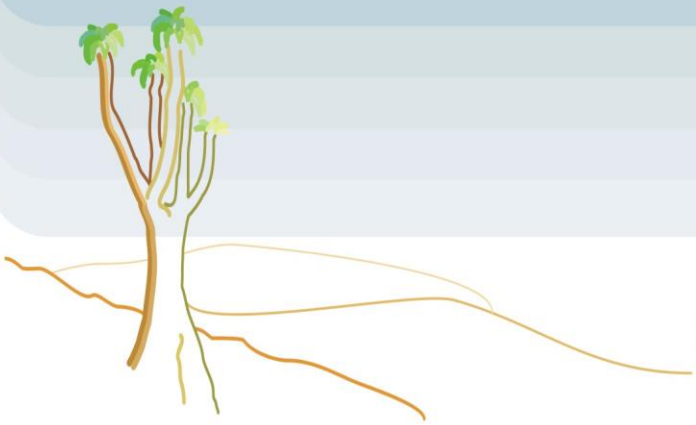

DPR
Ecologists & Environmental Services

Report on the ecological and biodiversity assessment for the proposed powerline construction between the Klipkop and Wessels substations near the town of Hotazel, Northern Cape Province.

November 2022

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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.

Report Version	**Final 1.0**		
Title	**Report on the ecological and biodiversity assessment for the proposed powerline construction between the Klipkop and Wessels substations near the town of Hotazel, Northern Cape Province.**		
Author	**DP van Rensburg (Pr.Sci.Nat)**		**Nov'22**

Executive Summary

The proposed development will consist of a powerline which will be constructed between the Wessels and Klipkop substations which is situated around the Blackrock and Wessels manganese mines located approximately 20 km to the north west of the small town of Hotazel (Appendix A: Map 1). The powerline will have an approximate extent of 8 km. The powerline will be situated in areas of natural vegetation though along the perimeter of mining areas and contains varying degrees of disturbance.

According to Mucina & Rutherford (2006) and utilising current mapping resources (National Biodiversity Assessment 2018) the site is indicated to fall within Kathu Bushveld (SVk 12) (Appendix A: Map 1 & 2). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) (Appendix A: Map 1) which will also decrease the conservation value of remaining natural vegetation. According to the Northern Cape Critical Biodiversity Areas Plan (2016) the proposed powerline route falls within an Other Natural Area (ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2).

Several protected plant species occur along the powerline route (Appendix B & C). These are all relatively widespread but do still retain a significant conservation value. Where the tree species (*Boscia albitrunca, Vachellia erioloba* and *Vachellia haematoxylon*) will be affected and will require removal, the necessary permits will have to be obtained to do so. In addition, two protected geophytic plant species, *Raphionacme velutina* and *Harpagophytum procumbens* were also observed along the powerline route. Should any specimens be affected, permits should be obtained and those transplanted to adjacent areas.

The impact significance has been determined and without mitigation a few impacts may be moderate. However, with adequate mitigation which in most cases could be easily applied, all impact can be decreased to at least low-moderate. The loss of protected tree species is however anticipated to remain a moderate impact since this will not be easily mitigated.

The vegetation along the powerline route it is clearly still largely natural, in a fairly good condition and with a significant species diversity. However, given the limited footprint of the proposed powerline it is unlikely to cause extensive disturbance of the environment. Disturbance caused by the powerline construction is likely to increase the establishment of exotic weeds and it will therefore still be important to undertake monitoring and clearing of exotic weeds after construction. In addition, the natural vegetation type in the area, Kathu Bushveld is also not currently considered to be of high conservation concern and is listed as being of Least Concern (LC) (Appendix A: Map 1 & 2). Furthermore, the area is also listed as an Other Natural Area (ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2). However, as indicated the powerline route does contain several protected species of significant conservation value and adequate mitigation will be required to alleviate the impact on these. Therefore, in conclusion, although elements of conservation value do occur, overall the proposed powerline route does not contain a high conservation value or unique features requiring exclusion and should not result in any high impacts on the vegetation and ecology of the site and immediate surroundings.

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Ecological and biodiversity 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 plant 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 power line is situated within the Griqualand West 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.

The proposed development will consist of a powerline which will be constructed between the Wessels and Klipkop substations which is situated around the Blackrock and Wessels manganese mines located approximately 20 km to the north west of the small town of Hotazel (Appendix A: Map 1). The powerline will have an approximate extent of 8 km. The powerline will be situated in areas of natural vegetation though along the perimeter of mining areas and contains varying degrees of disturbance.

A site visit was conducted on 10 October 2022. Due to the length of the powerline and limited access due to electrical fences, only sample sections of the powerline could be surveyed. This is however considered as more than sufficient to provide a comprehensive description of the powerline route. The survey was conducted during spring and as a result of recent years of good rainfall, the vegetation identification on the site was considered optimal.

For the above reasons it is necessary to conduct an 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.

1.3 Details and expertise of specialist

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South African Council for Natural Scientific Professions No. (400284/13) (Ecological Science).

Membership with relevant societies and associations:

- South African Society of Aquatic Scientists (SASAQS0091)
- South African Association of Botanists
- South African Wetlands Society (3SLY4IG4)

Expertise:

- Qualifications: B.Sc. (Hons) Botany (2008), M.Sc. in Vegetation Ecology (2012) with focus on ephemeral watercourses.
- Vegetation ecologist with over 10 years experience of conducting ecological assessments.
- Founded DPR Ecologists & Environmental Services (Pty) Ltd in 2016.
- Has conducted over 200 ecological and wetland assessments for various developments.
- Regularly attend conferences and courses in order to stay up to date with current methods and trends:

  2017: Kimberley Biodiversity Symposium.
  2018: South African Association of Botanists annual conference.
  2018: National Wetland Indaba Conference.
  2019: SASS5 Aquatic Biomonitoring Training.
  2019: Society for Ecological Restoration World Congress 2019.
  2019: Wetland rehabilitation: SER 2019 training course.
  2020: Tools For Wetlands (TFW) training course.
  2022: National Wetland Indaba Conference.

2. SCOPE AND LIMITATIONS

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

- Some geophytic or succulent species may have been overlooked due to a specific flowering time or cryptic nature.
- Some animal species may not have been observed as a result of their nocturnal and/or shy habits.
- Although a comprehensive survey of the site was done it is still likely that several species were overlooked.
- Electrical fences and secure areas limited the access along the powerline route and it is possible that areas or elements of conservation value were inaccessible and therefore were not surveyed.

3. METHODOLOGY

3.1 Several literature works were used for additional information.

General ecology:

- Red Data List (Raymondo *et al.* 2009).
- Vegetation types (Mucina & Rutherford 2006).
- NBA 2018 Technical Report Volume 1: Terrestrial Realm.
- SANBI (2011): List of threatened ecosystems.
- NEM:BA: List of threatened ecosystems and Threatened Or Protected Species (TOPS).
- National List of Protected Trees under the National Forest Act 84 of 1998.
- Northern Cape Nature Conservation Act No. 9 of 2009.
- Northern Cape Critical Biodiversity Areas Plan (2016).

Vegetation:
Field guides used for species identification (Adams 1976, Bromilow 1995, 2010, Coates-Palgrave 2002, Fish *et al* 2015, Gibbs-Russell *et al* 1990, Manning 2009, Roberts & Fourie 1975, Shearing & Van Heerden 2008, Van Oudtshoorn 2004, Van Rooyen 2001, Van Rooyen & Van Rooyen 2019, Van Wyk & Van Wyk 1997).

Terrestrial fauna:
Field guides for species identification (Smithers 1983, Child *et al* 2016, Cillié 2018).

3.2 Survey

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

- Noted species include rare and dominant species (Appendix B).
- The broad vegetation types present at 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.
- The state of the habitat was also assessed.

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

Refer to the list of species encountered on the powerline route and surroundings in Appendix B.

According to Mucina & Rutherford (2006) and utilising current mapping resources (National Biodiversity Assessment 2018) the site is indicated to fall within Kathu Bushveld (SVk 12) (Appendix A: Map 1 & 2). This vegetation type is characterised by a well-developed, tall tree layer which is fairly open and a variable grass layer situated on deep red sands. This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) (Appendix A: Map 1). The vegetation type is not under sufficient development pressures to be considered a threatened ecosystem. This will also decrease the conservation value of remaining natural vegetation. In addition, the natural vegetation is situated along the periphery of mining areas and contain varying degrees of disturbance caused by existing powerlines, dirt tracks and firebreaks.

The Northern Cape Critical Biodiversity Areas Plan (2016) has been published in order to identify areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas (CBA). The proposed powerline route falls within an Other Natural Area (ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2). The area does however still form part of the Girqualand West Centre of Endemism which is a large area identified to contain many endemic plant species localised to this area. It may therefore still be possible that the powerline route would contain plants of high conservation value.

The proposed development will consist of a powerline which will be constructed between the Wessels and Klipkop substations which is situated around the Blackrock and Wessels manganese mines located approximately 20 km to the north west of the small town of Hotazel (Appendix A: Map 1). The powerline will have an approximate extent of 8 km. The powerline will be situated in areas of natural vegetation though along the perimeter of mining areas and contains varying degrees of disturbance. No watercourses or wetlands could be identified on or near the proposed site and is therefore highly unlikely to have any impact on surface water features.

The entire powerline route is still dominated by natural vegetation and consists of a well-developed grass layer, prominent and dense shrub layer and scattered larger tree specimens. An herbaceous and geophyte component is also quite prominent within the vegetation layer. The topography and resulting habitat along the powerline route is fairly uniform, consisting of deep, yellow to reddish coloured, loose sandy soils with flat plains containing no discernible slope gradient. As a result, there is no appreciable diversity in terms of habitat and vegetation composition along the powerline route.

As indicated, though the powerline route is situated within natural vegetation various impacts does lead to some disturbance. Portions of the powerline will be situated along existing security fences where perimeter dirt tracks and firebreaks are also present and consequently some disturbance of the vegetation layer is already present. Along the northern portion of the

powerline, it will also be situated alongside an existing powerline and here the servitude has already affected the vegetation, especially the tree layer. The area is also being used for grazing by domestic livestock and significant levels of overgrazing were noted, especially in the northern portion of the powerline route. Overall, the vegetation layer is therefore still intact but with some disturbance notable.

Figure 1: Aerial view of the proposed powerline route (Google Earth 2020). The powerline will be situated all along the periphery of mining areas.

Figure 2: The vegetation along the powerline route is dominated by a savannah vegetation structure. Note also disturbance along the fenceline with dirt tracks and firebreaks being present.

Figure 3: Large trees may also be present along the powerline route and will be affected by the development. Note also a diminished grass layer here due to overgrazing by domestic livestock.

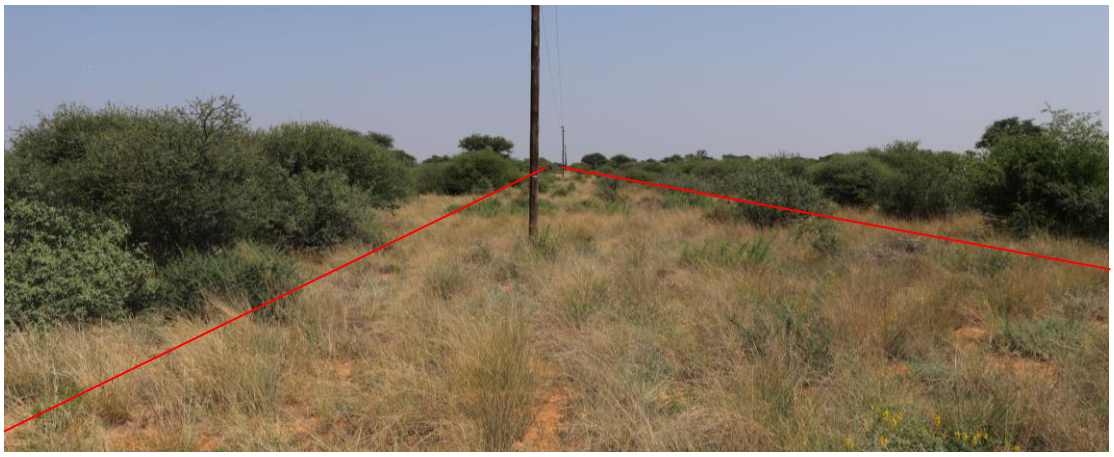

Figure 4: Some sections of the powerline route also contain existing powerlines and the servitude also indicate the anticipated impact in terms of the removal of trees.

As previously indicated, the topography of the powerline route consists of a uniform, flat sandy plain without a discernible slope. The topography along the powerline route is still intact and natural without any prominent modifications. Though mining operations causes modification of the surroundings this does not form part of the powerline route. No watercourses or wetlands occur near the site and the powerline route itself also does not contain any concentrated runoff patterns, wetlands or watercourses (Appendix A: Map 1 & 2). Due to the flat topography, the area does contain scattered pans or depression wetlands though none of these were observed near the powerline route. This was also confirmed by a wetland survey conducted by Jeffares & Green (2015) which indicates the absence of any wetlands or watercourses along the powerline route as indicated (Appendix A: Map 1). The proposed development should therefore not result in any impact on any wetland, watercourse or any other surface water feature. The elevation along the powerline route varies between 1045 and 1055 m which also indicates the largely flat topography.

Figure 5: Topography along the powerline route is clearly flat and without any prominent landscape features.

The region has an approximate mean annual rainfall of 340 mm with most rainfall occurring in summer to autumn. This is considered a relatively low rainfall and causes the area to form part of the more arid parts of South Africa. This therefore does not promote the formation of wetlands and watercourses in the area. The average temperature ranges from 11.2˚C in July to 26.1˚C in January with frosts common in winter.

The geology of the area consists of the Hotazel Formation which is unconformably overlain by Early Permian Dwyka diamictite (tillite) of the Karoo Supergroup or Cenozoic Kalahari calcrete, clay and windblown sand. The Hotazel Formation is underlain by hyaloclastic pillow and massive lavas of the Ongeluk Formation (Transvaal Supergroup) (SLR 2015a).

Dominant soil types within the area are made up of Chromic Cambisols and Ferralic Arenosols. Cambisols are characterised as having good structural stability, high porosity, good water holding capacity and good drainage. Ferralic Arenosols are characteristic of having a loamy sand to a coarse type texture, for depths of about 1 m. The pore spaces for these soils are usually large, allowing for free drainage and increased permeability. The available water capacity (AWC) is therefore low (SLR 2015b).

The following description of the vegetation on the site should give a good indication of the condition of the ecology on it.

As previously indicated, the vegetation structure consists of a scattered tree layer, relatively dense shrub layer and well-developed grass layer. The grass layer is dominated by a variety of species, with most being climax species. These climax species include *Schmidtia kalahariensis, Digitaria eriantha, Eragrostis pallens, Aristida meriodonalis* and *Anthephora pubescen* while pioneer species such as *Aristida stipitata* and *Pogonarthria squarrosa* are more common where disturbance is evident. This grass composition is also indicative of natural vegetation with relatively low levels of disturbance. Within this grass layer, an herbaceous component is also abundant and include species such as *Pollichia campestris, Hirpicium echinus, Hermannia comosa, Hermannia boraginiflora, Pomeria burchellii, Indigofera daleoides, Senna italica, Hermbstaedtia fleckii, Aptosimum elongatum, Dimorphotheca zeyheri, Nolletia arenosa, Helichrysum arenicola, Berkheya ferox* and *Dicerocaryum eriocarpum*. This also indicates a significant species diversity in this area and along the powerline route. The tree

layer consists of species such as *Vachellia erioloba, Vachellia haematoxylon, Senegalia mellifera* subsp. *detinens, Ziziphus mucronata, Boscia albitrunca* and *Terminais sericea*. Of these *B. albitrunca, V. haematoxylon* and *V. erioloba* are also listed as protected species and though they are widespread and relatively common they still retain some conservation value (Appendix C). Where the powerline will therefore require the removal of any of these trees, the necessary permits will have to be obtained to do so. The shrub layer is dominated by species such as *Grewia flava, Vachellia hebeclada, Lycium villosum, Crotalaria spartioides, Diospyros lycioides* and *Rhigozym trichotomum*. The sandy soils also promote the proliferation of creepers and geophytic plants (plants with an underground storage organ). Common creeping plants in the area include *Acanthosicyos naudinianus, Pergularia daemia, Convolvulus ocellatus, Xenostegia tridentata* subsp. *angustifolia* and *Ipmoea obscura*. Geophytic species include *Harpagophytum procumbens, Raphionacme velutina, Elephanthorrihiza elephantina* and *Moraea polystachya*. Of these plants, *R. velutina* and *H. procumbens* are also both listed protected species and therefore have a significant conservation value. Given the limited footprint of the powerline it is unlikely that they will be affected by the construction, especially given the subterranean nature, they will only be affected by excavations which will be limited to pylons. However, should any specimens be affected, permits should be obtained and those transplanted to adjacent areas where they will remain unaffected. As previously indicated, some disturbance is present within the vegetation layer and this was also indicated by a few pioneer herbaceous species often establishing where disturbance occurs. These pioneer species included *Nidorella resedifolia, Senecio consanguineus, Acrotome inflata* and *Felicia muricata*. Where overgrazing by livestock was also highest, a few exotic weeds had also established and includes *Argemone ochroleuca* and *Verbesina encelioides*. From the above description of the vegetation along the powerline route it is clearly still largely natural and in fairly good condition with a low level of disturbance and also contains a significant species diversity. Elements of conservation value (protected plant species) are also present and will require adequate mitigation.

Figure 6: The vegetation structure consists of a well-developed grass layer, fairly dense shrub layer and scattered larger trees.

Figure 7: The shrub component can also become quite dense in some areas.

Figure 8: Where overgrazing by livestock is highest, the grass layer is clearly diminished.

Figure 9: Protected trees along the powerline route include, from left to right; *Vachellia erioloba* (Camel Thorn), *Vachellia haematoxylon* (Grey Camel Thorn) and *Boscia albitrunca* (Shepherds Tree).

Figure 10: Protected subterranean plants observed along the powerline route include *Harpagophytum procumbens* (Left) and *Raphionacme velutina* (Right).

Endangered or Red Listed species are absent from the powerline route and is considered somewhat unlikely to occur as this area is not known for containing many Red Listed plant species. However, as indicated, several protected plant species do occur along the powerline route (Appendix B & C). These are all relatively widespread but do still retain a significant conservation value. Where the tree species (*Boscia albitrunca, Vachellia erioloba* and *Vachellia haematoxylon*) will be affected and will require removal, the necessary permits will have to be obtained to do so. The servitude underneath the powerline will have to be cleared and it is therefore inevitable that several of these trees will be affected. In addition, two protected geophytic plant species, *Raphionacme velutina* and *Harpagophytum procumbens* were also observed along the powerline route. Given the limited footprint of the powerline it is unlikely that they will be affected by the construction, especially given the subterranean nature, they will only be affected by excavations which will be limited to pylons. However, should any specimens be affected, permits should be obtained and those transplanted to adjacent areas where they will remain unaffected. It is recommended that prior to construction a walkthrough is undertaken to count and mark all protected trees requiring removal any other protected plants which should be transplanted and that applicable permits then be obtained for removal/transplanting (Appendix C).

From the description of the vegetation along the powerline route it is clearly still largely natural, in a fairly good condition and with a significant species diversity. Though some disturbance is present due to dirt tracks, firebreaks, existing powerlines and overgrazing by livestock it is still fairly low. However, given the limited footprint of the proposed powerline it is unlikely to cause extensive disturbance of the environment. Disturbance caused by the powerline construction is likely to increase the establishment of exotic weeds and it will therefore still be important to undertake monitoring and clearing of exotic weeds after construction. In addition, the natural vegetation type in the area, Kathu Bushveld is also not currently considered to be of high conservation concern and is listed as being of Least Concern (LC) (Appendix A: Map 1 & 2). Furthermore, the area is also listed as an Other Natural Area (ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2). However, as indicated the powerline route does contain several protected species of significant conservation value and adequate mitigation will be required to alleviate the impact on these

(Appendix B & C). Therefore, in conclusion, although elements of conservation value do occur, overall the proposed powerline route does not contain a high conservation value or unique features requiring exclusion and should not result in any high impacts on the vegetation and ecology of the site and immediate surroundings.

4.2 Overview of terrestrial fauna (actual & possible)

Tracks and signs of mammals are abundant along the powerline route and are likely coupled to the largely natural habitat in the surrounding areas. It is however highly likely the adjacent mining operations will affect the natural mammal population to some degree, especially in terms of the occurrence of reclusive and threatened mammal species. The area is also utilised for domestic livestock and the farmers will undoubtedly hunt small carnivores such as Black Backed Jackal (*Canis mesomelas*). The mammal population is therefore anticipated to be modified to some degree. In addition, mammal species which are rare and endangered are often habitat specific, sensitive to habitat change and avoids areas in close proximity to human activities. Given the proximity of mining operations it is therefore considered unlikely that such species would occur on the site. Extensive natural areas do still occur in the surroundings and should provide adequate habitat and the mammal population will still be largely natural here.

The mammal survey of the site was conducted by means of active searching and recording any tracks or signs of mammals and actual observations of mammals. It is also considered likely that the area will also contain several other mammal species but these were not observed on the site. From the survey the following actual observations of mammals were recorded:

- Soil mounds of the Common Molerat (*Cryptomys hottentotus*) were observed in the sandy plains portion. This is a widespread species which has even become adapted to urban areas. It is a generalist species anticipated to occur in this area.

- Scat and quills of Porcupines (*Hystrix africaeaustralis*) were noted in the study area. This is also a generalist species, widespread and common in peri-urban areas. It is also able to inhabit disturbed habitats.

- Dungheaps and tracks of small antelope, possibly Steenbok (*Raphicerus campestris*) or Duiker (*Sylvicarpa grimmia*) were noted. Both are also common and widespread and therefore not of high conservation value. They are also not confined to the site and should easily vacate into the surrounding natural areas.

- Droppings of Kudu (*Tragelaphus strepsiceros*) were also noted and this species is also still fairly common in this region.

These species identified are all relatively widespread and common generalist species and confirm the anticipated mammal composition on the site. They do however indicate that mammals are still able to inhabit the site though it is unlikely that any species of conservation concern will occur as a result of the proximity of current mining operations.

The impact that the proposed powerline will have is mainly concerned with the loss of habitat. Transformation of the natural vegetation on the site will result in a decrease in the population size as available habitat decreases. However, the survey has indicated that due to the proximity of mining operations, the mammal population will already be somewhat modified here. Large natural areas also occur around the site and any mammals on the site are likely to

vacate the site into these adjacent areas should development take place. Furthermore, the footprint of the development will not be extensive and should therefore limit the impact on mammals. The impact would also be mostly temporary as long as adequate rehabilitation is undertaken. Similar powerline projects have indicated that adequate rehabilitation allows the affected area to return to a close to natural condition which would therefore re-instate the habitat for fauna and minimise the impact on the faunal population.

In order to ensure no direct impact on the mammals on the site the hunting, capturing or trapping of mammals on the site should be strictly prohibited during construction.

Table 2: List of mammal species previously recorded in the region (Mammalmap & Child *et al* 2016).

Order	Family	Common name	Scientific name
Phylum Vertebrata; Class Mammalia			
Chiroptera	Vespertilionidae	Schreibers's Long-fingered Bat	*Miniopterus schreibersii*
Macroscelidea	Macroscelididae	Round-eared Sengi	*Macroscelides proboscideus*
Eulipotyphla	Erinaceidae	Southern African Hedgehog	*Atelerix frontalis*
Pholidota	Manidae	Ground Pangolin	*Smutsia temminckii*
Lagomorpha	Leporidae	Cape Hare	*Lepus capensis*
		Scrub Hare	*Lepus saxatilis*
Rodentia	Sciuridae	Southern African Ground Squirrel	*Xerus inauris*
	Pedetidae	Southern African Springhare	*Pedetes capensis*
	Bathyergidae	Common Mole-rat	*Cryptomys hottentotus*
	Gliridae	Flat-headed African Dormouse	*Graphiurus (Graphiurus) platyops*
	Hystricidae	Cape Porcupine	*Hystrix africaeaustralis*
	Muridae	Woosnam's Desert Mouse	*Zelotomys woosnami*
		Pouched Mouse	*Saccostumus campestris*
		Grey Climbing Mouse	*Dendromus melanotis*
		Large-eared Mouse	*Malacothrix typica*
		Cape Short-tailed Gerbil	*Desmodillus auricularis*
		Pygmy Hairy-footed Gerbil	*Gerbillurus paeba*
		Bushveld Gerbil	*Gerbilliscus leucogaster*
		Highveld Gerbil	*Gerbilliscus brantsii*
		Red Veld Rat	*Aethomys chrysophilus*
		Four-striped Grass	*Rhabdomys spp*

		Mouse	
		Black-tailed Tree Rat	*Thallomys nigricauda*
		Southern Multimammate Mouse	*Mastomys coucha*
		Xeric Four-striped Grass Rat	*Rhabdomys pumilio*
		Brant's Whistling Rat	*Parotomys brantsii*
		Littledale's Whistling Rat	*Parotomys littledalei*
Carnivora	Canidae	Cape Fox	*Vulpes chama*
		Bat-eared Fox	*Otocyon megalotis*
		Black-backed Jackal	*Canis mesomelas*
	Mustelidae	Honey Badger	*Mellivora capensis*
		African Striped Weasel	*Poecilogale albinucha*
		Striped Polecat	*Ictonyx striatus*
	Herpestidae	Slender Mongoose	*Galerella sanguinea*
		Yellow Mongoose	*Cynictis penicillata*
		Suricate	*Suricata suricatta*
	Viverridae	Small-spotted Genet	*Genetta genetta*
	Hyaenidae	Brown Hyaena	*Hyaena brunnea*
		Aardwolf	*Proteles cristatus*
	Felidae	African Wild Cat	*Felis silvestris*
		Small Spotted Cat	*Felis nigripes*
		Caracal	*Caracal caracal*
		Leopard	*Panthera pardus*
Tubulidentata	Orycteropodidae	Aardvark	*Orycteropus afer*
Cetartiodactyla	Bovidae	Common Eland	*Taurotragus oryx*
		Greater Kudu	*Tragelaphus strepsiceros*
		Springbok	*Antidorcas marsupialis*
		Steenbok	*Raphicerus campestris*
		Common Duiker	*Sylvicapra grimmia*

Figure 11: Tracks and signs of mammals on the site include clockwise from top to bottom; Scat and quill of a Porcupine (*Hystrix africaeaustralis*), soil mound of the Common molerat (*Cryptomys hottentotus*), Track of a small antelope, most likely Steenbok (*Raphicerus campestris*) or Duiker (*Sylvicarpa grimmia*) and droppings of Kudu (*Tragelaphus strepsiceros*).

5. ANTICIPATED IMPACTS

Anticipated impacts that the development will have is primarily concerned with the loss of habitat and species diversity.

As previously discussed, from the description of the vegetation along the powerline route it is clearly still largely natural, in a fairly good condition and with a significant species diversity. Though some disturbance is present due to dirt tracks, firebreaks, existing powerlines and overgrazing by livestock it is still fairly low. However, the natural vegetation type in the area, Kathu Bushveld is also not currently considered to be of high conservation concern and is listed as being of Least Concern (LC) (Appendix A: Map 1 & 2). Furthermore, the area is also listed as an Other Natural Area (ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2). In addition, given the limited footprint of the proposed powerline it is unlikely to cause extensive disturbance of the environment. Disturbance caused by the powerline construction is likely to increase the establishment of exotic weeds and it will therefore still be important to undertake monitoring and clearing of exotic weeds after construction. Therefore, in conclusion, although elements of conservation value do occur, overall the proposed powerline route does not contain a high conservation value or unique features requiring exclusion and should not result in any high impacts on the vegetation and ecology of the site and immediate surroundings. The loss of habitat and diversity should therefore not exceed a moderate impact.

Endangered or Red Listed species are absent from the powerline route and is considered somewhat unlikely to occur as this area is not known for containing many Red Listed plant species. However, as indicated, several protected plant species do occur along the powerline route (Appendix B & C). These are all relatively widespread but do still retain a significant conservation value. Where the tree species (*Boscia albitrunca, Vachellia erioloba* and *Vachellia haematoxylon*) will be affected and will require removal, the necessary permits will have to be obtained to do so. The servitude underneath the powerline will have to be cleared and it is therefore inevitable that several of these trees will be affected. In addition, two protected geophytic plant species, *Raphionacme velutina* and *Harpagophytum procumbens* were also observed along the powerline route. Given the limited footprint of the powerline it is unlikely that they will be affected by the construction, especially given the subterranean nature, they will only be affected by excavations which will be limited to pylons. However, should any specimens be affected, permits should be obtained and those transplanted to adjacent areas where they will remain unaffected. It is recommended that prior to construction a walkthrough is undertaken to count and mark all protected trees requiring removal any other protected plants which should be transplanted and that applicable permits then be obtained for removal/transplanting. The loss of protected trees is inevitable which will therefore remain at least a moderate impact and though mitigation may reduce the impact on geophytic species, the overall impact will remain moderate due to the loss of protected tree species.

As indicated, the topography of the powerline route consists of a uniform, flat sandy plain without a discernible slope and as a result, no watercourses or wetlands occur near the site and the powerline route itself also does not contain any concentrated runoff patterns, wetlands or watercourses (Appendix A: Map 1 & 2). Due to the flat topography, the area does contain scattered pans or depression wetlands though none of these were observed near the powerline route. This was also confirmed by a wetland survey conducted by Jeffares & Green (2015) which indicates the absence of any wetlands or watercourses along the powerline route as

indicated (Appendix A: Map 1). The proposed development should therefore not result in any impact on any wetland, watercourse or any other surface water feature.

Where disturbance was evident, especially in areas affected by overgrazing, a few exotic weeds have become established (Appendix B). Construction activities will also increase disturbance and therefore increase the susceptibility for the establishment of weeds and invasive species and their spread into the surroundings. Monitoring of weed establishment and eradication should form a prominent part of management of the development. 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. Unmitigated this is anticipated to be at least a moderate impact, though should be easily decreased through adequate weed control.

The impact that the proposed powerline will have on the mammal population is mainly concerned with the loss of habitat. Transformation of the natural vegetation on the site will result in a decrease in the population size as available habitat decreases. However, the survey has indicated that due to the proximity of mining operations, the mammal population will already be somewhat modified here. Large natural areas also occur around the site and any mammals on the site are likely to vacate the site into these adjacent areas should development take place. Furthermore, the footprint of the development will not be extensive and should therefore limit the impact on mammals. The impact would also be mostly temporary as long as adequate rehabilitation is undertaken. Similar powerline projects have indicated that adequate rehabilitation allows the affected area to return to a close to natural condition which would therefore re-instate the habitat for fauna and minimise the impact on the faunal population.

The impact significance has been determined and without mitigation a few impacts may be moderate. However, with adequate mitigation which in most cases could be easily applied, all impact can be decreased to at least low-moderate. The loss of protected tree species is however anticipated to remain a moderate impact since this will not be easily mitigated.

Please refer to Appendix D for the impact methodology.

Significance of the impact:

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Before Mitigation								
Loss of vegetation type and clearing of vegetation	3	4	1	2.6	4	4	4	10.4
Loss of protected species	4	5	1	3.3	5	4	4.5	14.8
Impact on watercourses	1	5	1	2.3	1	1	1	2.3
Infestation with weeds and invaders	3	4	3	3.3	4	3	3.5	11.5
Impact on Terrestrial fauna	2	4	1	2.3	3	3	3	6.9
After Mitigation								
Loss of vegetation type and clearing of vegetation	2	4	1	2.3	4	4	4	9.2
Loss of protected species	3	5	1	3	5	3	3.5	10.5
Impact on watercourses	1	5	1	2.3	1	1	1	2.3
Infestation with weeds and invaders	2	3	1	2	3	2	2.5	5
Impact on Terrestrial fauna	2	3	1	2	3	3	3	6

6. SITE SPECIFIC RESULTS

Habitat diversity and species richness:
The extent and length of the proposed powerline route is not large and consequently habitats along it are fairly uniform and consists of a flat sandy plain without a discernible slope (Appendix A: Map 1). The area does however still form part of the Griqualand West Centre of Endemism and as a result a moderate species diversity is still present. Overall, habitat and species diversity is therefore only moderate.

Presence of rare and endangered species:
Endangered or Red Listed species are absent from the powerline route and is considered somewhat unlikely to occur as this area is not known for containing many Red Listed plant species. However, as indicated, several protected plant species do occur along the powerline route (Appendix B & C). These are all relatively widespread but do still retain a significant conservation value. These protected plants include *Boscia albitrunca, Vachellia erioloba, Vachellia haematoxylon, Raphionacme velutina* and *Harpagophytum procumbens.*

Ecological function:
The ecological function of the site is still fairly intact though some level of modification is present. The site functions as habitat for fauna, sustains a specific vegetation type, i.e. Kathu Bushveld and also functions in terms of surface drainage and groundwater recharge (Appendix A: Map 1 & 2). The vegetation along the powerline route is largely intact though some disturbance associated with the adjacent mining operations does contribute to a low level of modification. Due to this proximity of the mining area, the habitat provided to mammals will also be modified. The functioning of surface drainage will also be affected to some degree by the nearby mining and overall, the ecological functioning of the area would be moderately modified. Furthermore, the function of the site is not paramount to the continued functioning of the surrounding natural areas. In other words, development of the site should not impair the functioning of the surrounding area to a large extent.

Degree of rarity/conservation value:
The survey has confirmed that the area consists of Kathu Bushveld (SVk 12) (Appendix A: Map 1 & 2). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) (Appendix A: Map 1). The vegetation type is not under sufficient development pressures to be considered a threatened ecosystem. This will also decrease the conservation value of remaining natural vegetation. In addition, the natural vegetation is situated along the periphery of mining areas and contain varying degrees of disturbance caused by existing powerlines, dirt tracks and firebreaks. In addition, the proposed powerline route falls within an Other Natural Area(ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2). Overall, the conservation value of the site is therefore considered as low.

Percentage ground cover:
The percentage vegetation cover is fairly natural though dirt tracks, existing powerline servitudes and areas of overgrazing does contribute toward a decrease in the vegetation cover which is therefore regarded as moderately modified.

Vegetation structure:
The natural vegetation structure should consist of scattered large trees and a shrub layer with well-developed grass layer interspersed. This is still largely the case for much of the powerline route though the clearance of shrubs and trees along tracks, firebreaks and existing powerline servitudes does modify this vegetation structure to a moderate degree.

Infestation with exotic weeds and invader plants:
Where disturbance is evident, especially in areas of overgrazing, some exotic weeds have established, though they do not yet form significant infestations (Appendix B). Construction activities will also increase disturbance and therefore increase the susceptibility for the establishment of weeds and invasive species and their spread into the surroundings. Overall the presence of exotic weeds and invasive species are therefore considered moderate.

Degree of grazing/browsing impact:
The area is utilised for grazing by domestic livestock and a few portions along the powerline route was notably affected by high levels of overgrazing. Overall the area is therefore affected by a moderate level of overgrazing.

Signs of erosion:
Die to the flat topography, absence of concentrated flow patterns and the largely still natural condition of vegetation along the powerline route, the area is not affected by any visible erosion.

Terrestrial animals:
Tracks and signs of mammals are abundant along the powerline route and are likely coupled to the largely natural habitat in the surrounding areas. It is however highly likely the adjacent mining operations will affect the natural mammal population to some degree, especially in terms of the occurrence of reclusive and threatened mammal species. The area is also utilised for domestic livestock and the farmers will undoubtedly hunt small carnivores such as Black Backed Jackal (*Canis mesomelas*). The mammal population is therefore anticipated to be modified to some degree. In addition, mammal species which are rare and endangered are often habitat specific, sensitive to habitat change and avoids areas in close proximity to human activities. Given the proximity of mining operations it is therefore considered unlikely that such species would occur on the site. Overall, the mammal population on the site is considered to be moderately modified.

Table 3: Biodiversity Sensitivity Rating for the proposed powerline development.

	Low (3)	Medium (2)	High (1)
Vegetation characteristics			
Habitat diversity & Species richness		2	
Presence of rare and endangered species	3		
Ecological function		2	
Uniqueness/conservation value	3		
Vegetation condition			
Percentage ground cover		2	
Vegetation structure		2	
Infestation with exotic weeds and invader plants or encroachers		2	
Degree of grazing/browsing impact		2	
Signs of erosion			1
Terrestrial animal characteristics			
Presence of rare and endangered species		2	
Sub total	6	14	1
Total		21	

7. BIODIVERSITY SENSITIVITY RATING (BSR) INTERPRETATION

Table 4: Interpretation of Biodiversity Sensitivity Rating.

Site	Score	Site Preference Rating	Value
Klipkop – Wessels Powerline	21	Acceptable	3

8. DISCUSSION AND CONCLUSION

The proposed site has been rated as being acceptable for the powerline development mostly as a result of the fairly uniform area to be affected which is largely devoid of elements of high conservation value as well as the limited extent of the powerline which will affect the ecosystem of the area.

The proposed development will consist of a powerline which will be constructed between the Wessels and Klipkop substations which is situated around the Blackrock and Wessels manganese mines located approximately 20 km to the north west of the small town of Hotazel (Appendix A: Map 1). The powerline will have an approximate extent of 8 km. The powerline will be situated in areas of natural vegetation though along the perimeter of mining areas and contains varying degrees of disturbance. No watercourses or wetlands could be identified on or near the proposed site and is therefore highly unlikely to have any impact on surface water features.

According to Mucina & Rutherford (2006) and utilising current mapping resources (National Biodiversity Assessment 2018) the site is indicated to fall within Kathu Bushveld (SVk 12) (Appendix A: Map 1 & 2). This vegetation type is currently listed as being of Least Concern (LC) under the National List of Threatened Ecosystems (Notice 1477 of 2009) (National Environmental Management Biodiversity Act, 2004) (Appendix A: Map 1). The vegetation type is not under sufficient development pressures to be considered a threatened ecosystem. This will also decrease the conservation value of remaining natural vegetation. In addition, the natural vegetation is situated along the periphery of mining areas and contain varying degrees of disturbance caused by existing powerlines, dirt tracks and firebreaks. The Northern Cape Critical Biodiversity Areas Plan (2016) has been published in order to identify areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas (CBA). The proposed powerline route falls within an Other Natural Area (ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2). The area does however still form part of the Girqualand West Centre of Endemism which is a large area identified to contain many endemic plant species localised to this area. It may therefore still be possible that the powerline route would contain plants of high conservation value.

As indicated, though the powerline route is situated within natural vegetation various impacts does lead to some disturbance. Portions of the powerline will be situated along existing security fences where perimeter dirt tracks and firebreaks are also present and consequently some disturbance of the vegetation layer is already present. Along the northern portion of the powerline, it will also be situated alongside an existing powerline and here the servitude has already affected the vegetation, especially the tree layer. The area is also being used for grazing by domestic livestock and significant levels of overgrazing were noted, especially in the northern portion of the powerline route. Overall, the vegetation layer is therefore still intact but with some disturbance notable.

The topography of the powerline route consists of a uniform, flat sandy plain without a discernible slope. The topography along the powerline route is still intact and natural without any prominent modifications. Though mining operations causes modification of the surroundings this does not form part of the powerline route. No watercourses or wetlands occur near the site and the powerline route itself also does not contain any concentrated runoff

patterns, wetlands or watercourses (Appendix A: Map 1 & 2). Due to the flat topography, the area does contain scattered pans or depression wetlands though none of these were observed near the powerline route. This was also confirmed by a wetland survey conducted by Jeffares & Green (2015) which indicates the absence of any wetlands or watercourses along the powerline route as indicated (Appendix A: Map 1). The proposed development should therefore not result in any impact on any wetland, watercourse or any other surface water feature.

Endangered or Red Listed species are absent from the powerline route and is considered somewhat unlikely to occur as this area is not known for containing many Red Listed plant species. However, as indicated, several protected plant species do occur along the powerline route (Appendix B & C). These are all relatively widespread but do still retain a significant conservation value. Where the tree species (*Boscia albitrunca, Vachellia erioloba* and *Vachellia haematoxylon*) will be affected and will require removal, the necessary permits will have to be obtained to do so. The servitude underneath the powerline will have to be cleared and it is therefore inevitable that several of these trees will be affected. In addition, two protected geophytic plant species, *Raphionacme velutina* and *Harpagophytum procumbens* were also observed along the powerline route. Given the limited footprint of the powerline it is unlikely that they will be affected by the construction, especially given the subterranean nature, they will only be affected by excavations which will be limited to pylons. However, should any specimens be affected, permits should be obtained and those transplanted to adjacent areas where they will remain unaffected. It is recommended that prior to construction a walkthrough is undertaken to count and mark all protected trees requiring removal any other protected plants which should be transplanted and that applicable permits then be obtained for removal/transplanting.

Tracks and signs of mammals are abundant along the powerline route and are likely coupled to the largely natural habitat in the surrounding areas. It is however highly likely the adjacent mining operations will affect the natural mammal population to some degree, especially in terms of the occurrence of reclusive and threatened mammal species. The mammal population is therefore anticipated to be modified to some degree. In addition, mammal species which are rare and endangered are often habitat specific, sensitive to habitat change and avoids areas in close proximity to human activities. Given the proximity of mining operations it is therefore considered unlikely that such species would occur on the site. The impact that the proposed powerline will have on the mammal population is mainly concerned with the loss of habitat. However, the footprint of the development will not be extensive and should therefore limit the impact on mammals. The impact would also be mostly temporary as long as adequate rehabilitation is undertaken. Similar powerline projects have indicated that adequate rehabilitation allows the affected area to return to a close to natural condition which would therefore re-instate the habitat for fauna and minimise the impact on the faunal population.

The impact significance has been determined and without mitigation a few impacts may be moderate. However, with adequate mitigation which in most cases could be easily applied, all impact can be decreased to at least low-moderate. The loss of protected tree species is however anticipated to remain a moderate impact since this will not be easily mitigated.

From the description of the vegetation along the powerline route it is clearly still largely natural, in a fairly good condition and with a significant species diversity. Though some disturbance is present due to dirt tracks, firebreaks, existing powerlines and overgrazing by livestock it is still fairly low. However, given the limited footprint of the proposed powerline it is unlikely to cause extensive disturbance of the environment. Disturbance caused by the powerline construction is

likely to increase the establishment of exotic weeds and it will therefore still be important to undertake monitoring and clearing of exotic weeds after construction. In addition, the natural vegetation type in the area, Kathu Bushveld is also not currently considered to be of high conservation concern and is listed as being of Least Concern (LC) (Appendix A: Map 1 & 2). Furthermore, the area is also listed as an Other Natural Area (ONA) which indicates that the area is considered to still consist of natural vegetation though is not considered essential to meeting conservation targets and has an overall low conservation value (Appendix A: Map 2). However, as indicated the powerline route does contain several protected species of significant conservation value and adequate mitigation will be required to alleviate the impact on these. Therefore, in conclusion, although elements of conservation value do occur, overall the proposed powerline route does not contain a high conservation value or unique features requiring exclusion and should not result in any high impacts on the vegetation and ecology of the site and immediate surroundings.

9. RECOMMENDATIONS

- The powerline route contains several protected plant species which, although widespread, has significant conservation value and will require mitigation (Appendix B & C).
    - A suitably qualified ecologist or botanist should undertake a walkthrough survey of the powerline route prior to construction to identify, count and mark all protected plants that will be affected by construction.
    - Where protected tree species (*Boscia albitrunca, Vachellia erioloba, Vachellia haematoxylon*) will be affected and will require removal, the necessary permits will have to be obtained to do so. The servitude underneath the powerline will have to be cleared and it is therefore inevitable that several of these trees will be affected.
    - Two protected geophytic plants (plants with an underground storage organ) occur along the powerline route and consist of *Raphionacme velutina* and *Harpagophytum procumbens.*
    - Given the limited footprint of the powerline it is unlikely that they will be affected by the construction, especially given the subterranean nature, they will only be affected by excavations which will be limited to pylons. However, should any specimens be affected, permits should be obtained and those transplanted to adjacent areas where they will remain unaffected.
    - Care should be taken where geophytic species are deciduous as they will be difficult to see in winter.
    - Protected trees are listed as such under the National Forests Act of 1998 (Act No. 84 of 1998) while protected geophytic species are listed as protected under the Northern Cape Nature Conservation Act of 2009 (Act No. 9 of 2009).

- The footprint of disturbance and clearance of vegetation must always be kept to a minimum.

- After construction the power line route and especially at pylon construction sites must be rehabilitated. This includes removal of all construction material. Excavated rock may not be left in heaps and must be removed or distributed evenly over the terrain to represent a natural environment. Compacted areas must be ripped. Construction roads not being utilised afterwards must be rehabilitated.

- Despite the absence of any watercourses or wetlands, the construction of the powerline should still implement adequate erosion monitoring and control.

- Adequate monitoring of weed and invasive species establishment and their continued eradication must be maintained (Appendix B). 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.

- The hunting, capturing and trapping of fauna should be prevented by making this a punishable offense during the construction phase of the development.

- Open excavations may act as pitfall traps to mammals, reptiles and amphibians and trenches should be daily monitored for trapped animals which should be removed promptly.

- In the event of poisonous snakes or other dangerous animals encountered on the site an experienced and certified snake handler or zoologist must remove these animals from the site and re-locate them to a suitable area.

- No littering must be allowed and all litter must be removed from the site.

- Monitoring of construction and compliance with recommended mitigation measures must take place.

- After construction has ceased all construction materials should be removed from the area.

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Annexure A: Maps

Locality map for the proposed powerline construction between the Klipkop and Wessels substations near the town of Hotazel, Northern Cape Province.

Preparred for:
Marguerite Cronje
Environmental Consultant
Tel: 082 702 0547

Legend:

- Powerline route
- Watercourses
- Wetlands and impoundments
- Kathu Bushveld

Map Information

Spheroid: WGS 84

Quantum GIS

Scale: 1:30 000

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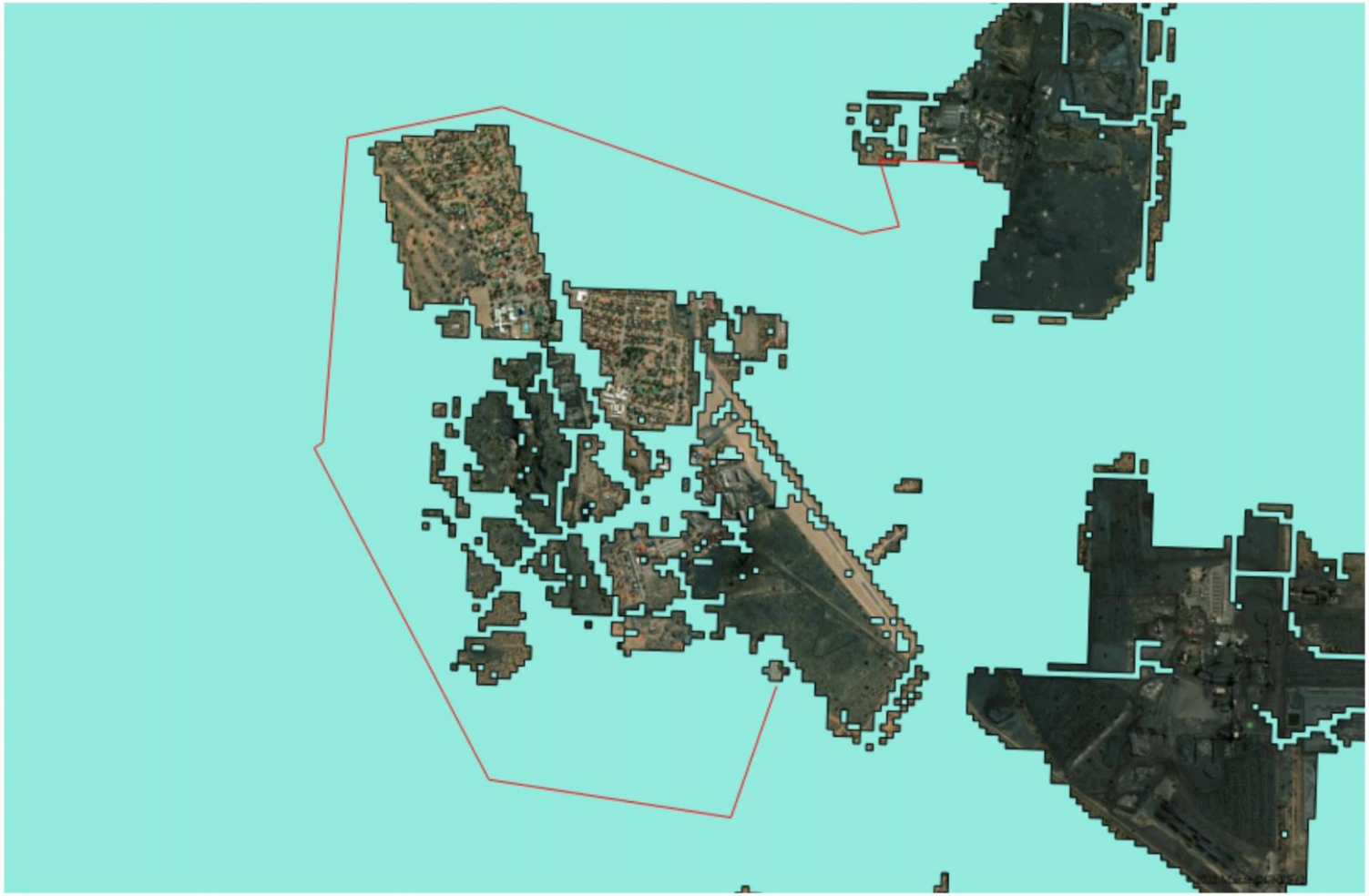
Map 1: Locality map of the proposed powerline between the Klikop and Wessels substations. Areas of remaining Kathu Bushveld vegetation is indicated and it is clear that while the powerline is still situated within natural areas, the adjacent mining areas are largely transformed. Note also the relative uniformity of the area.

Locality map for the proposed powerline construction between the Klipkop and Wessels substations near the town of Hotazel, Northern Cape Province.



Preparred for:
Marguerite Cronje
Environmental Consultant
Tel: 082 702 0547

Legend:

- Powerline route
- Watercourses
- Wetlands and impoundments
- Critical Biodiversity Area 1
- Critical Biodiversity Area 2
- Ecological Support Area
- Other Natural Area
- Protected Areas
- Other
- NPAES Focus Areas
- Threatened Ecosystems

Map Information

Spheroid: WGS 84

Quantum GIS

Scale: 1:30 000

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Map 2: General ecology map of the proposed powerline between the Klipkop and Wessels substations. The entire area and surroundings which still consist of natural vegetation is regarded as being Other Natural Areas which indicates that it is not considered essential for meeting conservation targets and has an overall lower conservation value. Localised areas of high conservation value or high sensitivity may however still be present.

Appendix B: Species list

Species indicated with an * are exotic.

Protected species are coloured orange and Red Listed species red.

Species	Growth form
**Argemone ochroleuca*	Herb
**Verbesina encelioides*	Herb
Acanthosicyos naudinianus	Creeper
Acrotome inflata	Herb
Anthephora pubescens	Grass
Aptosimum elongatum	Herb
Argyrolobium sp.	Herb
Aristida meriodonalis	Grass
Aristida stipitata	Grass
Asparagus sp.	Dwarf shrub
Berkheya ferox	Herb
Boscia albitrunca	Tree
Convolvulus ocellatus	Herb
Crotalaria spartoides	Shrub
Dicerocaryum eriocarpum	Herb
Dicoma macrocephala	Herb
Digitaria eriantha	Grass
Dimorphotheca zeyheri	Herb
Diospyros lycioides	Shrub
Elephanthorrhiza elephantina	Geophyte
Eragrostis pallens	Grass
Felicia muricata	Dwarf shrub
Gnidia polycephala	Dwarf shrub
Grewia flava	Shrub
Harpagophytum procumbens	Geophyte
Helichrysum arenicola	Herb
Helichrysum argyrosphaerum	Herb
Heliotropium ovalifolium	Herb
Hermannia boraginiflora	Herb
Hermannia comosa	Herb
Hermannia tomentosa	Herb
Hermbstaedtia fleckii	Herb
Hirpicium echinus	Herb
Indigofera daleoides	Herb
Ipomoea obscura	Creeper
Lycium villosum	Shrub
Melolobium microphyllum	Dwarf shrub
Moraea polystachya	Geophyte
Nidorella resedifolia	Herb
Nolletia arenosa	Herb

Nolletia sp.	Herb
Peliostomum leucorrhizum	Herb
Pergularia daemia	Climber
Plinthus sericeus	Dwarf shrub
Pogonarthria squarrosa	Grass
Pollichia campestris	Herb
Pomaria burchellii	Herb
Raphionacme velutina	Geophyte
Rhigozum trichotomum	Shrub
Schmidtia kalahariensis	Grass
Senecio consanguineus	Herb
Senegalia mellifera subsp. *detinens*	Tree
Senna italica	Herb
Talinum sp.	Geophyte
Terminalea sericea	Tree
Vachellia erioloba	Tree
Vachellia haematoxylon	Tree
Vachellia hebeclada	Shrub
Wahlenbergia sp.	Herb
Xenostegia tridentata subsp. *angustifolia*	Creeper
Ziziphus mucronata	Tree

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 protected species.

Boscia albitrunca
Shepherds Tree/Witgat Boom

Listed as a protected tree species under the National Forests Act of 1998 (Act No. 84 of 1998) and Northern Cape Nature Conservation Act of 2009 (Act No. 9 of 2009).

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

Method: **Few scattered specimens along the powerline route. Where they are affected by the powerline servitude permits must be obtained to removed them.**

Harpagophytum procumbens
Devil's Claw/Duiwelsklou

Protected in the Northern Cape Province under the Northern Cape Nature Conservation Act of 2009 (Act No. 9 of 2009) and also listed as National TOPS: Protected Medicinal Species.

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

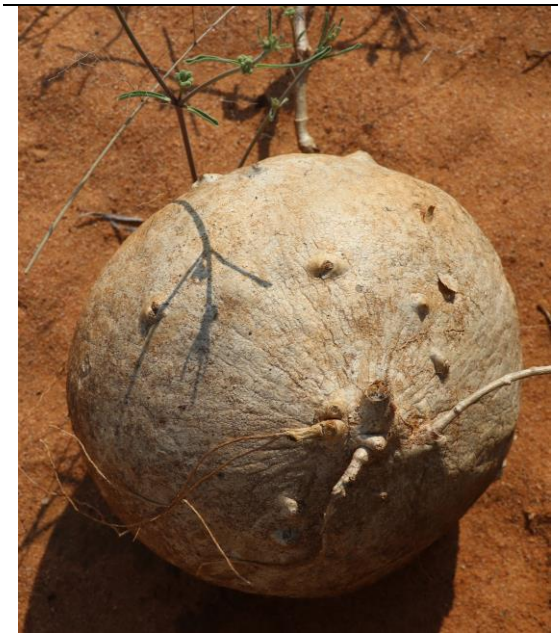
Method: **Few scattered specimens along the powerline. Where they are affected by construction they should be removed and transplanted to an adjacent area where they will not be affected. They have an exceedingly large taproot which will have to be taken into account with the transplanting.**

Vachellia erioloba
Camel Thorn/Kameeldoring

Listed as a protected tree species under the National Forests Act of 1998 (Act No. 84 of 1998).

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

Method: **Many specimens scattered along the powerline route. Where they are affected by the powerline servitude permits**

	must be obtained to removed them.
	***Vachellia haematoxylon*** **Camel Thorn/Kameeldoring** Listed as a protected tree species under the National Forests Act of 1998 (Act No. 84 of 1998). National Red List Status: **Least Concern (LC)** Method: **Many specimens scattered along the powerline route. Where they are affected by the powerline servitude permits must be obtained to removed them.**
	***Raphionacme velutina*** Protected in the Northern Cape Province under the Northern Cape Nature Conservation Act of 2009 (Act No. 9 of 2009). National Red List Status: **Least Concern (LC)** Method: **Few scattered specimens along the powerline. Where they are affected by construction they should be removed and transplanted to an adjacent area where they will not be affected. They have an exceedingly large tuber which will have to be taken into account with the transplanting.**

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/even 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.