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Terrestrial Ecology Specialist Assessment

Wag-'n-Bietjie MTS Project near De Aar in Northern Cape Province.

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For: Landscape Dynamics

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SPECIALIST DETAILS & DECLARATION

This report has been prepared in accordance with Section 13: General Requirements for Environmental Assessment Practitioners (EAPs) and Specialists as well as per Appendix 6 of GNR 982 – Environmental Impact Assessment Regulations and the National Environmental Management Act (NEMA, No. 107 of 1998 as amended 2017) and Government Notice 704 (GN 704). It has been prepared independently of influence or prejudice by any parties.

The details of Specialists are as follows –

Table 1: Details of Specialist

Specialist	Qualification accreditation	and	Signature
Dr David Hoare (Pr.Sci.Nat.)	PhD Botany		 Date: 19/01/2022

Details of Author:

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Professional Natural Scientist, South African Council for Natural Scientific Professions, Reg. no. 400221/05 (Ecology, Botany)

Statement of independence:

I, David Hoare, as the appointed plant species specialist, hereby declare/affirm the correctness of the information provided in this compliance statement, and that I:

1. meet the general requirements to be independent and
2. have no business, financial, personal or other interest in the proposed development and that no circumstances have occurred that may have compromised my objectivity; and
3. am aware that a false declaration is an offence in terms of regulation 48 of the EIA Regulations (2014).



Dr David Hoare

19 January 2022

Date

INTRODUCTION

The proposed infrastructure is on the farm Wag 'n Bietjie, approximately 12 km east of De Aar in the Northern Cape Province, within the quarter degree grid 3025CA (Figure 1).

The topography of the study site is relatively gentle. There is a range of hills in the southern and central parts of the site and a gentle increase in elevation northwards. The elevation on site varies from 1240 to 1336 m above sea level. There are a number of drainage lines and/or watercourses on the site, the main one of which constitutes a main tributary of the Brakrivier.

Most of the site consists of natural vegetation. The exception is some farm buildings and roads associated with these, as well as a small area of cultivation.

The activities to be undertaken under this planned application trigger activities listed under National Environmental Management Act (NEMA), thus, a basic assessment process is being followed for this application. The results of the Department of Forestry, Fisheries and the Environment (DFFE) environmental screening report indicates that the proposed project area is located within an area of medium, high and very high environmental sensitivity of Plant, Animal and Terrestrial Biodiversity respectively.

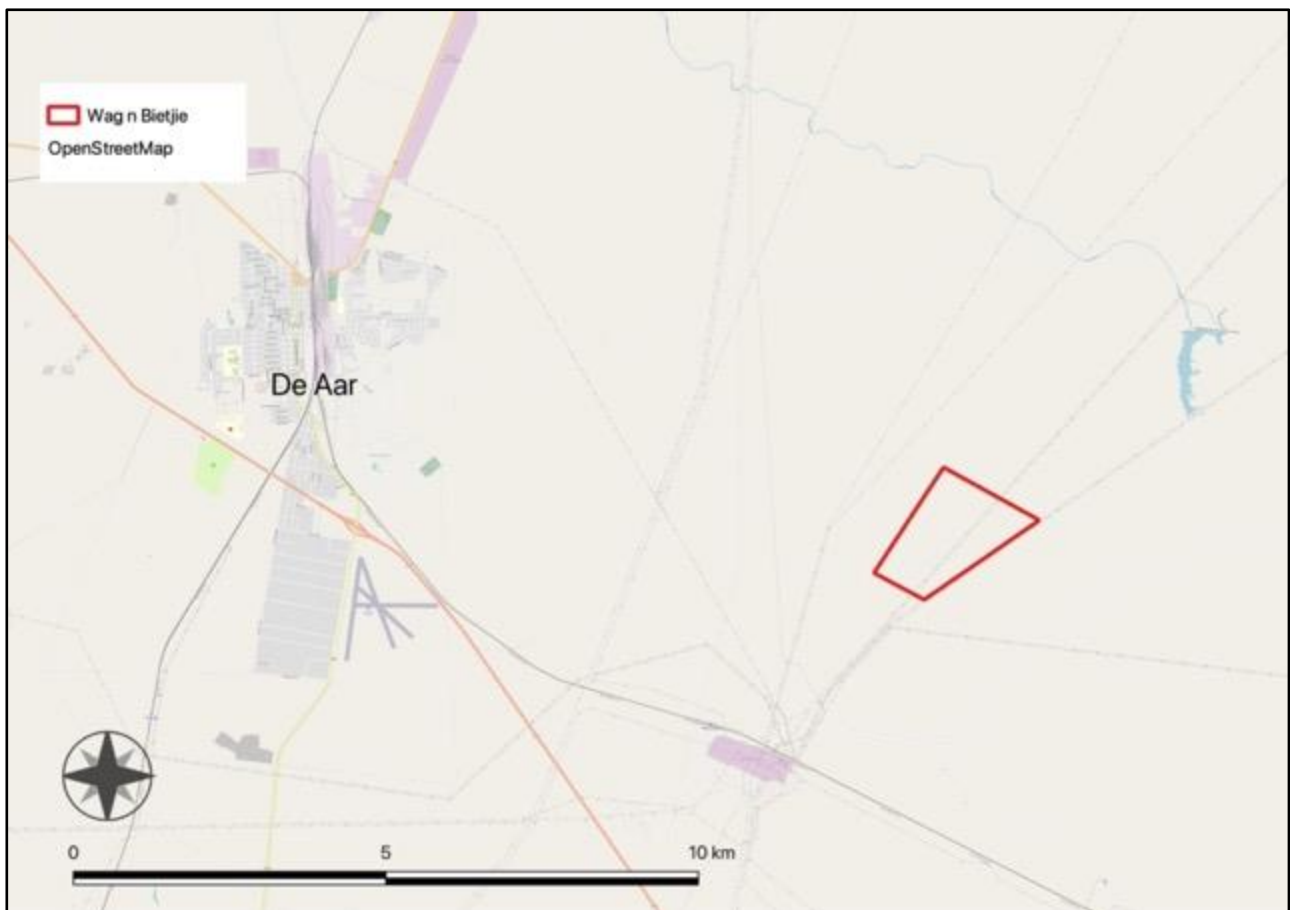


Figure 1: Location of the site near De Aar in the Northern Cape Province.

Description of proposed project

Solar PV facilities on Wag 'n Bietjie were previously approved but lapsed. There is no EA approved grid connection infrastructure on the Wag 'n Bietjie farm.

An EA application will be made for the following (Figure 2):

- A 400kV Main Transmission Substation (MTS)
- Loop in Loop Out (LILLO) lines connecting the new MTS to an existing 400kV power line
- A power line that connect the Wag 'n Bietjie MTS and the Vetlaagte MTS
- A 200m corridor for the power line

In accordance with GN 320 and GN 1150 (20 March 2020) of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). David Hoare Consulting, as the Ecological specialist, have been commissioned to verify the sensitivity of the project site under these specialist protocols.

The scope of this report is the study area defined above.



Figure 2: Proposed infrastructure.

Identified Theme Sensitivities

A sensitivity screening report from the DEA Online Screening Tool was requested in the application category: Utilities Infrastructure | Electricity | Distribution and transmission | Substation. The DEA Screening Tool report for the area indicates the following ecological sensitivities:

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Plant Species Theme			X	
Animal Species Theme		X		
Terrestrial Biodiversity Theme	X			

Plant theme

Sensitivity features are indicated as follows:

Sensitivity	Feature(s)
Medium	Tridentea virescens

Animal theme

Sensitivity features are indicated as follows:

Sensitivity	Feature(s)
High	Aves-Neotis ludwigii
Medium	Aves-Neotis ludwigii

Terrestrial Biodiversity theme

Sensitivity features are indicated as follows:

Sensitivity	Feature(s)
Very High	Ecological support area

METHODOLOGY

The detailed methodology followed as well as the sources of data and information used as part of this assessment is described below.

Survey timing

The study commenced as a desktop-study followed by a site-specific field study on 24 and 25 November 2021. The site is within the Nama-Karoo Biome. The climate is arid to semi-arid. Rainfall occurs from November to March, but peaks in mid- to late summer (February / March). Mean annual rainfall is 275 mm per year. There had been relatively good recent rainfalls prior to the field survey. The timing of the survey in early summer is therefore acceptable in terms of assessing the flora and vegetation of the site. The vegetation on site was in relatively good condition in terms of the seasonal presence of perennial plant species, although grass cover had not recovered from the previous winter period. The overall condition of the vegetation was therefore possible to be determined with a moderately high degree of confidence.

Field survey approach

During the field survey, the entire site was assessed on foot. A hand-held Garmin GPSMap 64s was used to record a track within which observations were made. Digital photographs were taken of features and habitats on site, as well as of all plant species that were seen. All plant species recorded were uploaded to the iNaturalist website and are accessible by viewing the observations for this site.

Aerial imagery from Google Earth was used to identify and assess habitats on site. Patterns identified from satellite imagery were verified on the ground. Digital photographs were taken at locations where features of interest were observed. During the field survey, particular attention was paid to ensuring that all habitat variability was covered physically on the ground.

Digital photographs were taken of features of interest that were seen on site, as well as of habitat in different parts of the site.

Sources of information

Vegetation and Plant species

- Broad vegetation types occurring on site were obtained from Mucina and Rutherford (2006), with updates according to the SANBI BGIS website (<http://bgis.sanbi.org>). The description of each vegetation type includes a list of plant species that may be expected to occur within the particular vegetation type.
- Plant species that could potentially occur on in the general area was extracted from the NewPosa database of the South African National biodiversity Institute (SANBI) for the quarter degree grid/s in which the site is located.
- The IUCN Red List Category for plant species, as well as supplementary information on habitats and distribution, was obtained from the SANBI Threatened Species Programme (Red List of South African Plants, <http://redlist.sanbi.org>).

- Lists were compiled specifically for any species at risk of extinction (Red List species) previously recorded in the area. Historical occurrences of threatened plant species were obtained from the South African National Biodiversity Institute (<http://posa.sanbi.org>) for the quarter degree square/s within which the study area is situated. Habitat information for each species was obtained from various published sources. The probability of finding any of these species was then assessed by comparing the habitat requirements with those habitats that were found, during the field survey of the site, to occur there.
- Regulations published for the National Forests Act (Act 84 of 1998) (NFA) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distribution of species on this list were obtained from published sources (e.g. van Wyk & van Wyk 1997) and from the SANBI Biodiversity Information System website (<http://sibis.sanbi.org/>) for quarter degree grids in which species have been previously recorded. Species that have been recorded anywhere in proximity to the site (within 100 km), or where it is considered possible that they could occur there, were listed and were considered as being at risk of occurring there.
- Mapping was done from aerial imagery on Google Earth, which also provides historical imagery for a period up to 15 years ago.

Regional plans

- Information from the National Protected Areas Expansion Strategy (NPAES) was consulted for possible inclusion of the site into a protected area in future (available on <http://bgis.sanbi.org>).
- The Northern Cape Biodiversity Conservation Plan maps were consulted for inclusion of the site into a Critical Biodiversity Area or Ecological Support Area (biodiversityadvisor.sanbi.org).

RESULTS

Broad vegetation patterns

There are two regional vegetation types in the study area, namely Northern Upper Karoo (NKu3), which occurs throughout the site, and Besemkaree Koppies Shrubland (Gh4), which occurs in the hills directly to the east (Figure 7), briefly described below, including expected species composition.

Northern Upper Karoo

Distribution

Northern Cape and Free State Provinces: Northern regions of the Upper Karoo plateau from Prieska, Vosburg and Carnarvon in the west to Philipstown, Petrusville and Petrusburg in the east. Bordered in the north by Niekerkshoop, Douglas and Petrusburg and in the south by Carnarvon, Pampoenpoort and De Aar. A few patches occur in Griqualand West. Altitude varies mostly from 1 000–1 500 m.

Vegetation & Landscape Features

Shrubland dominated by dwarf karoo shrubs, grasses and *Senegalia mellifera* subsp. *detinens* and some other low trees (especially on sandy soils in the northern parts and vicinity of the Orange River). Flat to gently sloping, with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast and with many interspersed pans.

Geology & Soils



Figure 7: Regional vegetation types of the site and surrounding areas.

Shales of the Volksrust Formation and to a lesser extent the Prince Albert Formation (both of the Ecca Group) as well as Dwyka Group diamictites form the underlying geology. Jurassic Karoo Dolerite sills and sheets support this vegetation complex in places. Wide stretches of land are covered by superficial deposits including calcretes of the Kalahari Group. Soils are variable from shallow to deep, red-yellow, apedal, freely drained soils to very shallow Glenrosa and Mispah forms. Mainly Ae, Ag and Fc land types.

Climate

Rainfall peaks in autumn (March). MAP ranges from about 190 mm in the west to 400 mm in the northeast. Mean maximum and minimum monthly temperatures for Britstown are 37.9°C and –3.6°C for January and July, respectively. Corresponding values are 37.1°C and –4.8°C for De Aar and 39.0°C and –2.3°C for Kareekloof (northwest of Strydenburg).

Important Taxa

Small Trees: *Senegalia mellifera* subsp. *detinens*, *Boscia albitrunca*.

Tall Shrubs: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*, *L. schizocalyx*, *Rhigozum trichotomum*.

Low Shrubs: *Chrysocoma ciliata* (d), *Gnidia polycephala* (d), *Pentzia calcarea* (d), *P. globosa* (d), *P. incana* (d), *P. spinescens* (d), *Rosenia humilis* (d), *Amphiglossa triflora*, *Aptosimum marlothii*, *A. spinescens*, *Asparagus glaucus*, *Barleria rigida*, *Berkheya annectens*, *Eriocephalus ericoides* subsp. *ericoides*, *E. glandulosus*, *E. spinescens*, *Euryops asparagoides*. *Felicia muricata*, *Helichrysum lucilioides*, *Hermannia spinosa*, *Leucas capensis*, *Limeum aethiopicum*, *Melolobium candicans*, *Microloma armatum*, *Osteospermum leptolobum*, *O. spinescens*, *Pegolettia retrofracta*, *Pentzia lanata*, *Phyllanthus maderaspatensis*, *Plinthus karooicus*, *Pteronia glauca*, *P. sordida*, *Selago geniculata*, *S. saxatilis*, *Tetragonia arbuscula*, *Zygophyllum lichtensteinianum*.

Succulent Shrubs: *Hertia pallens*, *Salsola calluna*, *S. glabrescens*, *S. rabieana*, *S. tuberculata*, *Zygophyllum flexuosum*.

Semiparasitic Shrub: *Thesium hystrix* (d),

Herbs: *Chamaesyce inaequilatera*, *Convolvulus sagittatus*, *Dicoma capensis*, *Gazania krebsiana*, *Hermannia comosa*, *Indigofera alternans*, *Lessertia pauciflora*, *Radyera urens*, *Sesamum capense*, *Sutera pinnatifida*, *Tribulus terrestris*, *Vahlia capensis*.

Succulent Herb: *Psilocaulon coriarium*.

Geophytic Herb: *Moraea pallida*.

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Enneapogon desvauxii* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *E. truncata* (d), *Sporobolus fimbriatus* (d), *Stipagrostis obtusa* (d), *Eragrostis bicolor*, *E. porosa*, *Fingerhuthia africana*, *Heteropogon contortus*, *Stipagrostis ciliata*, *Themeda triandra*, *Tragus berteronianus*, *T. koelerioides*, *T. racemosus*.

Biogeographically Important Taxa

Herb (western distribution limit): *Convolvulus boedeckerianus*.

Tall Shrub (southern limit of distribution): *Gymnosporia szyszylowiczii* subsp. *namibiensis*.

Endemic Taxa

Succulent Shrubs: *Lithops hookeri*, *Stomatium pluridens*.

Low Shrubs: *Atriplex spongiosa*, *Galenia exigua*.

Herb: *Manulea deserticola*.

Besemkaree Koppies Shrubland

Distribution

Northern Cape, Free State and Eastern Cape Provinces: On plains of Eastern Upper Karoo (between Richmond and Middelburg in the south and the Orange River) and within dry grasslands of the southern and central Free State. Extensive dolerite-dominated landscapes along the upper Orange River belong to this unit as well. Extends northwards to around Fauresmith in the northwest and to the Wepener District in the northeast. Altitude 1 120–1 680 m.

Vegetation & Landscape Features

Slopes of koppies, butts and tafelbergs covered by two-layered karroid shrubland. The lower (closed-canopy) layer is dominated by dwarf small-leaved shrubs and, especially in precipitation-rich years, also by abundant grasses, while the upper (loose canopy) layer is dominated by tall shrubs, namely *Searsia erosa*, *S. burchellii*, *S. ciliata*, *Euclea crispa* subsp. *ovata*, *Diospyros austroafricana* and *Olea europaea* subsp. *cuspidata*.

Geology & Soils

Dolerite koppies and sills embedded within Karoo Supergroup sediments. The dolerite dykes and sills are igneous intrusions that are the result of extensive volcanic activity, which accompanied the break-up of Gondwana in the Jurassic. In places the slopes of mesas and butts carrying this vegetation type have a mixed geology where dolerites occur together with sandstones and mudstones of the Ecca and Beaufort Groups. Fb land type covers almost 60% of the area, followed by Ib.

Climate

Due to the large extent of the area, the rainfall pattern differs slightly from west to east. Seasonal summer rainfall prevails when the patches are found embedded within other units of the Grassland Biome, but the southern and southwestern regions show hints of bimodal climate patterns typical of the Nama-Karoo. Far more importantly, despite an overall MAP of almost 400 mm, MAP ranges from about 280 mm in the west (De Aar) to more than double, 580 mm, in the east (Edenburg). Much of the rainfall is of convective origin. MAT 15°C.

Important Taxa

Small Trees: *Cussonia paniculata*, *Ziziphus mucronata*.

Tall Shrubs: *Diospyros austro-africana* (d), *Euclea crispa* subsp. *ovata* (d), *Olea europaea* subsp. *africana* (d), *Rhus burchellii* (d), *R. ciliata* (d), *R. erosa* (d), *Buddleja saligna*, *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida*, *Grewia occidentalis*, *Gymnosporia polyacantha*, *Tarchonanthus minor*.

Low Shrubs: *Asparagus suaveolens* (d), *Chrysocoma ciliata* (d), *Amphiglossa triflora*, *Aptosimum elongatum*, *Asparagus striatus*, *Diospyros pallens*, *Eriocephalus ericoides*, *E. spinescens*, *Euryops empetrifolius*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Helichrysum dregeanum*, *H. lucilioides*, *Hermannia multiflora*, *H. vestita*, *Lantana rugosa*, *Limeum aethiopicum*, *Lycium cinereum*, *Melolobium candicans*, *M. microphyllum*, *Nenax microphylla*, *Pegolettia retro-fracta*, *Pentzia globosa*, *Rhigozum obovatum*, *Selago saxatilis*, *Stachys linearis*, *S. rugosa*, *Sutera halimifolia*, *Wahlenbergia albens*.

Succulent Shrubs: *Aloe broomii*, *Chasmatophyllum musculinum*, *C. verdoorniae*, *Cotyledon orbiculata* var. *dactyloopsis*, *Pachypodium succulentum*.

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Cenchrus ciliaris* (d), *Cymbopogon caesius* (d), *Cynodon incompletus* (d), *Digitaria eriantha* (d), *Eragrostis curvula* (d), *E. lehmanniana* (d), *Heteropogon contortus* (d), *Setaria lindenbergiana* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Cymbopogon pospischilii*, *Enneapogon scoparius*, *Eragrostis chloromelas*, *E. obtusa*, *Eustachys paspaloides*, *Fingerhuthia africana*, *Hyparrhenia hirta*, *Sporobolus fimbriatus*.

Herbs: *Convolvulus sagittatus*, *Dianthus caespitosus* subsp. *caespitosus*, *Gazania krebsiana* subsp. *krebsiana*, *Hibiscus pusillus*, *Indigofera alternans*, *I. rhytidocarpa*, *Lepidium africanum* subsp. *africanum*, *Pollichia campestris*.

Herbaceous Climber: *Argyrolobium lanceolatum*.

Geophytic Herbs: *Albuca setosa*, *Asplenium cordatum*, *Cheilanthes bergiana*, *C. eckloniana*, *Freesia andersoniae*, *Haemanthus humilis* subsp. *humilis*, *Oxalis depressa*, *Pellaea calomelanos*.

Succulent Herbs: *Aloe grandidentata*, *Crassula nudicaulis*, *Duvalia caespitosa*, *Euphorbia pulvinata*, *Huernia piersii*, *Stapelia grandiflora*, *S. olivacea*, *Tridentea gemmiflora*.

Endemic Taxa

Small Tree: *Cussonia* sp. nov. (P.J. du Preez 3666 BLFU).

Succulent Shrubs: *Euphorbia crassipes*, *Neohenricia sibbettii*, *N. spiculata*.

Vegetation conservation status

National status

The conservation status of Northern Upeer Karoo, and Besemkaree Koppies Shrubland is Least Concern.

Neither vegetation type is listed in The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004).

Table 2: Conservation status of vegetation types occurring in the study area, according to Mucina et al. 2005 and the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011).

Vegetation Type	Status (Mucina et al. 2005)	Status (NEMBA – 2011)	Status (NBA 2018)
Northern Upeer Karoo	Least threatened	LC	LC
Besemkaree Koppies Shrubland	Least threatened	LC	LC

Provincial C-Plan status

The Northern Cape CBA map classifies the natural vegetation of the province according to conservation value in decreasing value, as follows:

1. Protected
2. Critical Biodiversity Area One (Irreplaceable Areas) (RED)
3. Critical Biodiversity Area Two (Important Areas) (ORANGE)
4. Ecological Support Area (GREEN)
5. Other Natural Area (YELLOW)

This shows features within the study area within one of these classes, as follows (Figure 8):

1. Ecological Support Areas: Most of the site, which corresponds with all remaining natural habitat.

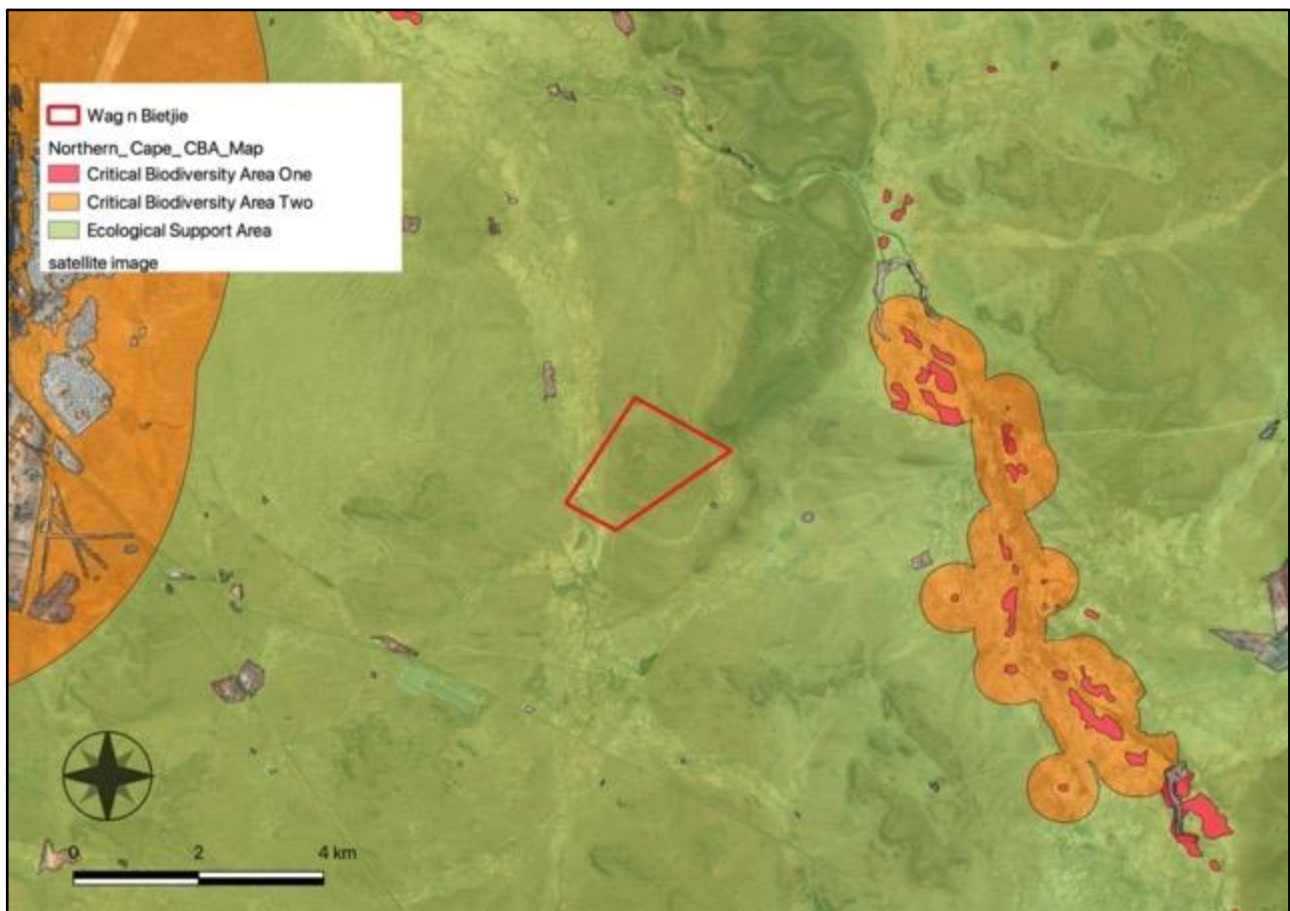


Figure 8: Northern Cape Biodiversity Conservation Plan for the site and surrounding areas.

Habitats on site

A broad habitat map was produced to provide context for the general occurrence of plant species, as well as likely habitat for plant or animal species of concern, which are usually restricted to specific habitat types. The habitat map is shown in Figure 9.

Plains

This is the widespread plains vegetation of the area around De Aar. It is generally found on loamy soils with relatively low rock cover. The vegetation consists mostly of low dwarf shrubs, such as *Pentzia incana*, *Chrysocoma ciliata*, *Aizoon africanum*, *Eriocephalus ericoides*, and *Ruschia intricata*, along with various grasses, including *Aristida congesta*, *Fingerhuthia africana*, *Eragrostis lehmanniana*, *Eragrostis obtusa*, *Chloris virgata*, *Stipagrostis uniplumis*, *Enneapogon cenchroides*, and *Cynodon dactylon*. It is relatively species poor, and is uniform across wide areas..

Low hills

There are a small number of low hills in the study area that have a steeper topography than the surrounding plains, are more rocky, and include various amounts of scattered rock and outcrops. The vegetation is much more diverse than the surrounding plains and includes a higher diversity of woody shrubs, such as *Searsia burchellii*, *Diospyros austro-africanus*, *Boscia albitrunca* (PROTECTED TREE), *Asparagus glaucus*, and *Felicia filifolia*. The grass species composition is also different and includes *Heteropogon contortus*, *Themeda triandra*, and *Cenchrus ciliaris*.



Figure 9: Habitats on site.

Rock outcrops

These are often bare of vegetation but where vegetation occurs, it includes species found nowhere else in the landscape, and is also important habitat for many different animal species, as well as various invertebrates. They are imbedded within the low hills and form an ecological continuum.

Drainage

The drainage areas include a variety of valley bottoms that are sometimes channelled and sometimes not, depending on the size. The margins generally grade into the surrounding karoo vegetation. The bottom is either bare soil or hollows that become waterlogged during rainfall. There are a number of built structures to hold back drainage, either for creating waterbodies or for erosion control. In places are well-defined channels in which recognisable wetland vegetation occurs, dominated by species such as *Afroscirpoides dioeca*, *Limosella major*, *Juncus rigidus*, *Eleocharis dregeana* and *Lobelia thermalis*.



Figure 10: Sensitivity of habitats on site.



Figure 11: View of plains vegetation in northern part of site.



Figure 12: Small outcrop surrounded by karroid plains.



Figure 13: Plains on site with hills in background.



Figure 14: Hill with rock outcrops.



Figure 15: Vegetation within hills showing scattered rock piles.



Figure 16: Channel area within floodplain.

Red List plant species of the study area

There is one plant species flagged for the site in the DEA Online Screening Tool output, namely *Tridentea virescens* (Figure 16), listed as Rare. It has a wide distribution over the drier parts of the Northern Cape and northern parts of the Eastern Cape (Bruyns 1994), as well as in southern Namibia (Figure 17). It occurs on stony ground, or on hard loam in floodplains. This habitat preference includes the entire gamut of habitat types occurring on site. The species has been recorded twice previously near to De Aar and could possibly occur on s

There are no known additional listed species from further afield with a geographical distribution that may include the site.

Protected trees

Tree species protected under the National Forest Act are listed in Appendix 2. There is one that has a geographical distribution that includes the study area, *Boscia albitrunca* (Shepherd's Tree / Witgatboom / !Xhi).

Boscia albitrunca occurs in semi-desert areas and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils. A number of individuals were found on site within the low hills on site. This is within the Vetlaagte assessment area, but outside the footprint of the proposed infrastructure occurring in that area (proposed and alternative MTS, as well as grid routes).

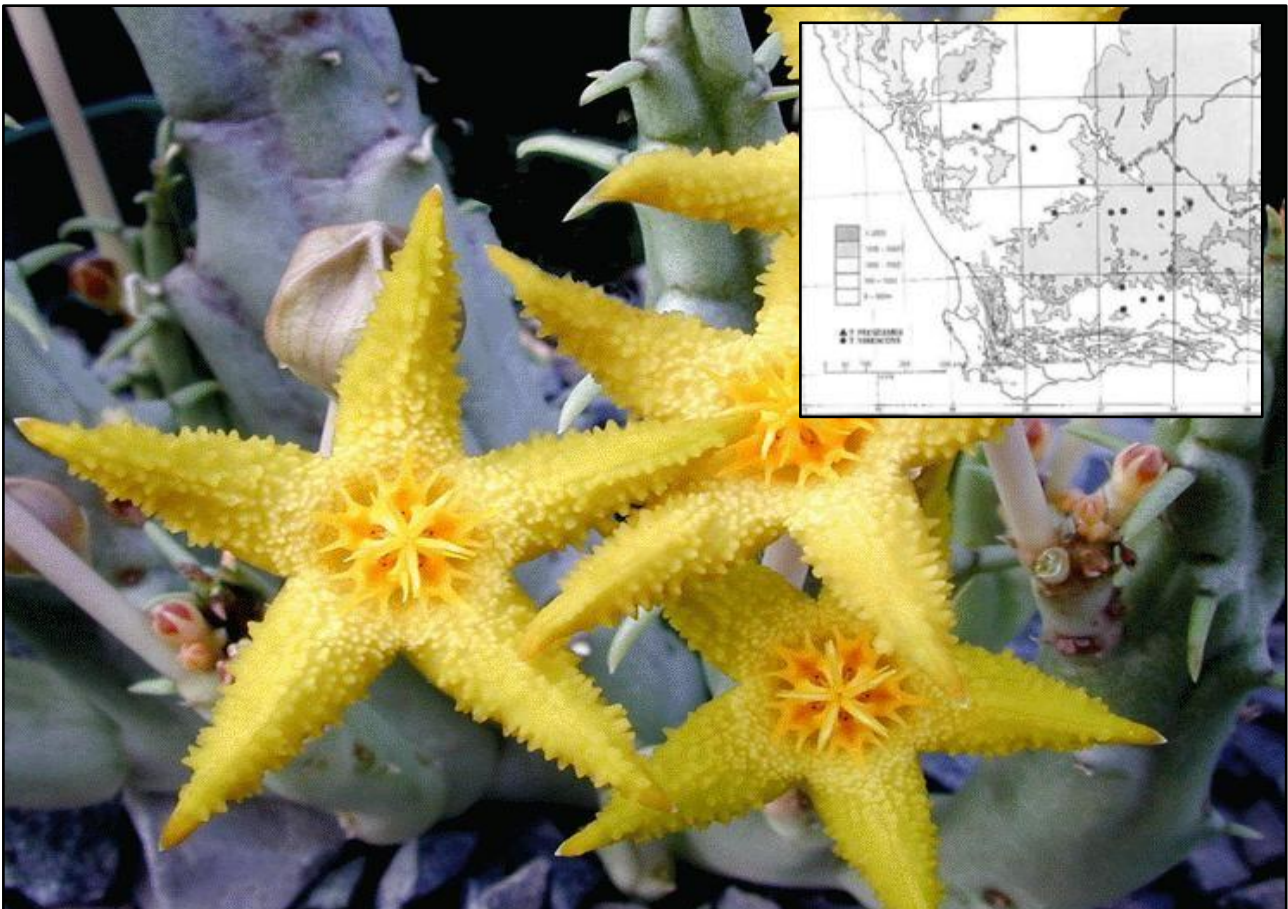


Figure 17: *Tridentea virescens* (picture from www.cactus-mall.com).

Red List animal species of the study area

There is one animal species flagged for the site in the DEA Online Screening Tool output, namely *Neotis ludwigii* (Ludwig's Bustard), listed as Endangered. A specialist avifaunal assessment forms a separate component of the environmental assessment application and birds in general are not discussed here. However, the habitat for this species is considered here as part of the general ecological assessment. Ludwig's Bustard occurs in flat, open, semi-arid shrublands, including in the Nama-Karoo. The study area forms part of the general area of occurrence for this species and is near the core high density distribution range for the species (Taylor et al. 2015). All habitat on site is therefore potentially suitable for this species. Habitat loss due to the current project will be relatively insignificant. However, the main impact on this species is due to collisions with overhead power lines.

Other listed animal species that could possibly occur in the study area are mostly small carnivores, including Black-footed Cat (Vulnerable) and Brown Hyaena (Near Threatened), both mobile species that will move away from any human disturbance. The Tent Tortoise (*Psammobates tentorius*), listed as Near Threatened, has been previously recorded nearby and could occur on site.

ASSESSMENT OF PROPOSED INFRASTRUCTURE

MTS

There is a single proposed location for the proposed MTS, shown in Figure 18 in relation to habitat sensitivity on site. It occurs within plains vegetation, close to rocky outcrops. A full walk-through of the site was undertaken in the field and no specific features of concern were noted (Figure 19). Possible impacts from the proposed project are as follows:

1. Loss of natural habitat.
2. Loss of individuals of protected trees, protected plants or other listed species.
3. Loss of faunal habitat.
4. Invasion by alien invasive plant species as a result of disturbance.

In all cases, the impact of the proposed project is relatively insignificant relative to the general availability of habitat in the study area and general geographical region.

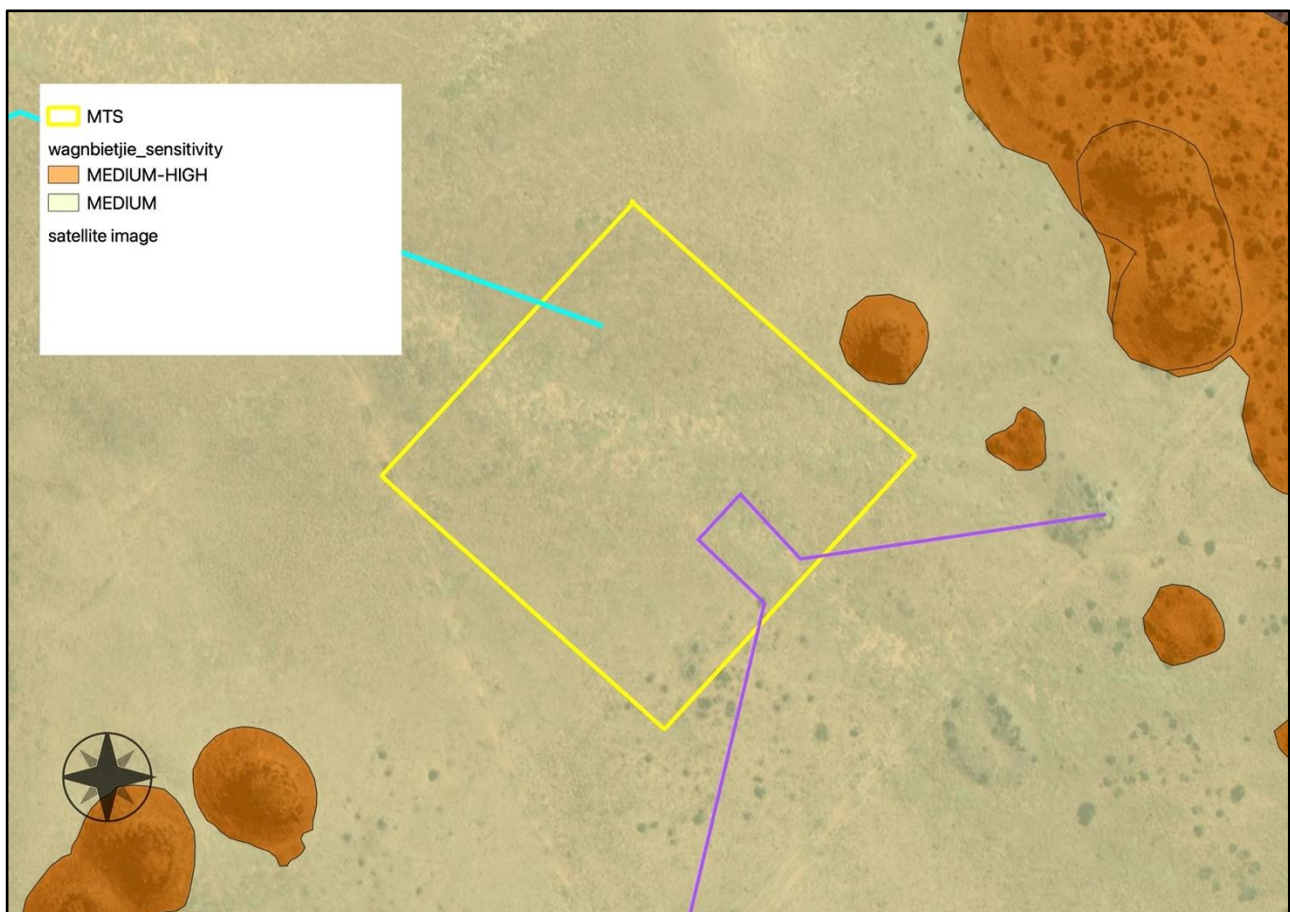


Figure 18: Proposed MTS infrastructure in relation to habitat sensitivity on site.



Figure 19: Views of habitat within MTS.

Assessment of impacts: Construction Phase

Possible impacts during the construction phase are as follows:

1. Loss of natural habitat (same for both options).
2. Loss of individuals of protected trees, protected plants or other listed species (no apparent differences were observed between the two sites).
3. Loss of faunal habitat (same for both options)

These are assessed below (Table 3-5).

Table 3: Assessment of impact: "Loss of natural habitat" for the MTS.

Impact Description Loss of natural habitat due to clearing						
Cumulative impact description Cumulative loss of habitat due to all project components						
Mitigation Minimise vegetation clearing and disturbance to footprint areas only. Compile a rehabilitation programme and rehabilitate disturbed areas. Compile and implement Alien Invasive Management Plan. Limit access to sensitive areas during construction. Undertake monitoring to evaluate whether further measures are required.						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of natural habitat	Site	Permanent	Definite	Low	Moderate	Moderate
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Table 4: Assessment of impact: "Loss of individuals of listed and protected plant species" for the MTS.

Impact Description Loss of individuals of listed and protected plant and tree species due to clearing
Cumulative impact description Cumulative loss of individuals of listed and protected plant and tree species due to all project components
Mitigation All mitigation measures that apply for "Loss of habitat".

Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of listed / protected flora	Site	Medium	Possible	Medium	Low	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Table 5: Assessment of impact: "Loss of habitat or individuals of sensitive faunal species" for the MTS.

Impact Description Loss of habitats or individuals of sensitive fauna species						
Cumulative impact description Cumulative loss of individuals or habitat of sensitive fauna species due to all project components						
Mitigation All mitigation measures that apply for "Loss of habitat".						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of sensitive fauna	Site	Medium	Possible	Medium	Low	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Assessment of impacts: Operation Phase

Possible impacts during the construction phase are as follows:

1. Invasion by alien invasive plant species as a result of disturbance.

These are assessed below (Table 6).

Table 6: Assessment of impact: "Invasion by alien invasive plant species" for the MTS.

Impact Description Invasion by alien invasive plant species						
Cumulative impact description Cumulative invasion due to all project components						
Mitigation Compile and implement Alien Invasive Management Plan. Rehabilitate disturbed areas.						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Invasion by alien invasive plant species	Local	Long-term	Probable	Medium	Moderate	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Summary of impacts

Construction Phase

Name of Impact	Significance without mitigation	Significance after mitigation
Loss of natural habitat	Moderate	Moderate
Loss of listed / protected flora/trees	Low	Low
Loss of sensitive fauna	Low	Low

Post-Construction and Operational Phase

Name of Impact	Significance without mitigation	Significance after mitigation
Invasion by alien invasive plant species	Moderate	Low

Powerline connecting Wag 'n Bietjie MTS and Vetlaagte MTS

The location for the proposed infrastructure is shown in Figure 21 in relation to habitat sensitivity on site. The switching station occurs within lowland plains and most of the power line is within lowland plains, A full walk-through of the switching station site was undertaken in the field and no specific features of concern were noted (see Figure 22 for view of switching station site). Possible impacts from the proposed project are as follows:

1. Loss of natural habitat.
2. Loss of individuals of protected trees, protected plants or other listed species (no specific concerns seen on site).
3. Loss of faunal habitat.
4. Invasion by alien invasive plant species as a result of disturbance.

The impact of the proposed project is relatively insignificant relative to the approved solar PV projects within the same area.

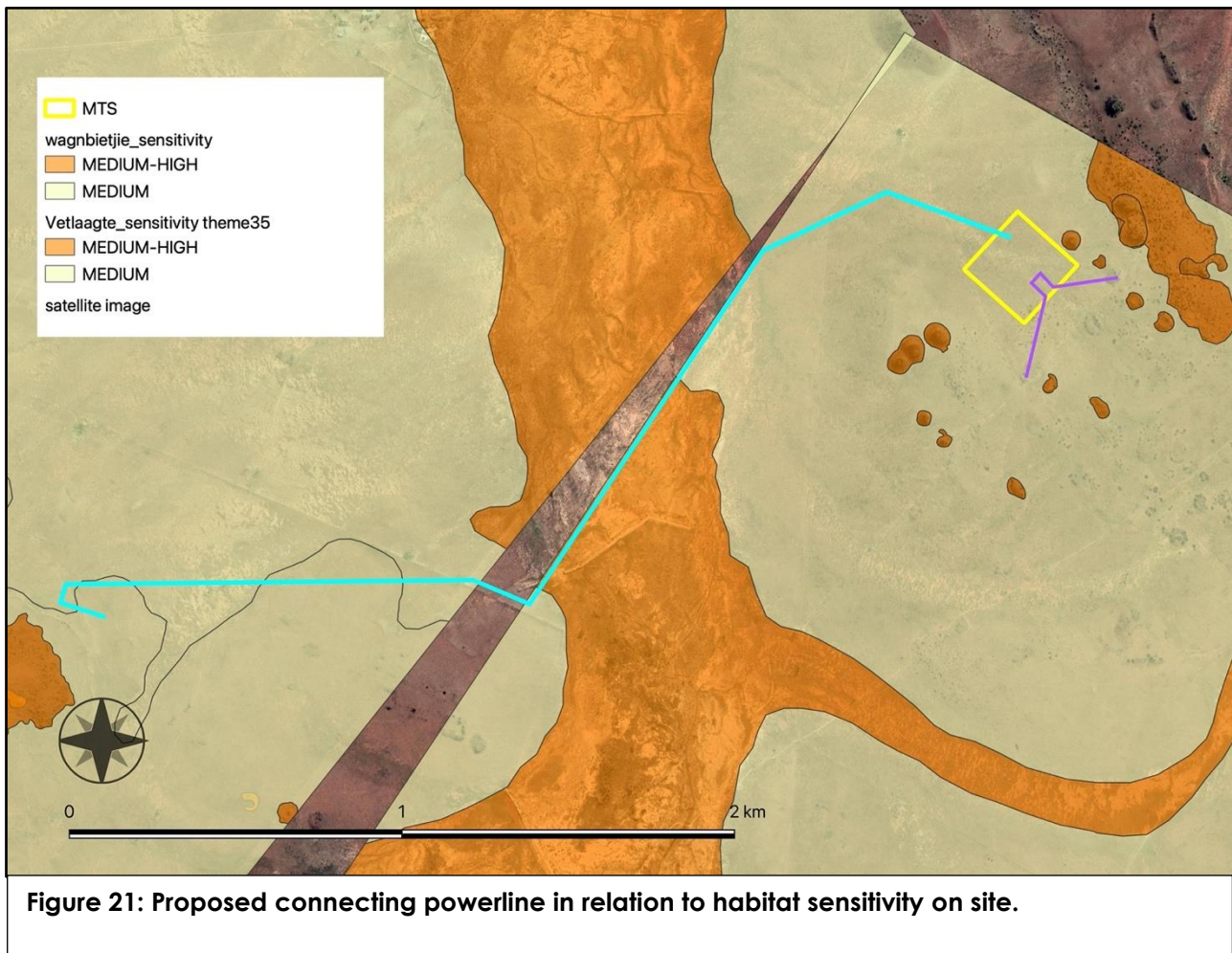


Figure 21: Proposed connecting powerline in relation to habitat sensitivity on site.



Figure 22: View of habitat within footprint of connecting powerline.

Assessment of impacts: Construction Phase

Possible impacts during the construction phase are as follows:

1. Loss of natural habitat.
2. Loss of individuals of protected trees, protected plants or other listed species.
3. Loss of faunal habitat.

These are assessed below (Table 7-9).

Table 7: Assessment of impact: "Loss of natural habitat" for the connecting powerline (Wag 'n Bietjie MTS to Vetlaagte MTS).

<p>Impact Description Loss of natural habitat due to clearing</p>
<p>Cumulative impact description Cumulative loss of habitat due to all project components</p>
<p>Mitigation Minimise vegetation clearing and disturbance to footprint areas only. Compile a rehabilitation programme and rehabilitate disturbed areas. Compile and implement Alien Invasive Management Plan. Limit access to sensitive areas during construction. Undertake monitoring to evaluate whether further measures are required.</p>

Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of natural habitat	Site	Permanent	Definite	Low	Moderate	Moderate
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Table 8: Assessment of impact: "Loss of individuals of listed and protected plant species" for the connecting powerline (Wag 'n Bietjie to Vetlaagte MTS).

Impact Description Loss of individuals of listed and protected plant and tree species due to clearing						
Cumulative impact description Cumulative loss of individuals of listed and protected plant and tree species due to all project components						
Mitigation All mitigation measures that apply for "Loss of habitat".						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of listed / protected flora	Site	Medium	Possible	Medium	Low	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Table 9: Assessment of impact: "Loss of habitat or individuals of sensitive faunal species" for the connecting powerline (Wag 'n Bietjie to Vetlaagte MTS).

Impact Description Loss of habitats or individuals of sensitive fauna species

Cumulative impact description Cumulative loss of individuals or habitat of sensitive fauna species due to all project components						
Mitigation All mitigation measures that apply for "Loss of habitat".						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of sensitive fauna	Site	Medium	Possible	Medium	Low	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Assessment of impacts: Operation Phase

Possible impacts during the construction phase are as follows:

1. Invasion by alien invasive plant species as a result of disturbance (equal risk for both options).

These are assessed below (Table 10).

Table 10: Assessment of impact: "Invasion by alien invasive plant species" for the connecting powerline (Wag 'n Bietjie to Vetlaagte MTS).

Impact Description Invasion by alien invasive plant species						
Cumulative impact description Cumulative invasion due to all project components						
Mitigation Compile and implement Alien Invasive Management Plan. Rehabilitate disturbed areas.						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Invasion by alien invasive plant species	Local	Long-term	Probable	Medium	Moderate	Low
Impact on Irreplaceable Resources (after mitigation)					YES	NO

If yes, please explain		
Cumulative impact rating (<i>after</i> mitigation) If high, please explain	Low	Medium

Summary of impacts

Construction Phase

Name of Impact	Significance without mitigation	Significance after mitigation
Loss of natural habitat	Moderate	Moderate
Loss of listed / protected flora/trees	Low	Low
Loss of sensitive fauna	Low	Low

Post-Construction and Operational Phase

Name of Impact	Significance without mitigation	Significance after mitigation
Invasion by alien invasive plant species	Moderate	Low

Line in line out (LILO)

The location for the proposed infrastructure is shown in Figure 23 in relation to habitats on site. The LILLO occurs within raised plains and most of the power line is within lowland plains, A full walk-through of the switching station site was undertaken in the field and no specific features of concern were noted. Possible impacts from the proposed project are as follows (see Figure 24 for view of switching station site). Possible impacts from the proposed project are as follows:

1. Loss of natural habitat.
2. Loss of individuals of protected trees, protected plants or other listed species (no specific concerns seen on site).
3. Loss of faunal habitat.
4. Invasion by alien invasive plant species as a result of disturbance.

The impact of the proposed project is relatively insignificant relative to the approved solar PV projects within the same area.



Figure 23: Proposed LILLO in relation to habitat sensitivity on site.



Figure 24: View of habitat within footprint of LILO.

Assessment of impacts: Construction Phase

Possible impacts during the construction phase are as follows:

4. Loss of natural habitat.
5. Loss of individuals of protected trees, protected plants or other listed species.
6. Loss of faunal habitat.

These are assessed below (Table 11-13).

Table 11: Assessment of impact: "Loss of natural habitat" for the LILO.

<p>Impact Description Loss of natural habitat due to clearing</p>
<p>Cumulative impact description Cumulative loss of habitat due to all project components</p>
<p>Mitigation Minimise vegetation clearing and disturbance to footprint areas only. Compile a rehabilitation programme and rehabilitate disturbed areas. Compile and implement Alien Invasive Management Plan. Limit access to sensitive areas during construction. Undertake monitoring to evaluate whether further measures are required.</p>

Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of natural habitat	Site	Permanent	Definite	Low	Moderate	Moderate
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Table 12: Assessment of impact: "Loss of individuals of listed and protected plant species" for the LILO.

Impact Description Loss of individuals of listed and protected plant and tree species due to clearing						
Cumulative impact description Cumulative loss of individuals of listed and protected plant and tree species due to all project components						
Mitigation All mitigation measures that apply for "Loss of habitat".						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of listed / protected flora	Site	Medium	Possible	Medium	Low	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Table 13: Assessment of impact: "Loss of habitat or individuals of sensitive faunal species" for the LILO.

Impact Description Loss of habitats or individuals of sensitive fauna species

Cumulative impact description Cumulative loss of individuals or habitat of sensitive fauna species due to all project components						
Mitigation All mitigation measures that apply for "Loss of habitat".						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of sensitive fauna	Site	Medium	Possible	Medium	Low	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO
Cumulative impact rating (after mitigation) If high, please explain				Low	Medium	High

Assessment of impacts: Operation Phase

Possible impacts during the construction phase are as follows:

- Invasion by alien invasive plant species as a result of disturbance (equal risk for both options).

These are assessed below (Table 14).

Table 14: Assessment of impact: "Invasion by alien invasive plant species" for the LIL0.

Impact Description Invasion by alien invasive plant species						
Cumulative impact description Cumulative invasion due to all project components						
Mitigation Compile and implement Alien Invasive Management Plan. Rehabilitate disturbed areas.						
Impact Assessment						
Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Invasion by alien invasive plant species	Local	Long-term	Probable	Medium	Moderate	Low
Impact on Irreplaceable Resources (after mitigation) If yes, please explain					YES	NO

Cumulative impact rating (after mitigation) If high, please explain	Low	Medium	High

Summary of impacts

Construction Phase

Name of Impact	Significance without mitigation	Significance after mitigation
Loss of natural habitat	Moderate	Moderate
Loss of listed / protected flora/trees	Low	Low
Loss of sensitive fauna	Low	Low

Post-Construction and Operational Phase

Name of Impact	Significance without mitigation	Significance after mitigation
Invasion by alien invasive plant species	Moderate	Low

CONCLUSIONS

- Neither of the two regional vegetation types that occur on site and in surrounding areas are listed or of conservation concern.
- The entire site is within an Ecological Support Area (ESA), but this extends across vast distances in all areas close to De Aar. There are therefore no options outside of this ESA for the project.
- The protected tree, *Boscia albitrunca*, occurs regularly in specific parts of the site, namely within the low hills and rocky outcrops. This is within the assessment area, but not within the proposed MTS footprint area. Therefore the proposed infrastructure does not affect any individuals of this species.
- No plant species of concern were found on site. One Rare plant species, *Tridentea virescens*, could potentially occur in the general area but was not seen. It occurs across a very wide geographical area and loss of a small area of habitat will not affect the species.
- One Near Threatened reptile, the Tent Tortoise (*Psammobates tentorius*), was seen nearby but not within the project area. The animal is mobile and could occur anywhere in this general area, or further away. This species is threatened by general habitat loss and/or degradation across its entire range, which includes the entire arid parts of South Africa, extending into Namibia. Loss of a small area of habitat for the proposed projects will not adversely affect the species.
- Impacts of the proposed project components are relatively insignificant in comparison to the approved solar PV projects in neighbouring areas.

RECOMMENDATIONS

The following recommendations are made to protect and enhance sensitive ecological features on site, which occur outside the proposed footprint areas:

- Low hills and rocky outcrops should be treated as moderately sensitive. Access control should be implemented to protect these areas from direct impacts.
- To comply with protected species legislation (National Forests Act and Northern Cape Nature Conservation Act), specific impact sites should be surveyed for protected trees, as well as for protected plant species.
- Alien invasive species must be strictly managed.

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Appendix 1: Checklist of plant species found on site.

Species	Category
<i>Afroscirpodes dioeca</i>	
<i>Agave americana</i>	Category
<i>Aizoon africanum</i>	
<i>Aizoon canariense</i>	
<i>Aizoon plinthoides</i>	
<i>Aloe broomii</i>	
<i>Aptosimum marlothii</i>	
<i>Aristida adscensionis</i>	
<i>Aristida congesta</i> subsp. <i>congesta</i>	
<i>Asparagus glaucus</i>	
<i>Asparagus striatus</i>	
<i>Asplenium cordatum</i>	
<i>Berkheya pinnatifida</i>	
<i>Berkheya spinosissima</i>	
<i>Boscia albitrunca</i>	PROTECTED
<i>Bulbine frutescens</i>	
<i>Cadaba aphylla</i>	
<i>Cenchrus ciliaris</i>	
<i>Chelanthes eckloniana</i>	
<i>Chloris virgata</i>	
<i>Chrysocoma ciliata</i>	
<i>Cynodon dactylon</i>	
<i>Cyperus usitatus</i>	
<i>Datura ferox</i> *	Category 1b
<i>Diospyros austro-africana</i>	
<i>Dipcade crispum</i>	
<i>Eleocharis dregeana</i>	
<i>Enneapogon cenchroides</i>	
<i>Eragrostis bergiana</i>	
<i>Eragrostis bicolor</i>	
<i>Eragrostis curvula</i>	
<i>Eragrostis lehmanniana</i>	
<i>Eragrostis obtusa</i>	
<i>Eriocephalus africanus</i>	
<i>Eriocephalus ericoides</i>	
<i>Felicia filifolia</i>	
<i>Fingerhuthia africana</i>	
<i>Gazania jurineifolia</i>	
<i>Gazania krebsiana</i>	
<i>Helichrysum</i> sp.	
<i>Heliophila minima</i>	
<i>Hermannia coccocarpa</i>	
<i>Heteropogon contortus</i>	
<i>Indigofera alternans</i>	
<i>Jamesbrittenia</i> sp.	
<i>Juncus rigidus</i>	
<i>Kohautia amatymbica</i>	
<i>Ledebouria apertiflora</i>	

Limosella major	
Lobelia thermalis	
Lycium cinereum	
Lycium horridum	
Mestoklema tuberosum	
Monsonia salminiflora	
Opuntia robusta*	Category 1b
Osteospermum scariosum	
Osteospermum spinescens	
Peliostomum leucorrhizum	
Pentzia incana	
Pentzia sphaerocephala	
Phragmites australis	
Phymaspermum parvifolium	
<i>Polygala ephedroides</i>	
Ruschia intricata	
Scabiosa columbaria	
Searsia burchellii	
Selago sp.	
Solanum sp.	
Stipagrostis uniplumis	
Themeda triandra	
Tragus koelerioides	

Appendix 2: Checklist of animal species found on site.

Species	Category
REPTILES:	
Trachylepis sulcata	
Naja nivea	
MAMMALS	
Antidorcus marsupialis	
Raphicerus campestris	
Elephantulus rupestris	
Hystrix africaeaustralis	
Orycteropus afer	
Procavia capensis	
Lepus saxatilis	
Pronolagus saundersiae	
Xerus inauris	
AMPHIBIANS	
Amietia poyntoni	
Tomopterna tandyi	
INVERTEBRATES	
Locustana pardalina	
Hycleus burmeisteri	
Subfamily Coenosiinae	
Tribe Tylopsidini	
Subfamily Asilinae	
Orthetrum caffrum	
Zonocerus elegans	
Family Lycosidae	
Genus Argiope	
Vanessa cardui	

Appendix 3: List of protected tree species (National Forests Act).

<i>Vachellia erioloba</i>	<i>Vachellia haematoxylon</i>
<i>Adansonia digitata</i>	<i>Azelia quanzensis</i>
<i>Balanites</i> subsp. <i>maughamii</i>	<i>Barringtonia racemosa</i>
<i>Boscia albitrunca</i>	<i>Brachystegia spiciformis</i>
<i>Breonadia salicina</i>	<i>Bruguiera gymnorhiza</i>
<i>Cassipourea swaziensis</i>	<i>Catha edulis</i>
<i>Ceriops tagal</i>	<i>Cleistanthus schlechteri</i> var. <i>schlechteri</i>
<i>Colubrina nicholsonii</i>	<i>Combretum imberbe</i>
<i>Curtisia dentata</i>	<i>Elaeodendron</i> (<i>Cassine</i>) <i>transvaalensis</i>
<i>Erythrophysa transvaalensis</i>	<i>Euclea pseudebenus</i>
<i>Ficus trichopoda</i>	<i>Leucadendron argenteum</i>
<i>Lumnitzera racemosa</i> var. <i>racemosa</i>	<i>Lydenburgia abottii</i>
<i>Lydenburgia cassinoides</i>	<i>Mimusops caffra</i>
<i>Newtonia hildebrandtii</i> var. <i>hildebrandtii</i>	<i>Ocotea bullata</i>
<i>Ozoroa namaensis</i>	<i>Philenoptera violacea</i> (<i>Lonchocarpus capassa</i>)
<i>Pittosporum viridiflorum</i>	<i>Podocarpus elongatus</i>
<i>Podocarpus falcatus</i>	<i>Podocarpus henkelii</i>
<i>Podocarpus latifolius</i>	<i>Protea comptonii</i>
<i>Protea curvata</i>	<i>Prunus africana</i>
<i>Pterocarpus angolensis</i>	<i>Rhizophora mucronata</i>
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	<i>Securidaca longependunculata</i>
<i>Sideroxylon inerme</i> subsp. <i>inerme</i>	<i>Tephrosia pondoensis</i>
<i>Warburgia salutaris</i>	<i>Widdringtonia cedarbergensis</i>
<i>Widdringtonia schwarzii</i>	

Boscia albitrunca has a geographical distribution that includes the study area.