation this impact can be decreased to low-moderate.

In conclusion the site is considered to be largely natural with few impacts and contains a significant diversity of species of which a high proportion are protected (Appendix B & C). However, these do not include any rare or endangered species which are of high conservation significance. The site is also considered to form part of a Critical Biodiversity Area (CBA 1) as a result of the high species diversity in the hills around Springbok (Map 3). The site itself is however situated in the lower lying areas where the diversity is much lower and the conservation value therefore not as high. The site has also already been zoned for resort development and is situated adjacent to an existing accommodation development and therefore is unlikely to remain undeveloped. Due to the lower diversity of species, small extent of the proposed development, existing adjacent development and current land use zoning it is recommended that the proposed site be utilised for the development. It is unlikely that this development will affect the integrity of the Critical Biodiversity Area, decrease species diversity or impact on any rare or endangered species. Despite this the site still contains a high proportion of protected species and it is recommended that adequate mitigation, including transplanting a significant portion of these protected species, be adhered to (Appendix B & C).



## 9. RECOMMENDATIONS

- The site contains a high amount of protected species as listed in the Northern Cape Nature Conservation Act (Act 9 of 2009). It is recommended that permits be obtained to remove these plants and that a significant portion of them be transplanted and utilised in the landscaping of the hotel development (Appendix B & C).
- The species, *Othonna sp. nova*, is scattered on the site. It is not listed as being protected. However, this species is listed in Snijman (2003) as *Othonna sp. A*, a newly discovered species which is abundant around Springbok but localised to the area. As a result it is also considered to be of some conservation value and recommended that it should also be transplanted and incorporated into the landscaping of the development (Appendix C).
- It is recommended that a walkthrough of the site be done prior to construction to mark and map all protected plants on the site. It is recommended that a suitably qualified ecologist/botanist perform the walkthrough. Following this transplanting of succulent and bulb species should be done adequately and establishment overseen by an ecologist or person with suitable qualifications. These transplanted specimens should be utilised in the landscaping of the development.
- The development should incorporate an adequate storm water system which should manage any surface runoff on the site and release storm water into the natural drainage pattern.
- Alien weeds and invaders occurring on the site should be removed and monitored for re-establishment.
- The hunting, capturing and trapping of fauna should be prevented by making this a punishable offense during the construction phase.
- After construction has ceased all construction materials should be removed from the area.

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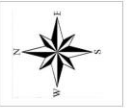
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## **Annexure A: Maps and Site photos**



**Locality map for the proposed establishment of a hotel development on Erf 5206 in Springbok, Northern Cape Province.**



Map 1: Locality map of the proposed establishment of a hotel development in Springbok. The surrounding hills and urban developments are indicated.



**Prepared for:**  
 Marguerite Cronje  
 P.O. Box 29729  
 Danhof  
 9310

- Legend:**
-  Site boundary
  -  Road network
  -  Urban area
  -  Goegap Nature Reserve

**Map Information**

**Spheroid:** WGS 84

Quantum GIS

**Scale:** 1:20 000

DPR Ecologists

**Contact Darius van Rensburg at:**

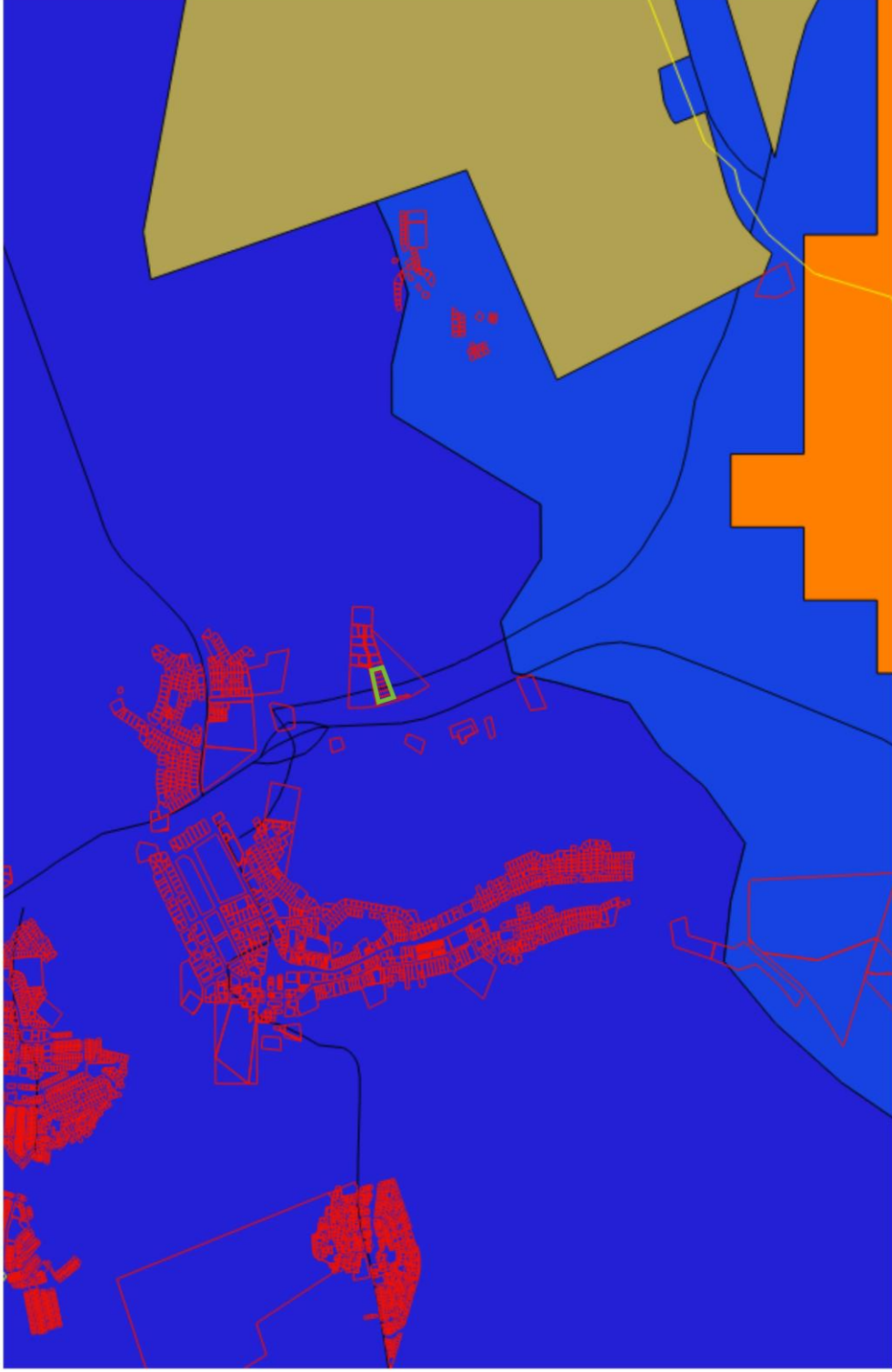
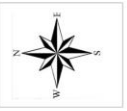
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**General ecology map for the proposed establishment of a hotel development on Erf 5206 in Springbok, Northern Cape Province.**



**Prepared for:**  
 Marguerite Cronje  
 P.O. Box 29729  
 Danhof  
 9310

- Legend:**
- Site boundary
  - Road network
  - Urban area
  - Watercourses and wetlands
  - Goegap Nature Reserve
  - Namaqualand Klipkoppe Shrub
  - Namaqualand Blomveld
  - NPAES Focus Areas

**Map Information**

**Spheroid:** WGS 84

Quantum GIS

**Scale:** 1:35 000

DPR Ecologists

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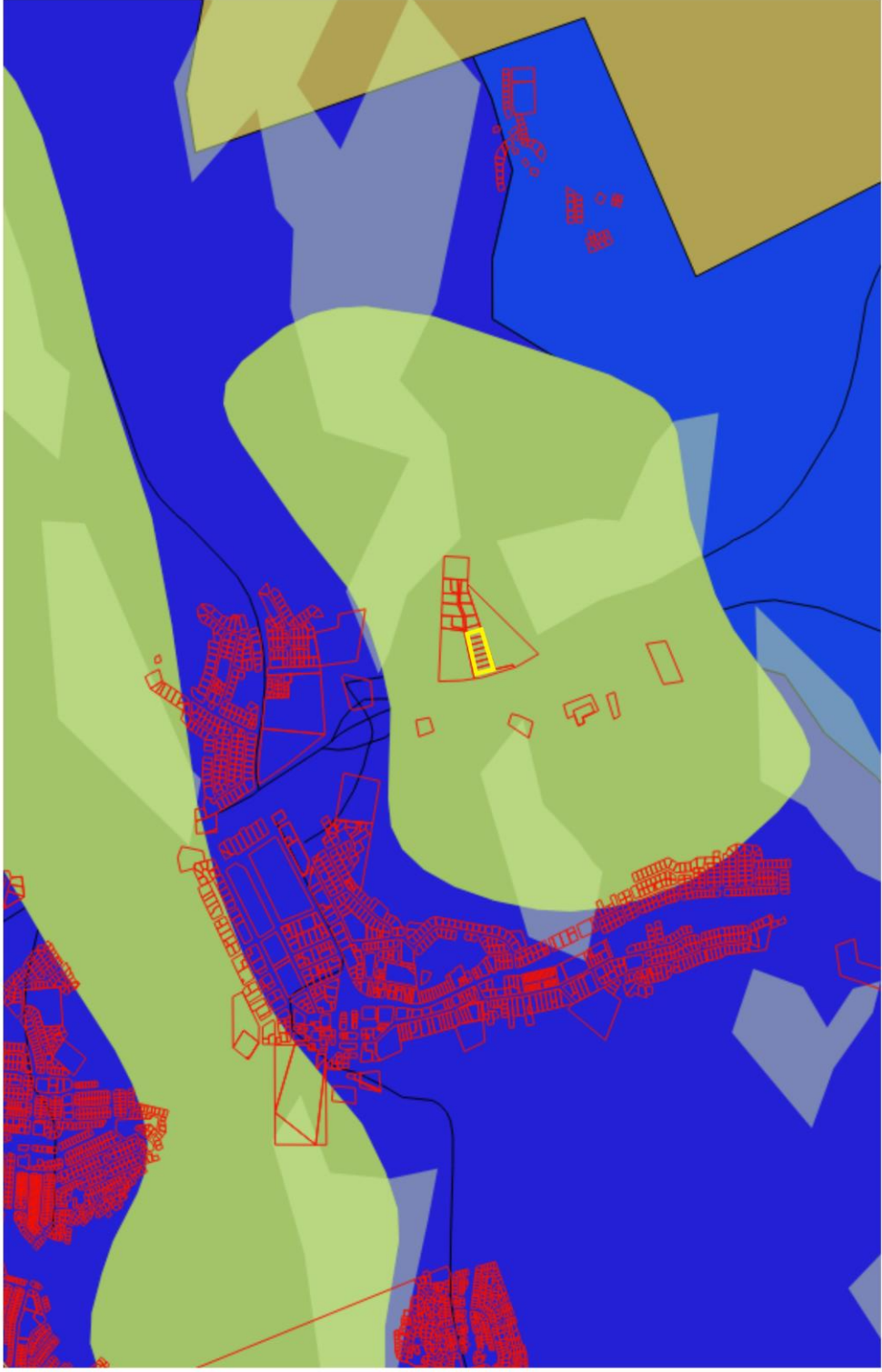
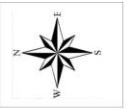
P.O. Box 12726, Brandhof, 9324

Tel: 083 410 0770



Map 2: General ecology map of the proposed establishment of a hotel development in Springbok. Threatened ecosystems, National Protected Areas Expansion Strategy (NPAES) Focus Areas, Watercourses and Wetlands, Protected areas and vegetation types are indicated.

**Namakwa District Biodiversity Sector Plan map for the proposed establishment of a hotel development on Erf 5206 in Springbok, Northern Cape Province.**



Map 3: Namakwa District Biodiversity Sector Plan map of the proposed establishment of a hotel development in Springbok. Critical Biodiversity Areas (1 & 2) and Ecological Support Areas are indicated.



**Prepared for:**  
 Marguerite Cronje  
 P.O. Box 29729  
 Danhof  
 9310

**Legend:**  
 Site boundary  
 Road network  
 Urban area

Goegap Nature Reserve  
 Namqualand Klipkoppe Shrub  
 Namaqualand Blomveld  
 Critical Biodiversity Area 1  
 Critical Biodiversity Area 2  
 Ecological Support Area

**Map Information**

**Spheroid:** WGS 84

Quantum GIS

**Scale:** 1:20 000

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Figure 1: Panorama of the site (red) as seen from the gravel road bordering it.



Figure 2: Panorama of the site. Local disturbance and clearing of vegetation is visible (red).



Figure 3: Panorama of the site toward the tarred road to the west. The slope of the site is noticeable.



Figure 4: Panorama of the site. The adjacent tourist accommodation is indicated (red). Note also that the site is situated in the lower lying portion surrounded by hills.



Figure 5: Panorama of the site. A portion of rocky outcrop is visible in the foreground (red).





Figure 6: Extensive burrow colony (red) of the Common Mole Rate (*Cryptomys hottentottus*) occurring on the site.

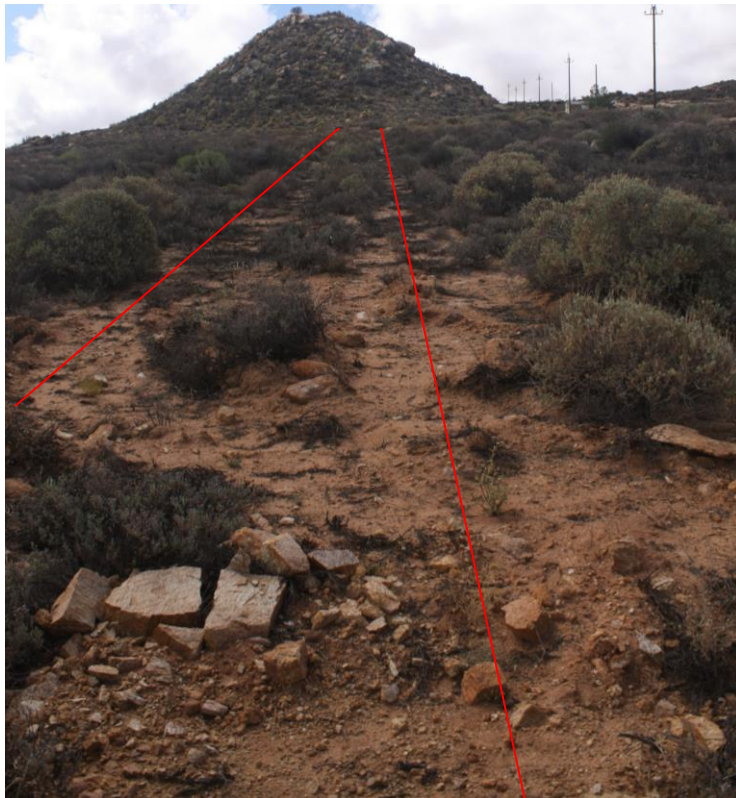


Figure 7: View of local disturbance on the site caused by vehicle tracks (red).



Figure 8: View of the adjacent tourist accommodation.

## Appendix B: Species list

Species indicated with an \* are exotic.

Protected species are coloured orange and Red List species red.

| Species   | Growth form           |
|---|-----------------------|
| * <i>Salsola kali</i>                               | Herbaceous weed       |
| <i>Aizoon canariense</i>                            | Herb                  |
| <i>Aptosimum indivisum</i>                          | Herb                  |
| <i>Asparagus asparagoides</i>                       | Climber/herb          |
| <i>Asparagus rubicundus</i>                         | Shrub                 |
| <i>Babiana dregei</i>                               | Geophyte              |
| <i>Bromus pectinatus</i>                            | Grass                 |
| <i>Bulbine alooides</i>                             | Succulent             |
| <i>Chlorophytum crassinerve</i>                     | Geophyte              |
| <i>Cotula leptalea</i>                              | Herb                  |
| <i>Crassula muscosa</i>                             | Succulent             |
| <i>Cyphia sp.</i>                                   | Climber               |
| <i>Didelta spinosa</i>                              | Shrub                 |
| <i>Drosanthemum hispidum</i>                        | Succulent dwarf shrub |
| <i>Eriocephalus brevifolius</i>                     | Shrub                 |
| <i>Eriocephalus ericoides</i>                       | Shrub                 |
| <i>Euclea tomentosa</i>                             | Shrub                 |
| <i>Euphorbia mauritanica</i>                        | Succulent shrub       |
| <i>Euphorbia rhombifolia</i>                        | Succulent shrub       |
| <i>Fingerhuthia africana</i>                        | Grass                 |
| <i>Galenia africana</i>                             | Shrub                 |
| <i>Gazania heterochaeta</i>                         | Herb                  |
| <i>Gorteria diffusa</i> subsp. <i>diffusa</i>       | Herb                  |
| <i>Hermannia disermifolia</i>                       | Shrub                 |
| <i>Lapeirousia selinoides</i>                       | Geophyte              |
| <i>Lebeckia sp.</i>                                 | Shrub                 |
| <i>Leysera gnaphalodes</i>                          | Shrub                 |
| <i>Leysera tenella</i>                              | Herb                  |
| <i>Mesembryanthemum barklyi</i>                     | Succulent             |
| <i>Microloma sagittatum</i>                         | Climber               |
| <i>Oncosiphon suffruticosum</i>                     | Herb                  |
| <i>Osteospermum hyoseroides</i>                     | Herb                  |
| <i>Osteospermum oppositifolium</i>                  | Shrub                 |
| <i>Osteospermum sinuatum</i> subsp. <i>sinuatum</i> | Shrub                 |
| <i>Othonna sp. Nova</i>                             | Succulent shrub       |
| <i>Oxalis pes-carpae</i>                            | Geophyte              |
| <i>Oxalis sp.</i>                                   | Geophyte              |
| <i>Pelargonium pulchellum</i>                       | Succulent             |
| <i>Pentzia incana</i>                               | Dwarf shrub           |

|   |                    |
|---|--------------------|
| <i>Prenia pallens</i>                                   | Succulent          |
| <i>Pteronia divaricata</i>                              | Shrub              |
| <i>Ruschia erecta</i>                                   | Succulent shrub    |
| <i>Schmidtia kalahariensis</i>                          | Grass              |
| <i>Searsia undulata</i>                                 | Shrub              |
| <i>Thesium lineatum</i>                                 | Shrub              |
| <i>Trachyandra falcata</i>                              | Geophyte           |
| <i>Tylecodon wallichii</i> subsp.<br><i>ecklonianus</i> | Succulent shrub    |
| <i>Viscum capense</i>                                   | Epiphytic parasite |
| <i>Zygophyllum retrofractum</i>                         | Shrub              |

## Appendix C: Protected species on the site

Protected species on the site may not be limited to these species but these species have identified on and around the site. Additional sources should be consulted to confirm the presence of other protected species.



***Babiana dregei***  
**Bobbejaantjie/KLipuintjie**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Bulbine alooides***  
**Wildekopiva**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Crassula muscosa***  
**Veterbossie/Lizard's Tail**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is abundant on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Euphorbia* spp.  
Melkbos**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **Two species are present, *E. mauritanica* and *E. rhombifolia*, both very similar. They are abundant on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Lapeirousia silneoides*  
Meidestert**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Mesembryanthemaceae*  
Vygies**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **Several species are present on the site and include *Drosanthemum hispidum*, *Mesembryanthemum barklyi*, *Prenia pallens*, *Ruschia erecta*. They may differ in growth habit but leaves and flowers are similar. They are abundant on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Microloma sagittatum***  
**Bokhoring/Melkblommetjie**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Oxalis spp.***  
**Surings**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. Two species occur on the site, both very similar. They should be transplanted and incorporated into the landscaping of the development.**



***Pelargonium pulchellum***

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Trachyandra falcata***  
**Bokkool/Veldkool**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Tylecodon wallichii* subsp. *ecklonianus***  
**Karkeibos/Krimpsiektebos**

Protected in the Northern Cape Province

National Red List Status: **Least Concern (LC)**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



***Othonna sp. nova***

Not protected in the Northern Cape Province

National Red List Status: **Not yet evaluated**

Method: **The species is rare on the site. They should be transplanted and incorporated into the landscaping of the development.**



## Appendix D: Impact methodology

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood

### Determination of Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: **Severity/Intensity, Duration and Extent/Spatial Scale**. Each factor is assigned a rating of 1 to 5, as described below and in tables 6, 7, 9 and 10.

### Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.

Table 7 will be used to obtain an overall rating for severity, taking into consideration the various criteria.

Table 7: Rating of severity

| Type of criteria   | Rating   |  |  |  |   |
|--|--|--|--|--|---|
|  | 1  | 2  | 3  | 4  | 5   |
| Quantitative   | 0-20%  | 21-40%   | 41-60%   | 61-80%   | 81-100%   |
| Qualitative  | Insignificant / Non-harmful  | Small Potentially harmful /                    | Significant / Harmful  | Great / Very harmful                                   | Disastrous Extremely harmful  |
| Social/ Community response   | Acceptable / I&AP satisfied  | Slightly tolerable / Possible objections       | Intolerable/ Sporadic complaints   | Unacceptable / Widespread complaints                   | Totally unacceptable / Possible legal action  |
| Irreversibility  | Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible | Low cost to mitigate                           | Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact | High cost to mitigate                                  | Prohibitive cost to mitigate / Little or no mechanism to mitigate impact Irreversible |
| Biophysical (Air quality, water quantity and quality, waste production, fauna and flora) | Insignificant change / deterioration or disturbance  | Moderate change / deterioration or disturbance | Significant change / deterioration or disturbance  | Very significant change / deterioration or disturbance | Disastrous change / deterioration or disturbance                                      |

### Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 8: Rating of Duration

| Rating         | Description                           |
|----------------|---------------------------------------|
| 1: Low         | Almost never / almost impossible      |
| 2: Low-Medium  | Very seldom / highly unlikely         |
| 3: Medium      | Infrequent / unlikely / seldom        |
| 4: Medium-High | Often / regularly / likely / possible |
| 5: High        | Daily / highly likely / definitely    |

### Determination of Extent/Spatial Scale

Extent refer to the spatial influence of an impact be local (extending only as far as the activity, or will be limited to the site and its immediate surroundings), regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders).

Table 9: Rating of Extent / Spatial Scale

| Rating         | Description                                 |
|----------------|---|
| 1: Low         | Immediate, fully contained area             |
| 2: Low-Medium  | Surrounding area                            |
| 3: Medium      | Within Business Unit area of responsibility |
| 4: Medium-High | Within Mining Boundary area                 |
| 5: High        | Regional, National, International           |

### Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 4.

Table 10: Example of calculating Overall Consequence

| Consequence                               | Rating    |
|---|-----------|
| Severity                                  | Example 4 |
| Duration                                  | Example 2 |
| Extent                                    | Example 4 |
| SUBTOTAL                                  | 10        |
| TOTAL CONSEQUENCE:(Subtotal divided by 4) | 3.3       |

### Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in Table 11 and Table 12.

### Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Table 11: Rating of frequency

| Rating         | Description                                   |
|----------------|---|
| 1: Low         | Once a year or once/more during operation/LOM |
| 2: Low-Medium  | Once/more in 6 Months                         |
| 3: Medium      | Once/more a Month                             |
| 4: Medium-High | Once/more a Week                              |
| 5: High        | Daily   |

### Determination of Probability

Probability refers to how often the activity/event or aspect has an impact on the environment.

Table 12: Rating of probability

| Rating         | Description                           |
|----------------|---------------------------------------|
| 1: Low         | Almost never / almost impossible      |
| 2: Low-Medium  | Very seldom / highly unlikely         |
| 3: Medium      | Infrequent / unlikely / seldom        |
| 4: Medium-High | Often / regularly / likely / possible |
| 5: High        | Daily / highly likely / definitely    |

### Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Table 13: Example of calculating the overall likelihood

| Consequence                              | Rating    |
|--|-----------|
| Frequency                                | Example 4 |
| Probability                              | Example 2 |
| SUBTOTAL                                 | 6         |
| TOTAL LIKELIHOOD (Subtotal divided by 2) | 3         |

### Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH, as shown in the table below.

Table 14: Determination of overall environmental significance

| Significance or Risk                     | Low     | Low-Moderate | Moderate  | Moderate-High | High    |
|--|---------|--------------|-----------|---------------|---------|
| Overall Consequence X Overall Likelihood | 1 - 4.9 | 5 - 9.9      | 10 - 14.9 | 15 - 19.9     | 20 - 25 |

### Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision making process associated with this event, aspect or impact.

Table 15: Description of the environmental significance and the related action required.

| Significance     | Low   | Low-Moderate  | Moderate  | Moderate-High   | High   |
|------------------|---|---|---|---|--|
| Impact Magnitude | Impact is of very low order and therefore likely to have very little real effect. Acceptable. | Impact is of low order and therefore likely to have little real effect. Acceptable.   | Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company              | Impact is real and substantial in relation to other impacts. Pose a risk to the company. Unacceptable | Impact is of the highest order possible. Unacceptable. Fatal flaw.   |
| Action Required  | Maintain current management measures. Where possible improve.                                 | Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve | Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible. | Improve management measures to reduce risk.   | Implement significant mitigation measures or implement alternatives. |