

# APPENDIX D<sub>2</sub>

Ecological Report

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**Report on the floristic and ecological assessment of the proposed establishment of a diesel depot on Portion 5 of the farm Avenham 2187, Bloemfontein, Free State Province.**

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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.

It is inevitable that developments will occur around large cities as the necessity exists to provide housing, energy, food and waste management to the large population these areas house. Where such developments occur in the rural periphery of cities the site should be chosen so that areas of higher disturbance are preferred over pristine natural vegetation. 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 diesel depot is situated on the farm Avenham 2187/5 that is located adjacent to the N1 National Road approximately 3 km south of the Brandfort turnoff. The extent of the development area is approximately 4 ha in size. The coordinates for the site is S 28° 59' 52.28" E 26° 16' 00.23" (Map 1).

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.

A site assessment was conducted on 11 April 2016.

#### **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 diesel depot development.
- To identify possible negative impacts that could be caused by the proposed construction of a diesel depot.

### **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**

Due to high levels of historical disturbance and human activity on the site large areas are devoid of natural vegetation.

Bulbous and herbaceous species may have been overlooked due to time of year, the current drought as well as the amount of disturbance on the site.

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, Manning 2009 Van Oudtshoorn 2004, Van Wyk & Malan 1998, Van Wyk & Van Wyk 1997, Venter & Joubert 1985)

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

The vegetation in the study area consists of Winburg Grassy Shrubland (Gh 7). The vegetation type is currently listed as being of Least Concern under the National List of Threatened Ecosystems (Notice 1477 of 2009)(National Environmental Management Biodiversity Act, 2004) (Map 2). The vegetation type is not currently subjected to any pronounced development pressures. Landscape features of this vegetation type are dominated by hills, slopes and escarpments of mesas creating a mosaic of habitats ranging from open grassland to shrubland (Mucina & Ruterford 2006).

The topography on the site is undulating with a low hill to the north of the site sloping gently toward the south. The vegetation on the site consist primarily of grassland with patches of shrubs where shallow soils occur. Due to historic land use the site is in a degraded condition and the natural vegetation composition has been transformed to a large degree. The site was previously utilised as a crocodile farm and the structures and infrastructure associated with it is still present on the site. Wastes such as scrap metal, construction materials and skeletal remains of crocodile food is littered around the site. A seasonal stream is located south of the site (approximately 350 meters, Map 1 & 2) but is unlikely to be affected by the development given that no leakage of diesel or contaminated runoff ends up in the stream.

The site itself does not contain any wetlands, drainage lines or any other water related systems (Map 2). The seasonal stream to the south of the site will not be directly affected by the development. However, the nature of the development may cause pollution of the stream in the form of diesel contamination of runoff or groundwater. As long as adequate measures are implemented to ensure leaking of diesel or contamination of stormwater runoff does not occur the stream will not be affected in any way by the development.

The current land use consists of small residences and grazing by livestock. The historical structures of the crocodile farm is also still present on the site and occupies large areas of the site. Around the structures and residences disturbance is high. The extent of the site is approximately 4 hectares. Building rubble, scrap metal and littering is evident on the site. Bare areas containing no vegetation are present in several areas on the site. Overgrazing is considered relatively high but this may also have been caused by human activities on the site. The vegetation is transformed and grass species indicate a high level of disturbance. The abundance of weeds also substantiate this.

The vegetation structure on the site is dominated by a degraded grass layer with clumps of shrubs and small trees where shallow soils occur. The grass layer is highly degraded and the species composition largely altered. The natural dominant grass species, *Themeda triandra*, only remains in small patches. The natural grass species have been replaced in most areas by pioneer grasses such as *Chloris virgata*, *Urochloa panicoides*, *Hyparrhenia hirta* and *Aristida canescen*. The low shrubs, *Searsia ciliata* and *Lycium horidum*, is also abundant on the site and is transitional between shallow and deeper soils. They have however increased as a result of overgrazing and disturbance. Isolated specimens of the protected species, *Brunsvigia radulosa*, occur along the western boundary of the site. It is a widespread and common species but is listed as a protected species and therefore permits will have to be obtained to transplant it to an adjacent area. Scattered *Vachelia karroo* specimens also occur in the grassland area. The areas of shallow soil is dominated by several shrub and small tree species. These include

*Olea europaea* subsp. *africana* (Wild Olive), *Ehretia rigida*, *Ziziphus mucronata*, *Searsia ciliata*, *Buddleja saligna* and *Diospyros lycioides*. Of these the Wild Olives are protected species. It is a widespread and common species but is nonetheless protected and should be retained where possible or permits should be obtained to remove them. Due to the degraded condition several weed species occur on the site. These include *Alternanthera pungens*, *Sphaeralcea bonariensis*, *Solanum incanum*, *Xanthium spinosum*, *Schkuhria bipinnata*, *Chenopodium murale* and *Tagetes minuta*.

In conclusion the remaining vegetation on the site is considered to be in an advanced state of disturbance and transformation. The historical land uses and current human activities and overgrazing has caused transformation of the natural vegetation. The vegetation type naturally occurring in the area, Winburg Grassy Shrubland, is listed as being of Least Concern (Map 2). The seasonal stream to the south of the site (approximately 350 meters) is unlikely to be affected as long as adequate measures are implemented to prevent contamination of surface and groundwater by hydrocarbons (Map 1 & 2). Two species of low conservation significance is the protected bulb, *Brunsvigia radulosa*, and tree, *Olea europaea* subsp. *africana* (Wild Olive). These species should be retained otherwise permits must be obtained to remove them. A foot survey prior to construction should be done to mark all protected specimens and determine the need to remove them.

#### 4.2 Overview of terrestrial mammals (actual & possible)

Due to the degraded condition of the site as well as the urban proximity of dwellings it is considered unlikely that any species of concern will occur on the site. The mammal population on the site is likely to be diminished from the natural condition.

List of some Red Data terrestrial mammals that could occur in the region:

Pangolin	<i>Manis teminckii</i>
South African Hedgehog	<i>Atelerix frontalis</i>
Aardwolf	<i>Proteles cristatus</i>
African Wild Cat	<i>Felis lybica</i>
Small-Spotted Cat	<i>Felis nigripes</i>
Bat-Eared Fox	<i>Otocyon megalotis</i>
Striped Weasel	<i>Poecilogale albinucha</i>

It is considered highly unlikely that any these species would occur in the vicinity.

## 5. Site specific results

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

Habitat diversity on the site is relatively low. Two broad habitats are present being the grassland and shrubby pockets on shallow soil. Both have also been degraded and transformed. As a result the diversity of species is relatively low.

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

No rare or endangered species occur in the study area although two protected species were identified. These species are the bulb, *Brunsvigia radulosa*, and the Wild Olive tree, *Olea europaea* subsp. *africana*. The bulb species is restricted to a few individuals along the western border of the site. If needed it can be easily transplanted. Permits should be obtained for transplanting the species. Several Wild Olive specimens occur in areas of shallow soils. They should be retained where possible and if required permits should be obtained to remove them.

### **Ecological function:**

The ecological function has been largely transformed due to historic and current land use. Natural areas remain to the north and west of the site.

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

The vegetation in the study area consists of Winburg Grassy Shrubland (Gh 7). The vegetation type is currently listed as being of Least Concern under the National List of Threatened Ecosystems (Notice 1477 of 2009)(National Environmental Management Biodiversity Act, 2004) (Map 2). The vegetation type is not currently subjected to any pronounced development pressures. According to this the conservation value of the vegetation type is not significant.

A Biodiversity Conservation Plan has not yet been published for the Free State and the site can therefore not be assigned a Biodiversity Planning Category.

A rough estimate of the percentage of vegetation condition on the site consist of roughly 20% near natural, 40% degraded and 40% transformed vegetation in comparison to natural vegetation of the region in pristine condition with no impacts.

### **Percentage ground cover:**

The percentage ground cover is exceptionally low over the majority of the site. This is largely due to high levels of overgrazing as well as the current drought.

### **Vegetation structure:**

The vegetation structure is still natural to some degree but has been transformed in terms of the infestation of weeds and the increase in dominance of low shrubs. The vegetation structure should consist of grassland with few herds and low shrubs and trees confined to shallow soils.

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

The site contains a high amount of exotic species.

### **Degree of grazing/browsing impact:**

Overgrazing of the site by domestic stock is high.

### **Signs of erosion:**

Erosion is considered as moderate.

**Terrestrial animals:**

Due to the degraded condition of the site as well as the urban surroundings and proximity of dwellings it is considered unlikely that any species of concern will occur on the site. The mammal population on the site is likely to be diminished from the natural condition.

Table 2: Biodiversity Sensitivity Rating for the proposed diesel depot.

	Low (3)	Medium (2)	High (1)
Vegetation characteristics			
Habitat diversity & Species richness	3		
Presence of rare and endangered species		2	
Ecological function	3		
Uniqueness/conservation value	3		
Vegetation condition			
Percentage ground cover	3		
Vegetation structure	3		
Infestation with exotic weeds and invader plants or encroachers	3		
Degree of grazing/browsing impact	3		
Signs of erosion		2	
Terrestrial animal characteristics			
Presence of rare and endangered species	3		
Sub total	24	4	
Total		28	

**6. Biodiversity sensitivity rating (BSR) interpretation**

Table 3: Interpretation of Biodiversity Sensitivity Rating.

Site	Score	Site Preference Rating	Value
Proposed diesel depot	28	Preferred	4

## 7. Discussion and conclusions

The site proposed for the diesel depot has been rated as being preferred for the development.

The vegetation in the study area consists of Winburg Grassy Shrubland (Gh 7). The vegetation type is currently listed as being of Least Concern under the National List of Threatened Ecosystems (Notice 1477 of 2009)(National Environmental Management Biodiversity Act, 2004) (Map 2). The vegetation type is not currently subjected to any pronounced development pressures. Landscape features of this vegetation type are dominated by hills, slopes and escarpments of mesas creating a mosaic of habitats ranging from open grassland to shrubland (Mucina & Ruterford 2006).

The site itself does not contain any wetlands, drainage lines or any other water related systems (Map 2). The seasonal stream to the south of the site will not be directly affected by the development (Map 2 & 3). However, the nature of the development may cause pollution of the stream in the form of diesel contamination of runoff or groundwater. As long as adequate measures are implemented to ensure leaking of diesel or contamination of stormwater runoff does not occur the stream will not be affected in any way by the development.

Due to the degraded condition of the site as well as the proximity of dwellings it is considered unlikely that any species of concern will occur on the site. The mammal population on the site is likely to be diminished from the natural condition.

Habitat diversity on the site is relatively low. Two broad habitats are present being the grassland and shrubby pockets on shallow soil. Both have also been degraded and transformed. As a result the diversity of species is relatively low.

No rare or endangered species occur in the study area although two protected species were identified. These species are the bulb, *Brunsvigia radulosa*, and the Wild Olive tree, *Olea europaea* subsp. *africana*. The bulb species is restricted to a few individuals along the western border of the site. If needed it can be easily transplanted. Permits should be obtained for transplanting the species. Several Wild Olive specimens occur in areas of shallow soils. They should be retained where possible and if required permits should be obtained to remove them.

In conclusion the remaining vegetation on the site is considered to be in an advanced state of disturbance and transformation. The historical land uses and current human activities and overgrazing has caused transformation of the natural vegetation. The vegetation type naturally occurring in the area, Winburg Grassy Shrubland, is listed as being of Least Concern (Map 2). The seasonal stream to the south of the site (approximately 350 meters) is unlikely to be affected as long as adequate measures are implemented to prevent contamination of surface and groundwater by hydrocarbons (Map 2 & 3). Two species of low conservation significance is the protected bulb, *Brunsvigia radulosa*, and tree, *Olea europaea* subsp. *africana* (Wild Olive). These species should be retained otherwise permits must be obtained to remove them. A foot survey prior to construction should be done to mark all protected specimens and determine the need to remove them.

## 8. Recommendations

- Weed eradication on the site must be done prior to construction and must be maintained after construction has ceased (Appendix B).
- All compacted areas must be ripped following construction. This must include compacted paths.
- All rubbish and rubble must be removed from the site prior to construction.
- After construction has ceased all construction materials should be removed from the area and no dumping of rubble or waste may occur on or around the site.
- The seasonal stream to the south of the site (approximately 350 meters) is unlikely to be affected as long as adequate measures are implemented to prevent contamination of surface and groundwater by hydrocarbons (Map 2 & 3).
- Two species of low conservation significance is the protected bulb, *Brunsvigia radulosa*, and tree, *Olea europaea* subsp. *africana* (Wild Olive). These species should be retained otherwise permits must be obtained to remove them. A foot survey prior to construction should be done to mark all protected specimens and determine the need to remove them. The bulb species is restricted to a few individuals along the western border of the site. If needed it can be easily transplanted. Permits should be obtained for transplanting the species. Several Wild Olive specimens occur in areas of shallow soils. They should be retained where possible and if required permits should be obtained to remove them.

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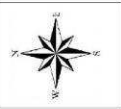


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## **Annexure A: Maps and Site photos**



# Locality map for the proposed establishment of a diesel depot on Portion 5 of the Farm Avenham 2187, District Bloemfontein, Free State Province.



Map 1: Location of the proposed establishment of a diesel depot on the farm Avenham 2187/5. Note the existing structures in the study area. The presence of thicket pockets on the site is also visible. The seasonal stream is indicated to the south of the site.



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**Legend:**

-  Site boundary
-  Seasonal stream
-  N1 National Road

**Map Information**

Spheroid: WGS 84

**Scale:**



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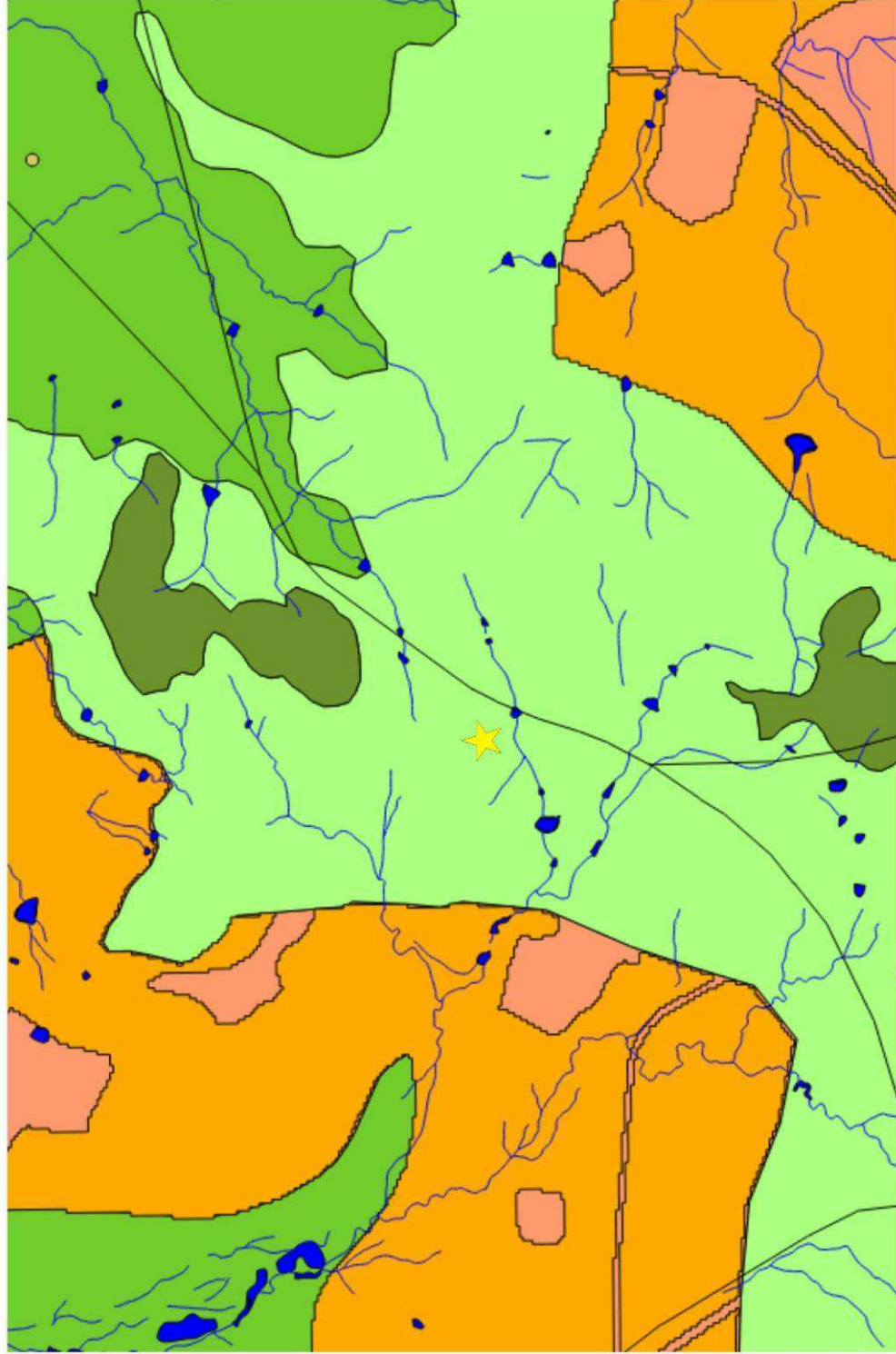
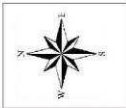
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# Ecology map for the proposed establishment of a diesel depot on Portion 5 of the Farm Avenham 2187, District Bloemfontein, Free State Province.



Map 2: Broad ecology of the proposed establishment of a diesel depot on the farm Avenham 2187/5. Vegetation types and threatened ecosystems are indicated. Watercourses and wetlands are also indicated.



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**Legend:**

- Site location
- Road network
- Wetlands and watercourses
- Winburg Grassy Shrubland
- Highveld Alluvial Vegetation
- Bloemfontein Karroid Shrub
- Bloemfontein Dry Grassland
- Threatened Ecosystem

**Map Information**

**Spheroid:** WGS 84

**Scale:** 1:40 000

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Figure 1: Panorama of the site along the western border. Note the existing structures, low vegetation cover and establishment of low shrubs (red figure) as a result of disturbance and overgrazing.



Figure 2: Panorama of the south western portion of the site. Note the low percentage vegetation cover and bare patches.



Figure 3: Panorama of the southern portion of the site. Note the low percentage vegetation cover and isolated trees.



Figure 4: Panorama of the site. Note the low percentage vegetation cover. Weeds are also abundant in these areas.



Figure 5: Panorama of the north western portion of the site. Note increase of low shrubs and piles of scrap metal.



Figure 6: panorama of the eastern portion of the site. Buildings dominate this portion with isolated planted trees.



Figure 7: Panorama of the eastern portion of the site. Note that vegetation has been cleared by previous land uses. In the background a portion of thicket is visible (red figure).



Figure 8: Isolated specimens of the protected bulb species, *Brunsvigia radulosa* (red circles), occur in the western portion of the site.

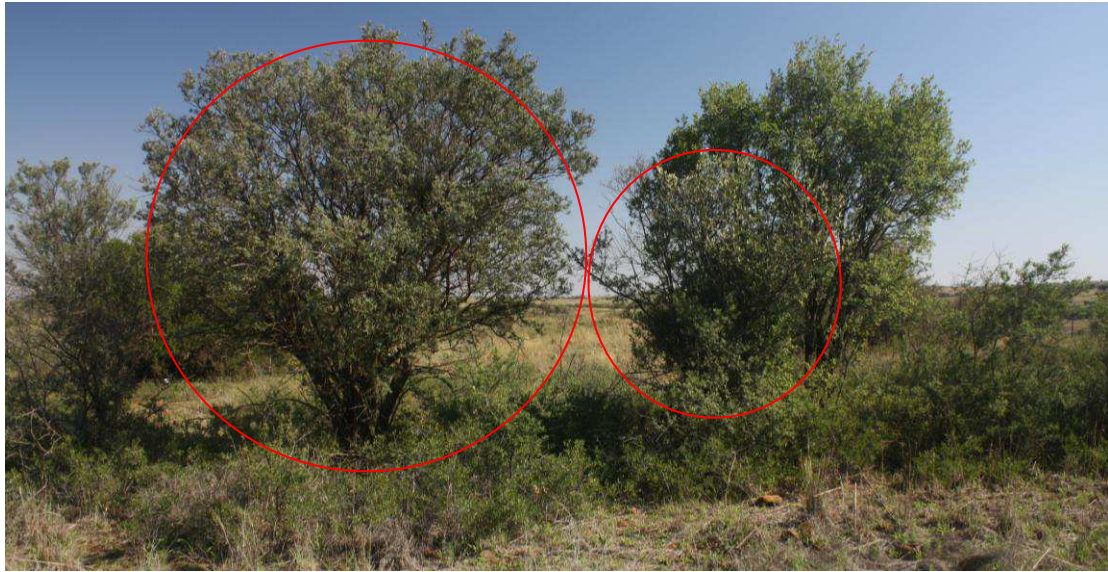


Figure 9: Several specimens of the protected Wild Olive tree, *Olea europaea* subsp. *africana*, occur in the northern portion of the study area.

## Appendix B: Likely invader weed species

Invader weed species on the site may not be limited to these species but these are considered to be the most likely and significant invaders to occur. Additional sources should be consulted to confirm invader weed species as well as the best method to eradicate them.

According to the Conservation of Agricultural Resources Act, No. 43 of 1983 any Category 1 declared plants must be controlled by the land user on whose land such plants are growing.



***Cirsium vulgare***  
**Scotch Thistle/Skotse Dissel**

**Type:** Weed  
**Category:** 1

Mechanical removal is effective to control this weed. Cutting should be done below soil level and no leaves should remain.



***Xanthium spinosum***  
**Spiny Cocklebur/Boetebos**

**Type:** Weed  
**Category:** 1

Mechanical removal by hand is effective to control this weed.

Several chemicals have also been registered for control: amitrole/simazine, bromoxynil, metribuzin, MCPA-K and 2,4-D(A).



***Datura ferox***  
**Large thorn-apple/Grootstinkblaar**

**Type:** Weed  
**Category:** 1

Mechanical removal by hand is effective for this weed.





***Argemone ochroleuca***  
**Mexican Poppy**

**Type:** Weed  
**Category:** 1

Mechanical removal by hand is effective against this weed.

Several chemicals have also been registered for control: 2, 4-D, 2, 4-DB, dicamba, diuron, fluroxypyr, hexazinone, isoproturon, karbutilate, MCPA, picloram and terbutryn.



***Melia azedarach***  
**Syringa/Seringboom**

**Type:** Invader  
**Category:** 3

It is fast growing and coppices strongly from cut stumps. It is very difficult to control. Physical removal of stumps is effective but expensive and laborious. Cutting trees down and treating the stump immediately with Triclopyr and diesel is effective but requires periodic follow up.

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