

## **6. GENERAL DESCRIPTION OF THE STUDY AREA ENVIRONMENT**

The existing Hydra Substation and Gamma Substations lie approximately 130 km apart, and are separated by a generally flat landscape, interrupted in the northern section by high broken ground and small ridges, and the Bulberg and Horseshoe Ridges in the south close to the Gamma Substation site. The broader study area falls within the Northern Cape Province and extends from the existing Hydra Substation near De Aar to the south near Victoria West, where the Gamma Substation is located.

### **6.1 Topography**

The study area is located within a generally flat area interrupted at intervals by a number of hills and ridges. The height above sea level, of the study area ranges from 1300 m to 1800 m. Prominent ridges within the study area include Bulberg Ridge, located north of the Gamma Substation site and the Horseshoe Ridge located in the south close to the Gamma Substation site. Other ridges and hills in the study area include the Platberg, Nooinberg, Groot and the Tafelberg ridge. There are no ridges located within the proposed 80 m servitude.

### **6.2 Climatic Conditions**

Based on the information recorded in the Victoria West area, the average annual rainfall for the Victoria West region is 328 mm. The maximum total rainfall recorded in one day is 131 mm. Average annual rainfall for the De Aar region as recorded at the De Aar weather station is 331,4 mm with a total maximum rainfall recorded in one day of 112 mm. Climate data recorded in the area indicates that this area is arid in nature (Weather Bureau, 2004). These readings are low in comparison to regions such as Mpumalanga, Eastern Cape, thereby indicating the aridity of the area.

Mean annual air temperatures in De Aar range from 1,1°C in July to 33,7°C in January. Average daily maximum temperatures range from 14,8°C – 31,9°C. Average daily minimum temperatures range from 1,0°C – 18,3°C. No temperature data is available for the Victoria West area.

Hourly and gust wind speeds recorded in the broader area are high (Clara, 1992). Wind analysis data recorded from the weather station in De Aar indicates that wind direction is more frequently to the west at speeds ranging from 4 m/s – 7 m/s. No wind data is available for the Victoria West area.

The lightning ground flash density for this area is very low (1 – 2 flashes/km<sup>2</sup>/year) (Clara, 1992).

### **6.3 Surface Water**

The study area is generally arid with very limited water sources. There are various water bodies within the study area, including rivers and small local dams. Most of the dams within the study area are man-made, and have been constructed to supplement the limited water resources of the area. The area is traversed mainly by non-perennial rivers with a limited number perennial rivers. Rivers in the area that are perennial, include the Elandsontein, Ongers and Brakfontein Rivers, and all flow in a north-westerly direction. All these rivers are tributaries of the Orange River. No wetlands were recorded within the study area.

### **6.4 Geology and Soils**

Geological maps indicate that shale, sandstone and mudstone of the Karoo Sequence, Ecca and Beaufort Group, Tierberg and Carnarvon formation underlie the study area. The geology is interrupted at intervals by dolomite sills and dykes. Calcrete soils are dominant in the area due to the climatic conditions and the underlying parent rock.

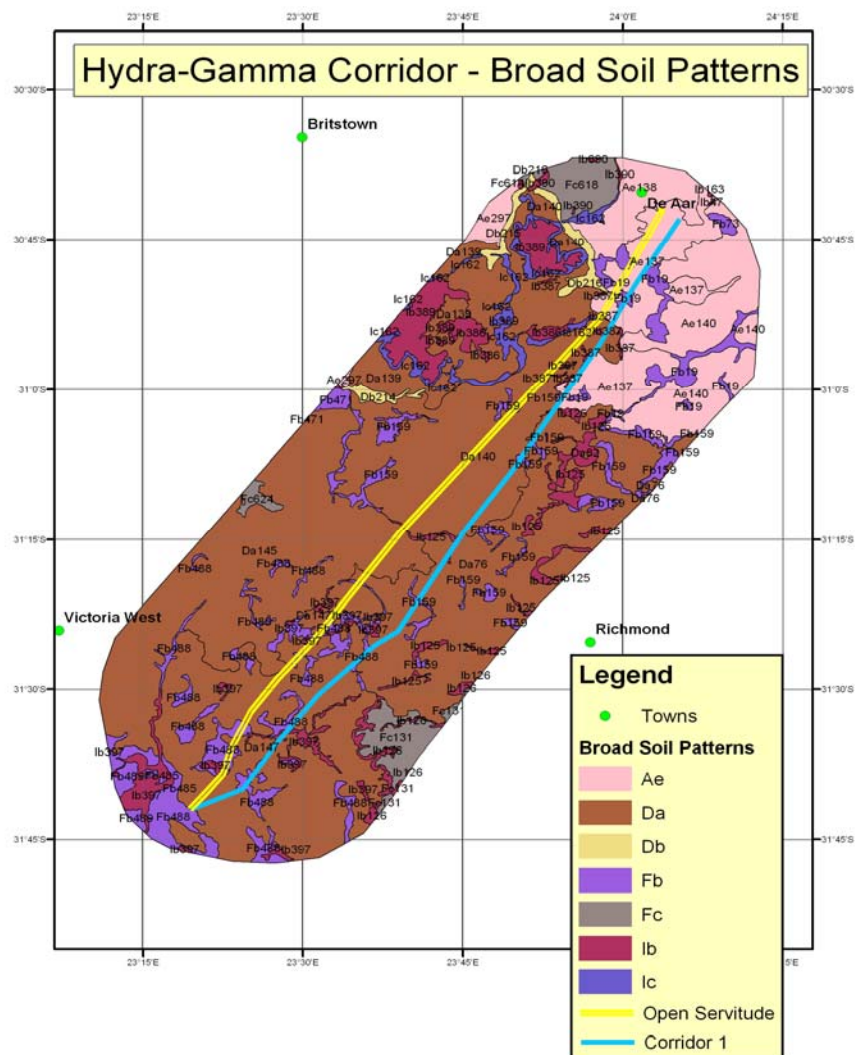
The low rainfall conditions coupled with the geology of the area result in the formation of a thin soil cover. These soils are sensitive to water and wind erosion

### **6.5 Agricultural Potential**

The study area comprises a total of eleven land types, namely:

- *Red, structureless, high base status soils:*
  - \* Ae137
- *Red duplex soils:*
  - \* Da76
  - \* Da140
  - \* Da145
  - \* Da147
- *Shallow soils with some lime:*
  - \* Fb19
  - \* Fb159
  - \* Fb488
- *Rocky areas:*
  - \* Ib125
  - \* Ib387
  - \* Ib397

The distribution of land types within the broader study area is indicated in Figure 6.1, with the proposed servitude indicated in yellow



**Figure 6.1:** Broad soil patterns within the study area

### 6.5.1 Land Type Characteristics

The main characteristics of each land type occurring (soils, depth, texture and occurrence), as well as agricultural potential, are given in Table 6.1. The soils were classified according to MacVicar *et al*, 1977.

**Table 6.1:** Soil properties per land type (MacVicar *et al*, 1977)

Property Land type	Dominant soils	Sub-dominant soils	Slopes	Agricultural Potential (%)
<b>Ae137</b>	Hu36/33	Ms10/20 (100-150	2-3%	H: 1.1

	(200-400 mm), SaLm-SaCILm 69%	mm), SaLm-SaCILm, 13% Sw11/21 (20-200 mm), CILm-Cl, 10%		M: 3.7 L: 95.2
<b>Da76</b>	Sw21/11 (200-600 mm), CILm-Cl, 43%	Hu36/33 (200-400 mm), SaLm-SaCILm, 19% Va21/41 (200-400 mm), SaCl-Cl, 17%	1-2%	H: 0.0 M: 5.0 L: 95.0
<b>Da140</b>	Sw10/20/30 (150-650 mm), SaCILm-SaCl, 40%	Hu36/33/46 (150-550 mm) SaLm-SaCILm, 26% Gs16/Ms10 (50-250 mm), SaLm-SaCILm, 10%	0-3%	H: 0.0 M: 8.4 L: 91.6
<b>Da145</b>	Sw21/11 (200-600 mm), CILm-Cl, 30%	Oa26/27/46/47 (500- 1200 mm), SaLm-CILm, 20% Ms20/22 (50-150 mm), SaLm, 20%	1-3%	H: 0.0 M: 30.5 L: 69.5
<b>Da147</b>	Sw20/21/40/41 (200-600 mm), SaCILm-Cl, 24%	Gs26/Ms20 (50-300 mm), SaLm-SaCILm, 23% Va20/21/40/41 (500- 1200 mm), SaCl-Cl, 18%	1-3%	H: 0.0 M: 43.4 L: 56.6
<b>Fb19</b>	Gs16/Ms10 (50-250 mm), SaLm-SaCILm, 44%	Hu36 (200-400 mm), SaCILm, 16% Rock, 15%	3-8%	H: 0.0 M: 1.4 L: 98.6
<b>Fb159</b>	Gs26/Ms10/20 (50-300 mm), SaCILm-Cl, 61%	Rock, 9% Hu36/33 (100-300 mm), SaLm-SaCILm, 9%	8-15%	H: 0.0 M: 9.1 L: 90.9
<b>Fb488</b>	Ms10/20 (50-150 mm), SaLm, 33%	Rock, 21% Sw21/41 (200-300 mm), CILm, 15%	3-8%	H: 0.0 M: 8.0 L: 92.0
<b>Ib125</b>	Rock, 61%	Hu36/33 (50-150 mm), SaLm, 14% Ms10/20 (50-150 mm),	15- 40%	H: 0.0 M: 0.2 L: 99.8

		SaLm, 12%		
<b>Ib387</b>	Rock, 75%	Gs16/Ms10 (50-250 mm), LmSa-SaLm, 18%	5-90%	H: 0.0 M: 0.0 L: 100.0
<b>Ib397</b>	Rock, 76%	Ms10/20 (50-150 mm), LmSa-SaLm, 10%	12-15%	H: 0.0 M: 0.3 L: 99.7

From the above table and the land type map, it can be seen that the soils in the area consist mainly of shallow, duplex soils, mainly of the Swartland (Sw) form, with an abrupt texture and structure increase from the topsoil to subsoil. Smaller areas of shallow, lithosols of the Mispah (Ms), Glenrosa (Gs) and Hutton (Hu) forms, along with rock, also occur.

Very little high potential land exists, and only isolated areas of moderate potential land, mainly in some of the lower lying areas of land types Da145 and Da147, occur. Therefore, impacts on agricultural potential will be negligible.

## 6.6 Vegetation and General Ecology

The greater part of the study area falls within the Eastern Mixed Nama Karoo (Veld Type 52, Low and Rebelo, 1996). A small section, from Victoria West extending approximately 10 kilometers to the north-east, falls within the Upper Nama Karoo (Veld Type 50, Low and Rebelo, 1996). The Eastern Mixed Nama Karoo reflects a broad and extensive ecotone area between the Grassland biome to the east and the Nama Karoo to the west. The vegetation of veld types 50 and 52 is, therefore, very similar in appearance. Acocks (1985) however, describes Veld type 50 as Upper Karoo (Acocks Veld type 27) and Veld type 52 (Acocks Veld type 36) as False Upper Karoo. According to Acocks, False Upper Karoo is nothing but highly degraded grassland invaded by Karoo vegetation and a product of undiscerning grazing practices by sheep farmers of an area that was described as prime sheep grazing (grassland) by the first white farmers settling in the area (1700s). The current status of Veld type 52 are still hotly debated between researchers following either of the two major vegetation classifications of the area. Hoffman accurately sums it up in Low and Rebelo (1996):

*"Although there is much support for Acocks's theory on Karoo encroachment due to overgrazing, some scientists maintain that this "invasion" is determined by rainfall events and that drought periods result in an increase in Karoo elements. This process is reversed during wet cycles in which the grasses again dominate. However, overgrazing does encourage Karoo encroachment and it is important that stocking densities should be maintained at the carrying capacity of the vegetation as determined by its rainfall at the time."*

For the purpose of this study the more recent classification of Low and Rebelo (1996) were used as a reference while the more detailed descriptions and species lists of Acocks (1985) were also used in the descriptions and assessments.

### **6.6.1 The Upper Nama Karoo (Veld Type 50, Low and Rebelo, 1996)**

The vegetation can be described as a fairly dense to dense, semi-arid shrubland occurring on the central upper Karoo plateau at altitudes between 1050m and 1700m above sea level. The topography generally consists of large, flat, stony plains dotted with hills and small mountains. The rainfall is low and erratic (200 - 250mm/year) occurring mainly during late summer and autumn. The characteristically weak structureless clayey to sandy soils are derived from sandstones and shales from the Karoo sequence.

Vegetation of the hills and mountains is fairly grassy with grass species such as *Eragrostis lehmanniana*, *E. bergiana* and *Aristida congesta* subsp *congesta* the most common. Typical shrubs and shrublets (karroo bushes) of these areas include *Rhus undulata*, *R. burchellii*, *Rhigozum trichotomum*, *Lycium spp.* and in some areas even *Aloe broomii* (See Photograph 6.1)



**Photograph 6.1:** Upper Nama Karoo vegetation occurring within the study area (Veld type 50)

On the plains a large variety of typical karroo bushes occurs including, amongst others *Eriocephalus ericoides*, *Plinthus karooicus*, *Rosenia humilis*, *Salsola glabrescens*, *Pentzia incana*, *P. globosa*, *P. spinescens*, *Felicia muricata*,

*Eberlanzia ferox*, *Rhigozum obovatum*, *Aptosimum procumbens* and *Zygophyllum incrasata*. Good rainfall events often provide dense stands of grass between the shrubs including mainly *Eragrostis lehmanniana*, *E. bicolor*, *Panicum stapfianum*, *Sporobolus acinifolius*, *Arsitida congesta*, *Stipagrostis obtusa* and *S. ciliata*. Along the streams and rivers *Acacia karroo* often occurs while the reed *Phragmites australis* is mostly dominant.

#### **6.6.2 Eastern Mixed Nama Karoo (Veld Type 52, Low and Rebelo, 1996)**

The vegetation can be described as a semi-arid grassy shrubland occurring at altitudes between 700m (plains) and 1400m (on the escarpment) above sea level. Similar to the adjacent Upper Nama Karoo, the topography generally consists of large, flat, stony plains dotted with hills and small mountains. The rainfall is higher, though still erratic and 300 - 500mm/year. According to the information received from the farmers during the investigation the rainfall within the study area varies between 300mm and 350mm, occurring mainly during late summer and autumn. The characteristically weak structureless clayey to sandy soils are derived from sandstones and shales from the Beaufort Group, while dolerite dykes and sills played a role in the formation of the typical Karoo landscape of mesas and buttes.

The vegetation is very similar to that of the Upper Nama Karoo, the most obvious difference being the degree of grassiness. *Eragrostis lehmanniana*, *Aristida adscensionis* and *A. congesta* are the most common grasses while areas to the more temperate north eastern regions of the veld type can even be dominated by *Themeda triandra*. Typical Karoo shrubs include *Pentzia incana*, *Eriocephalus ericoides*, *E. spinescens*, *Limeum aethiopicum*, *Cadaba aphylla* and *Hermannia spp.*, Trees, of which *Acacia karroo* is the most common, are found along the dry river beds. According to Hoffman (in Low and Rebelo, 1996) this veld type has a high cover of herbs like *Psilocaulon absimile*, *geigeria ornativa* and *Atriplex lindleyii*, more so than all the other Nama Karoo types while it is also known for its numerous geophytes. Eastern Nama Karoo vegetation occurring in the area is shown in Photographs 6.2 and 6.3 below.



**Photograph 6.2:** Eastern mixed Nama Karoo vegetation occurring in the study area



**Photograph 6.3:** Vegetation of the hills showing *Aloe broomi* and *Cenchrus ciliaris*

### **6.6.3 Species Recorded within the Study Area**

Species recorded within the study area are listed in Table 6.2 below. This list is not comprehensive but is merely a reflection of the most common species found.



**Table 6.2:** Plant species recorded within the study area

Species	Common Name
<b>Grasses and Sedges</b>	
<i>Aristida adscensionis</i>	Annual Three-awn/Eenjarige steekgras
<i>Aristida congesta subsp. congesta</i>	Tassel three-awn/Katstertsteekgras
<i>Aristida congesta subsp. barbicollis</i>	Spreading Three-awn/Lossteekgras
<i>Aristida diffusa</i>	Iron grass/Ystergras
<i>Cenchrus ciliaris</i>	Blue Buffalo grass/Bloubuffelsgras
<i>Chloris virgata</i>	Feathered Chloris/Witpluim-chloris
<i>Cynodon dactylon</i>	Couch grass/Kweek
<i>Digitaria eriantha</i>	Finger grass/Vingergras
<i>Eragrostis bergiana</i>	-
<i>Eragrostis capensis</i>	Heart-seed Love grass/Hartjiesgras
<i>Eragrostis lehmanniana</i>	Lehman's Love grass/Knietjiesgras
<i>Fingerhuthia africana</i>	Thimble grass/Vingerhoedgras
<i>Hyparrhenia hirta</i>	Thatch grass/Dekgras
<i>Phragmites australis</i>	Common reed/Fluitjiesriet
<i>Sporobolus stapfianus</i>	Fibrous Dropseed/Veselfynsaadgras
<i>Stipagrostis uniplumis</i>	Silky bushman Grass/Blinkaar-boesmangras
<i>Stipagrostis obtusa</i>	Small bushman grass/Kortbeen-boesmangras
<i>Stipagrostis namaquensis</i>	River bushman grass/Steekwiet
<i>Tragus berteronianus</i>	Common Carrot Seed grass/Gewone Wortelsaadgras
<b>Non-Woody Forbs, Geophytes And Ferns</b>	
<i>Atriplex lindleyii</i>	Blasiebrak
<i>Atriplex semibaccata venappediculata</i>	Kruipsoutbos
<i>Bidens pilosa</i>	Black jack/Knapsekêrel
<i>Gazania krebsiana</i>	Botterblom
<i>Geigeria ornativia</i>	Vermeerbos
<i>Gethylis sp.</i>	-
<i>Galenia sarcophylla</i>	Vanwyksbrak
<i>Gomphrena celosioides</i>	Bachelor's button/Mierbossie
<i>Helichrysum sp.</i>	-
<i>Hibiscus trionum</i>	Bladderweed/Terblansbossie
<i>Huernia sp.</i>	-
<i>Indigofera sp.</i>	-
<i>Ledebouria sp.</i>	-
<i>Limeum aethopica</i>	-
<i>Moraea polystachya</i>	-
<i>Oxalis sp.</i>	Sorrel/Suring

<b>Species</b>	<b>Common Name</b>
<i>Pellaea calomelanos</i>	Rock fern
<i>Solanum panduriforme</i>	Poison apple/Gifappel
<i>Sonchus wilmsii</i>	Milk thistle/Melkdissel
<i>Tetragonia calycina</i>	Klappiesbrak
<i>Walafrida geniculata</i>	Pers-Aar
<b>Trees, Shrubs And Shrublets</b>	
<i>Acacia karroo</i>	Sweet thorn/Soetdoring
<i>Aloe broomii</i>	Slangaalwyn, Bergaalwyn
<i>Aloe claviflora</i>	Kanonaalwyn, Kraalaalwyn
<i>Aptosium procumbens</i>	Brandbossie
<i>Aptosipum spinescens</i>	Rolvarkie
<i>Asparagus suaveolens</i>	Wild asparagus/Katdoring
<i>Cadaba aphylla</i>	Rooistorm
<i>Cotoneaster pannosa</i>	Cotoneaster
<i>Crysocoma cillata</i>	Bitterbos
<i>Diospyros lyciodes subsp. guerkei</i>	Bloubos
<i>Erbelanzia ferox</i>	Doringvygie
<i>Eriocephalus ericoides</i>	Kapokbos
<i>Felicia muricata</i>	Bloublommetjie
<i>Hermannia cuneifolia var. glabrescens</i>	Geelpleisterbos
<i>Hermannia vestita</i>	Swaelbossie
<i>Nenax microphylla</i>	Daggapit
<i>Osteospermum spinescens</i>	Geeldraaibos
<i>Pentzia globoza</i>	Vaalkaroo
<i>Pentzia incana</i>	Ankerkaroo
<i>Plinthus karrooicus</i>	Silwerkaroo
<i>Psilocaulon absimile</i>	Asbos
<i>Pterothrix spinescens</i>	Voeltjie-kan-nie-sit-nie
<i>Rhigozum obovatum</i>	Granaatbos
<i>Rhigozum trichotomum</i>	Driedoring
<i>Rhus undulata</i>	Bloubos
<i>Salsola glabrescens</i>	Riverganna
<i>Salsola tuberculata</i>	Blomkoolganna
<i>Stomatium alboroseum</i>	Mesemb
<i>Stoebe vulgaris</i>	Bankrupt bush/Bankrotbos
<i>Sutherlandia frutescens</i>	Keurtjie
<i>Thesium lineatum</i>	Witstorm
<i>Zygophyllum incrasata</i>	Witkriedoring

#### **6.6.4 Rare and Endangered Species**

According to Mr. Vlok of Cape Nature Conservation (1991) certain rare plants may occur within the study area (Table 6.3). Although potential habitat for all of these species exists within the study area, none of them were recorded during the survey. Special effort was made, using plant illustrations, to establish from the landowners if they knew of the occurrence of any of these species. Although several landowners pointed out certain species in the veld, none of these were included in the list of Cape Nature Conservation (e.g. *Stomatium alboroseum* was mistakenly pointed out as a *Titanopsis* species).

**Table 6.3:** List of Rare species provided by Cape Nature Conservation

Species Name	Common Name
<i>Aloe grandidentata</i>	Bontaalwyn, Kanniedood
<i>Hoodia pillansii</i>	Ghaap
<i>Hoodia Bainsii</i>	Ghaap
<i>Lithops salicola</i>	Beeskloutjie, Perdekloutjie
<i>Titanopsis calcarea</i>	Sheeps tongue/Kalkvygie, Skilpadvoetjie,

No sensitive vegetation or specialised habitats with a high potential for Rare and Endangered species to occur were recorded within the study area, and no rare species were identified. However, some uncommon succulent plant species have been recorded in the area at a localised level.

## 6.7 Fauna

Several fauna species have been recorded within the study area. These include species such as the Riverine rabbit, which is listed as an endangered faunal species. However, no sensitive or specialised faunal habitats with a high potential for Rare and Endangered species to occur were recorded within the study area, and no rare species were identified.

The characteristic vegetation of the area supports a high diversity of bird species that are endemic to southern Africa. This is due to the fact that the open areas support ground dwelling species, whilst the watercourses with their taller trees support species that would normally be found in Arid Woodland. An example of such a species is the Kori Bustard.

There is also the upper non-succulent Karoo type. This type of vegetation within the study area provides suitable habitats for bird species. The vegetation types growing in the different areas of the study area determine the type of bird species found within that particular location, as different bird species have different habitat choices. A total of 16 Red Data bird species, seven of which are classified as 'vulnerable' and nine near-threatened species have been recorded within the

study area (refer to Table 6.4 overleaf. A large number of non-Red-Data bird species have also been recorded within the area (refer to Table 6.5).

**Table 6.4:** Red data bird species and their report rates, present in each quarter degree square in the study area (Harrison *et al* 1997)

Species	Conservation status	302 4CC	302 3DB	302 3DC	3023 DD	302 4CA	312 3AB	312 3AD	312 3BA	312 3BB	312 3BC	312 3BD	312 3CA	312 3CB	312 3CC	312 3CD	312 3DA	3123 DC
Blue Crane	V	33	7	40	30	30	27	33	50	83	6	-	-	-	60	9	-	-
Ludwig's Bustard	V	-	-	53	50	7	73	78	68	84	44	8	20	-	65	18	-	13
Tawny Eagle	V	-	7	-	10	-	-	-	-	69	-	-	-	-	-	-	-	-
Martial Eagle	V	-	7	-	-	4	-	-	5	86	-	-	7	-	28	-	-	3
Lesser Kestrel	V	-	7	-	20	-	-	-	7	22	-	4	-	-	12	-	-	6
Kori Bustard	V	8	-	13	10	22	9	-	-	5	-	-	-	-	-	-	7	-
Cape Vulture	V	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-
Karoo Lark	NT	8	7	27	-	-	18	11	2	17	-	-	-	-	-	9	14	3
Secretarybird	NT	33	14	7	50	19	9	-	59	83	-	-	7	10	56	-	-	3
Lanner Falcon	NT	-	7	7	10	-	18	-	2	12	-	-	-	10	30	-	-	6
Blue Korhaan	NT	-	-	13	-	-	-	-	-	34	-	-	-	-	-	-	-	-
Greater Flamingo	NT	-	-	-	10	7	-	-	-	2	-	-	-	-	-	-	-	-
Black Stork	NT	-	-	-	-	4	-	-	7	40	-	-	-	10	7	-	-	10
Black Harrier	NT	8	-	-	-	14	18	22	18	31	-	-	-	-	7	-	-	3
Peregrine Falcon	NT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-
Yellow-billed Stork	NT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
White Stork	Bonn Convention	-	-	-	-	-	27	-	14	14	6	8	-	-	12	-	-	3

V = vulnerable

NT = near-threatened

Bonn Convention – protected under the Bonn Convention on Migratory Species

Shaded columns represent those quarter degree squares that either of the two alternatives pass directly through.

Report rates are essentially a percentage of the number of counts conducted in the square, that recorded that particular species.

**Table 6.5:** Non-Red data bird species recorded in the study area

<p><b>Water Birds</b></p>	<p>Little Grebe                  Black-necked Grebe                  White-breasted Cormorant                  Reed Cormorant                  Grey Heron                  Black-headed Heron                  Goliath Heron                  Purple Heron                  Little Egret                  Cattle Egret                  Back-crowned night Heron                  Little Bittern                  Hamerkop                  White-faced Duck                  Egyptian Goose                  SA Shelduck                  Yellow-billed Duck                  African Black Duck                  Cape Teal                  Red-billed Teal                  Southern Pochard                  Spur-winged Goose                  Macoa Duck                  Common Moorhen                  Red-knobbed Coot</p>
<p><b>Storks, Ibises and Spoonbills</b></p>	<p>African Sacred Ibis                  Hadedda Ibis                  African Spoonbill</p>
<p><b>Medium to large Raptors</b></p>	<p>Black Eagle                  Booted Eagle                  Steppe Buzzard                  Jackal Buzzard                  Pale Chanting Goshawk                  Spotted Eagle Owl</p>
<p><b>Crows and Ravens</b></p>	<p>Pied Crow                  Black Crow                  White-necked Raven</p>
<p><b>Other terrestrial birds</b></p>	<p>Dikkops                  Plovers                  Korhaans                  Helmeted Guineafowl</p>

## **6.8 Visual/Aesthetic Impacts**

Any change in a local view through the introduction of a new development in the line-of-sight can be considered as a visual impact. Visual impacts are subjective, and are usually considered most significant when the development is not of a similar nature to other developments in the area, or is readily viewed from areas of public access, paths, roads and view points, or in areas which are characterised by significant natural features.

### **6.8.4 Visual/Aesthetic Impacts of the Proposed extension of the Hydra Substation**

The visual impact assessment for the proposed substation was informed by the generation of maps indicating the visibility of the substation to surrounding areas. The visibility is ranked on a scale of high to low based on the proportion of the substation that is visible. The visibility of the structure is a function of the lie of the land.

The structure and design of substations or switching stations are related to its function, and do not allow for many variations that may allow for the reduction in visual intrusions. Substations constitute a grouping of narrow, linear structures. This feature results in a rapid reduction in the visibility of these structures with increasing distance.

The substation can be considered to impose a higher visual impact as a result of its larger size and low aesthetic appeal. In addition, the visibility of these structures is significantly higher if viewed against the skyline. Therefore, the extension of the Hydra Substation is anticipated to add significantly to this visual impact, as this infrastructure is steel-intensive and considered to be visually intrusive.

### **6.8.2 Visual/Aesthetic Impacts of the Proposed Transmission Line**

The visual impact assessment for the proposed Transmission line was informed by the generation of maps indicating the visibility of the Transmission line to surrounding areas. The visibility is ranked on a scale of high to low based on the proportion of the Transmission line that is visible.

In addition, the study area is impacted by existing Transmission line infrastructure (i.e. No 1, 2 and 3 Hydra-Droërivier 400 kV lines) and the Victoria capacitor station, which is located approximately 3 km to the east of the proposed substation site. Therefore, the visual quality of the area is already impacted by developments of a similar nature.

## **6.9 Social Environment**

### **6.9.4 Demographics**

The study area falls within two Municipal Regions, namely the Ubuntu and Emthanjeni Municipalities. The Emthanjeni Municipality comprises De Aar, Hanover and Britstown, while the Ubuntu Municipality consists of five formal towns namely Victoria-West, Hutchinson, Merriman, Loxton and Richmond.

Prominent settlements found around the study area include the town of De Aar, Victoria West and Richmond. In addition to these prominent towns other small towns and communities exist within the study area including farm settlements.

According to the Emthanjeni Municipality's Integrated Development Plan (IDP), the estimated total population in the entire area is 38 975. The Ubuntu Municipal area is also characterised by low population figures. It can, therefore, be concluded that the total population density in the study area is very low compared with the rest of South Africa.

De Aar is viewed as an industrial growth centre in the Northern Cape Province as it has a number of industrial sites, reasonable prices and tariffs, inexpensive labour and the required infrastructure. Due to the agricultural activities in the area and the processing of these products, De Aar has several abattoirs which could be classified as one of the main economic sectors within the municipal area. The Emthanjeni municipal area is further known for its vital positioning on the main railway line between Johannesburg, Cape Town, Port Elizabeth and Namibia.

The Ubuntu Municipal area has the potential for economic growth, especially in the agricultural and tourism fields, due to the supporting factor of its natural resources.

As in most rural areas in South Africa, the residents living in the study area do not have access to adequate social infrastructure such as health care facilities, housing, tertiary educational facilities and recreational facilities. Unemployment and poor academic profiles are the order of the day.

### **6.9.5 Land Use Profile**

Sheep, mutton and wool are the dominant farming activities in the area. The average farm area size is 6 000 ha with a grazing capacity of 3 to 4 sheep per hectare. Hunting and eco-tourism activities are fast becoming a significant industry within the study area.



The area has a number of archaeological, historical and rock art sites, especially of the San.

### **6.9.6 Infrastructure**

A railway line runs along the western section of the study area from De Aar to the areas close to Victoria West. This railway line almost divides the study area in two in the northern section close to De Aar. This railway line forms part of the rail route from Johannesburg to Cape Town. This railway line has three stations within the study area, i.e. Deelfontein, Merriman and Hutchinson.

In addition to the railway line, the study area is accessed via minor service roads and major National roads. Roads in the area include the National Route N10, N12, N1 and the R 83. The N10 runs in a north-west direction to north-east of the study area. The N12 and N1 run along the western and eastern border of the study area respectively. The R83 services the southern areas of the study area, providing access from Victoria West to the Gamma Substation site.

The study area is traversed on the eastern side by three 400 kV Transmission lines linking Hydra Substation to Droërivier Substation. The western portion of the study area is traversed by 132 kV Sub-transmission lines servicing the railway line and an 88 kV powerline linking Victoria west to Murraysburg. Numerous other Transmission and Distribution power lines are present in the study area.

Three airstrips are found within the study area. These are located in various areas. One is found in De Aar, the other in the middle section of the study area on the farm Verborgen and the third is found in the south on the farm Bultfontein 217.

### **6.10 Tourism Potential**

The lack of significant features and distance from the tourism market renders the area at a disadvantage. According to the latest South Africa Tourism (SAT) survey, 2,6% of the total foreign visitors to South Africa visited the Northern Cape Province in the year 2005. During 2006, there has been no change in foreign visitors in the province compared to 2005. In addition, the survey indicates that, the Northern Cape Province attracts the lowest number of foreign visitors to South Africa compared to all other Provinces.

Tourism within De Aar and Victoria West is limited to areas in close proximity to road networks connecting Cape Town and the northern parts of South Africa, in hunting areas within the Northern Cape and farm stays.

De Aar's, most important tourist attraction is the house of the well-know author Olive Schreiner, while the Apollo Film Festival is becoming a well-known annual event in Victoria West, drawing tourists to the area. The museums in Victoria West also attract a number of visitors. Several bed and breakfast establishments, guesthouses and hunting lodges can be found within De Aar and Victoria West.

Furthermore, limited farm owners have established small-scale tourist activities such as hunting and wildlife experiences on their farms targeting international tourists.

### **6.11 Heritage and Archaeology**

The archaeology of the Northern Cape is rich and varied, covering long spans of human history. The Karoo is particularly bountiful.

It is likely that the study area has been relatively marginal to human settlement for most of its history, yet it is in fact exceptionally rich in terms of stone age sites and rock art, as a relatively few but important studies have shown (Sampson, 1985; Morris, 1994; Beaumont & Morris, 1990; Beaumont & Vogel, 1984; 1989; Morris, 1988; 1994; 1996; 2000a; 2000b; 2001; Morris & Beaumont, 1991; 1994; 2004).

Archaeological material found within the study area include several stone age sites, surface assemblages, rock engravings, and painting sites. Fossil data for the area is limited.

No specific sites were identified within the proposed servitude, however, within the general study area the following sites have been identified:

**Table 6.6:** Archaeological sites identified within the study area

<b>Site/Farm</b>	<b>Description</b>
Bulberg	Numerous fossils; archaeological sites; frontier/colonial era structures, were identified by fieldworkers, all directly within the servitude.
Draayfontein	Rock engravings were reported from the vicinity of Kamrand.
Sterkfontein	Two sets of site(s) – stone age and rock art – were identified by fieldworkers within the servitude.
Merriman	Masonry Blockhouse close to Deelfontein.
Deelfontein	Various features including the ruins of a hospital and cemetery were found.

In addition, heritage sites are known from along the railway, for example a masonry blockhouse at Merriman, and various features (ruin of hospital, cemetery) at Deelfontein.

Photographs of the various sites identified above are represented in Figures 6.4 and 6.6 below.



**Photograph 6.4:** Fossil remains found in the study area



**Photograph 6.5:** Masonry blockhouse at Merriman close to Deelfontein

Known archaeological and rock art sites exist on the farms Nieuwejaars Fountain, Minfontein and Deelfontein (Morris 1991; 2000b) (see Photograph 6.6.).



**Photograph 6.6:** Bushmen etching found in the study area