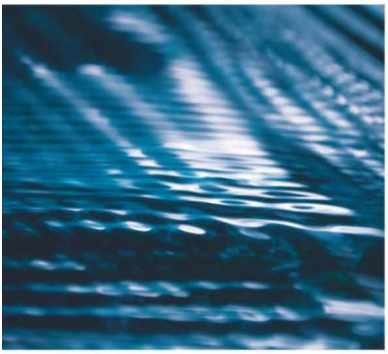
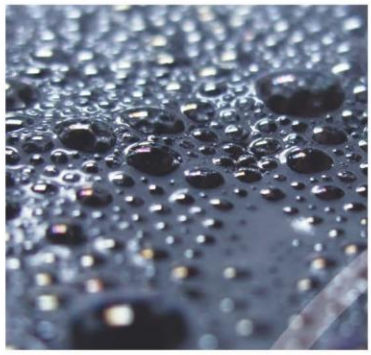
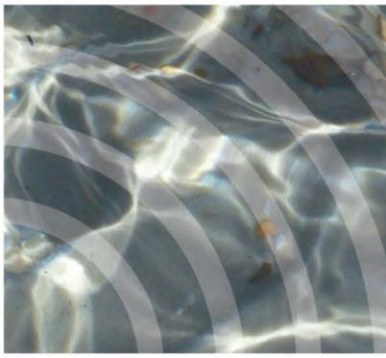
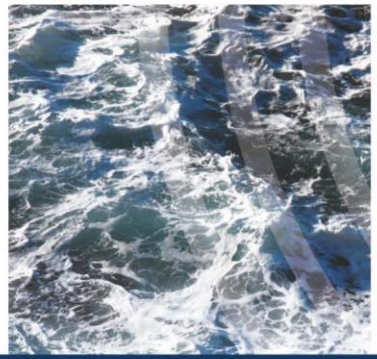


Hakskeen Pan Flora Impact Assessment







M²ENCO

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Title:
Flora Impact Assessment for the Hakskeen Pan Speed Events, Northern Cape Province

Report Compiled for:

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Date:
November 2016

EXECUTIVE SUMMARY

Introduction

M2 Environmental Connections (Pty) Ltd was commissioned to undertake an impact assessment of the flora on the Hakskeen Pan, near Rietfontein in the Northern Cape Province. The Flora Assessment is undertaken as part of the Environmental Authorisation required for the construction of speed events facilities by Bloodhound SSC.

The project area is situated in the Dawid Kruiper Local Municipality, with the closest town being Rietfontein, 10 km to the east.

The vast majority of the Hakskeen Pan is devoid of vegetation. The edges of the pan were found to generally have more vegetation, but still with low species diversity. Areas investigated outside the pan boundary were more vegetated, with taller shrub and tree species, but with low species diversity.

The location of the existing and proposed speed events infrastructure is optimally situated in terms of vegetation, as the layout is proposed to be located on those areas with the least vegetative cover. Therefore this layout would have the lowest impact. The western edge of the pan has relatively more vegetative cover than the rest of the pan due to the streams entering the Hakskeen Pan. However, it is important to note that none of the areas investigated are considered to be sensitive in terms of flora and even though the western edge of the pan is more vegetated, the species diversity and sensitivity remains low.

No species of conservation concern were found to occur on site. However, one Alien and Invasive Plant (AIP) species (NEMBA Category 3), *Prosopis glandulosa* (Honey mesquite), was found to be widespread on the project site and surrounding area.

No areas in the project site were considered to be sensitive or "No-go" areas in terms of vegetation composition.

The largest impact on the flora of the area is expected to occur during the construction and operational phases. The construction will result in the complete removal of plant species and habitats located on the construction area. Other possible impacts that may occur is the spread of invasive exotic species, increased edge effects on road verges as a result of vehicles not staying within the demarcated roads. Staff members and/or spectators may also damage species if they move within unauthorised areas.

The impact of the proposed development were found to be of medium significance without mitigation, but of low significance once reasonable mitigation measures were taken into account.

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ABBREVIATIONS

AIP	Alien Invasive Plants
BGIS	Biodiversity Geographical Information System
DEA	Department of Environmental Affairs
ECO	Environmental Control Officer
EMP	Environmental Management Plan
IUCN	International Union for Conservation of Nature and Natural Resources
LC	Least Concern
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
POSA	Plants of Southern Africa
QDS	Quarter Degree Squares
SANBI	South African Biodiversity institute

DECLARATION

I, Nicole Upton, declare that -

- I act as the independent specialist;
- I will perform the work relating to the project in an objective manner, even if this results in views and findings that are not favourable to the project proponent;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this project, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998; the Act), regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the project proponent and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the project; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority or project proponent;
- All the particulars furnished by me in this document are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of Specialist	
Name of Company	*M2 Environmental Connections (Pty) Ltd (MENCO)*
Date	*November 2016*

1 INTRODUCTION

M2 Environmental Connections (Pty) Ltd was commissioned to undertake an impact assessment of the flora on the Hakskeen Pan, near Rietfontein in the Northern Cape Province. The Flora Assessment is undertaken as part of the Environmental Authorisation required for the construction of speed events facilities by Bloodhound SSC.

The project area is situated in the Dawid Kruiper Local Municipality, with the closest town being Rietfontein, 10 km to the east.

In terms of the National Environmental Management Act, 1998 (Act no. 107 of 1998) an Impact Assessment must be undertaken before certain developments may commence. Such a process will ensure that all aspects and possible consequences to the environment, stakeholders and affected parties are considered during the project.

The natural resources of South Africa, with its highly complex and diversified society are continually under threat from development, especially in and close to areas richly endowed with natural resources.

In order to prevent the degradation of any ecosystem, it is important that systematic planning and co-ordination of human activities and development should receive priority. This planning should include studies of the natural environment (soil, water, vegetation, animals and cultural / historical aspects).

Plant communities are regarded as fundamental units of an ecosystem and therefore form the base for environmental planning and the compilation of environmental management plans. Plant species assemblages reflect habitat and ecosystem health and rarity, and are therefore imperative for an Environmental Impact Assessment.

2 SCOPE OF WORK

M2 Environmental Connections (Pty) Ltd was appointed to conduct a Flora Assessment as one of the specialist studies required for the inclusion in the Basic Assessment for the proposed speed events facilities at Hakskeen Pan. This Flora Assessment consists of a desktop study, as well as a site survey, which includes the following:

- A desktop vegetation study, which included:
    - Classification of the main biome and description of the dominant vegetation type;
    - Investigation of the dominant indigenous species within this region;
    - Listing the endemic species;
    - Listing the IUCN Red Data species; and
    - Determining the medicinal species.

- Field surveys to:
    - Determine the condition of ecosystems;
    - Determine actual floral composition in the area;
    - Identifying known sensitive areas such as ridges, caves and wetlands[1];
    - Determine presence of exotic and invasive species; and
    - Determine presence of species of conservation concern.

The following provincial and national legislation and best-practice documents are relevant to this study:

- Northern Cape State of the Environment Report, 2004;
- National Environmental Management Protected Areas Act (Act 57 of 2003)
- National Environmental Management Biodiversity Act (Act 10 of 2004)
- National Biodiversity Assessment (2004, updated 2011)
- National Freshwater Ecosystems Priority Atlas
- National Forests Act, 1998 (Act No. 84 of 1998)

The following information resources were consulted in order to ascertain whether any species of conservation concern occur, or could possibly occur within the study area:

- IUCN Red Data List;
- SANBI Red List of South African Plants;
- List of Protected Trees - National Forests Act, 1998 (Act No. 84 of 1998); and
- ToPS List – Government Gazette Notice No. 389 of 2013: "Publication of Lists of species that are Threatened or Protected, Activities that are prohibited and

[1] As per GDARD minimum requirements published in 2014

Exemption form Restriction", National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act 10 of 2004).

3 OBJECTIVES OF STUDY

The aim of this study includes the following objectives on the project area (Hakskeen Pan) located within the Northern Cape Province:

- Identify sensitive areas and species that should be avoided during the proposed development of the speed events facilities.
- Make use of the South African Biodiversity Institute Database to obtain specialised information and previous surveys within the area.
- Summarise legislation pertaining to the project with regard to biodiversity.
- Highlight major concern or fatal flaws of the project with regard to biodiversity.
- Provide relevant mitigations and recommendations to the developer to help limit and minimise the impacts they may have on the flora of the area.

4 LEGISLATION

The aim of this component of the report is to provide a brief overview of the pertinent policies, as well as legal and administrative requirements applicable to biodiversity aspects of the proposed development.

4.1 The National Environmental Management Act (NEMA) (Act No. 107 of 1998)

This Act embraces all three fields of environmental concern namely: resource conservation and exploitation; pollution control and waste management; and land use planning and development.

4.2 National Environmental Management Biodiversity Act (NEMBA: Act 10 0f 2004)

The following aspects of the NEMBA (2004) are important to consider in the compilation of an ecological report. It:

- Lists ecosystems that are threatened or in need of national protection;
- Links to Integrated Environmental Management processes;
- Must be taken into account in EMP and IDPs;
- The Minister may make regulations to reduce the threats to listed ecosystems.

4.2.1 Threatened or Protected Species List (ToPS List) – Government Gazette Notice No. 389 of 2013

"Publication of Lists of species that are Threatened or Protected, Activities that are prohibited and Exemption form Restriction", National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act 10 of 2004).

4.2.2 Alien and Invasive Species List - Government Gazette Notice No. 599 of 2014

The Department of Environmental Affairs (DEA) manages Invasive Alien Species (IAS) under the NEMBA, 2004 (Act 10 of 2004).

The four different categories that NEMBA classify Alien Invasive Species under are:

- Category 1a: Invasive species that may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway. These

species need to be controlled on your property, and officials from the Department of Environmental Affairs must be allowed access to monitor or assist with control.

- Category 1b: Invasive species that may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway. Category 1b species are major invaders that may need government assistance to remove. All category 1b species must be contained, and in many cases they already fall under a government sponsored management programme.
- Category 2: These are invasive species that can remain in your garden, but only with a permit, which is granted under very few circumstances.
- Category 3: These are invasive species that can remain in your garden. However, you cannot propagate or sell these species and must control them in your garden. In riparian zones or wetlands all category 3 plants become category 1b plants.

4.2.3 National List of Threatened Terrestrial Ecosystems (2011)

The National Environmental Management Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing of threatened or protected ecosystems, in one of four categories:

- Critically Endangered;
- Endangered;
- Vulnerable; or
- Protected.

Threatened ecosystems are listed in order to reduce the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value (SANBI, BGIS).

4.3 The National Forest Act (Act 84 of 1998)

The National Forest Act:

- Promotes the sustainable management and development of forests for the benefit of all;
- Creates the conditions necessary to restructure forestry in State Forests;
- Provide special measures for the protection of certain forests and protected trees;
- Promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.
- Promotes community forestry.

In terms of the National Forests Act of 1998, forest trees or protected tree species may not be cut, disturbed, damaged, destroyed and their products may not be possessed,

collected, removed, transported, exported, donated, purchased or sold – except under license granted by the Department of Agriculture, Forestry and Fisheries (DAFF).

4.4 National Biodiversity Assessment (NBA; 2011)

The latest National Biodiversity Assessment (2011) provides an assessment of South Africa's biodiversity and ecosystems, including headline indicators and national maps for the terrestrial, freshwater, estuarine and marine environments. The NBA (2011) was led by SANBI in partnership with a range of organisations. It follows on from the National Spatial Biodiversity Assessment (2004), broadening the scope of the assessment to include key thematic issues as well as a spatial assessment. The NBA (2011) includes a summary of spatial biodiversity priority areas that have been identified through systematic biodiversity plans at national, provincial and local levels (SANBI, BGIS).

5 LIMITATIONS AND ASSUMPTIONS

Fieldwork was conducted during the summer months (October). Conditions were very dry during the field survey, consequently conditions for species identification were not optimal. However, the general condition, species composition and sensitivity of the site could be established.

It is therefore important that the report be viewed and acted upon with these limitations in mind. M2 Environmental Connections cannot be held responsible for conclusions deducted in good faith based on the available resources and information provided at the time of the report compilation.

6 OVERVIEW OF STUDY AREA

6.1 Locality of Proposed Activities

The project area is situated in the Northern Cape Province with the closest town being Rietfontein, 10 km to the east. Hakskeen Pan is located at 26°48'34.61"S and 20°12'57.68"E. The proposed activities are located on Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD in Dawid Kruiper Local Municipality.

Surrounding activities of the area that may influence the biodiversity mostly include nearby communities and livestock grazing.

6.2 Brief Overview of Proposed Activities

Bloodhound SSC is in the process of applying for the necessary authorisations for the proposed construction and operation of speed events facilities on Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD in Dawid Kruiper Local Municipality.

Anticipated infrastructure for the speed events facilities will include the following:

- A dedicated track of 20km;
- A trackside Airstrip;
- Corporate Hospitality Area;
- A technical Camp;
- A domestic Camp;
- A Fuel Depot.

The construction of certain infrastructure for the speed events held/to be held on Hakskeen Pan has commenced, including:

- An 110kVa diesel generator, with a 3500l diesel tank and bund, housed within a portable shipping container on site.
- A 44000l sewerage septic/holding tank.
- A 20km long, 500m wide track has been constructed, including a 300m wide safety buffer on either side of the track.
- Temporary structures (mostly shipping containers) placed on the edge of the pan.
- Two telecommunications masts placed at the landside camp and next to the R31
- 6 x 10 000l jo-jo tanks have been constructed for the storage of water on site.
- A pipeline (16m long, 40mm diameter) to source water from a local borehole near the site.

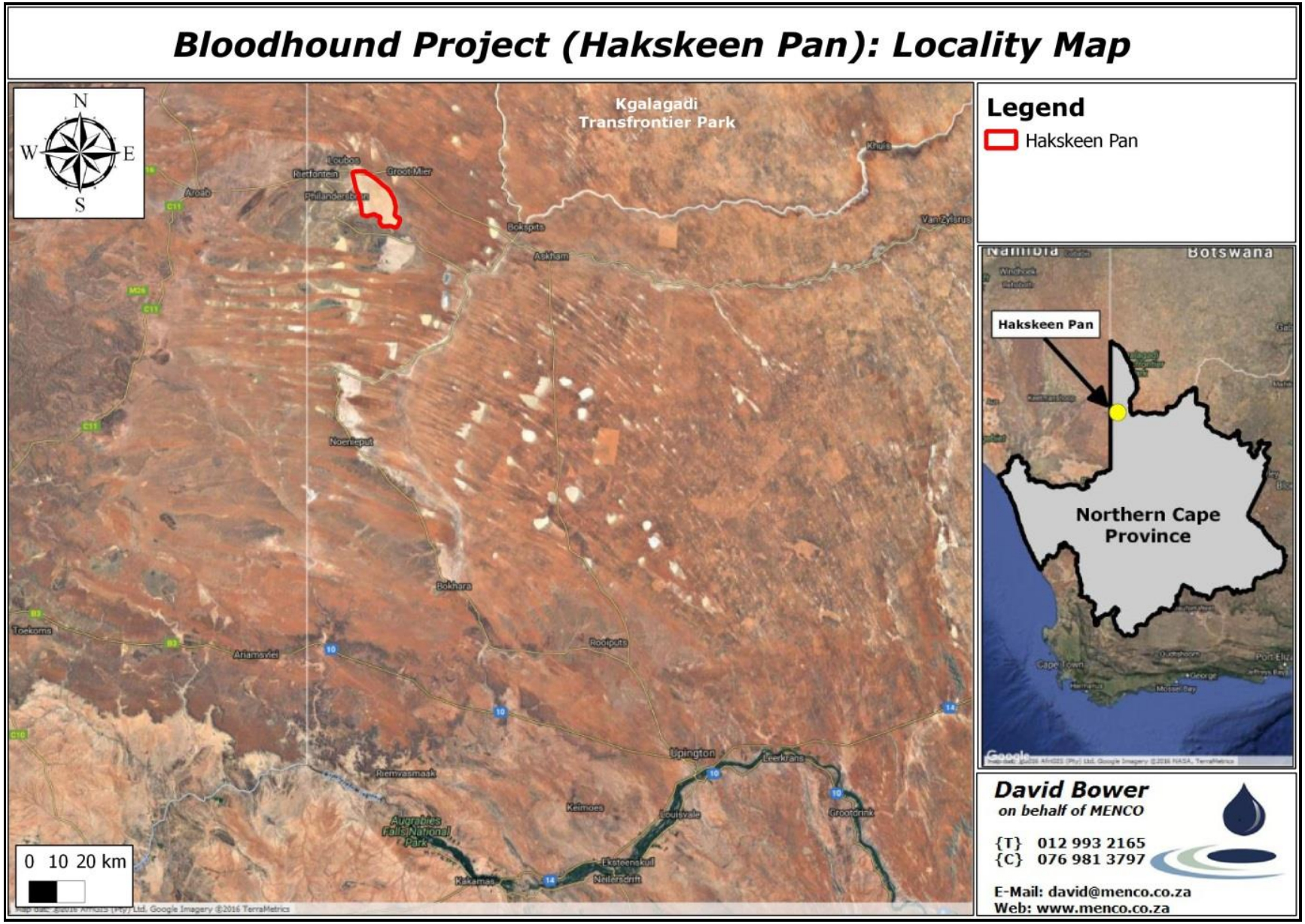

Figure 1: Locality of proposed speed events at Hakskeen Pan

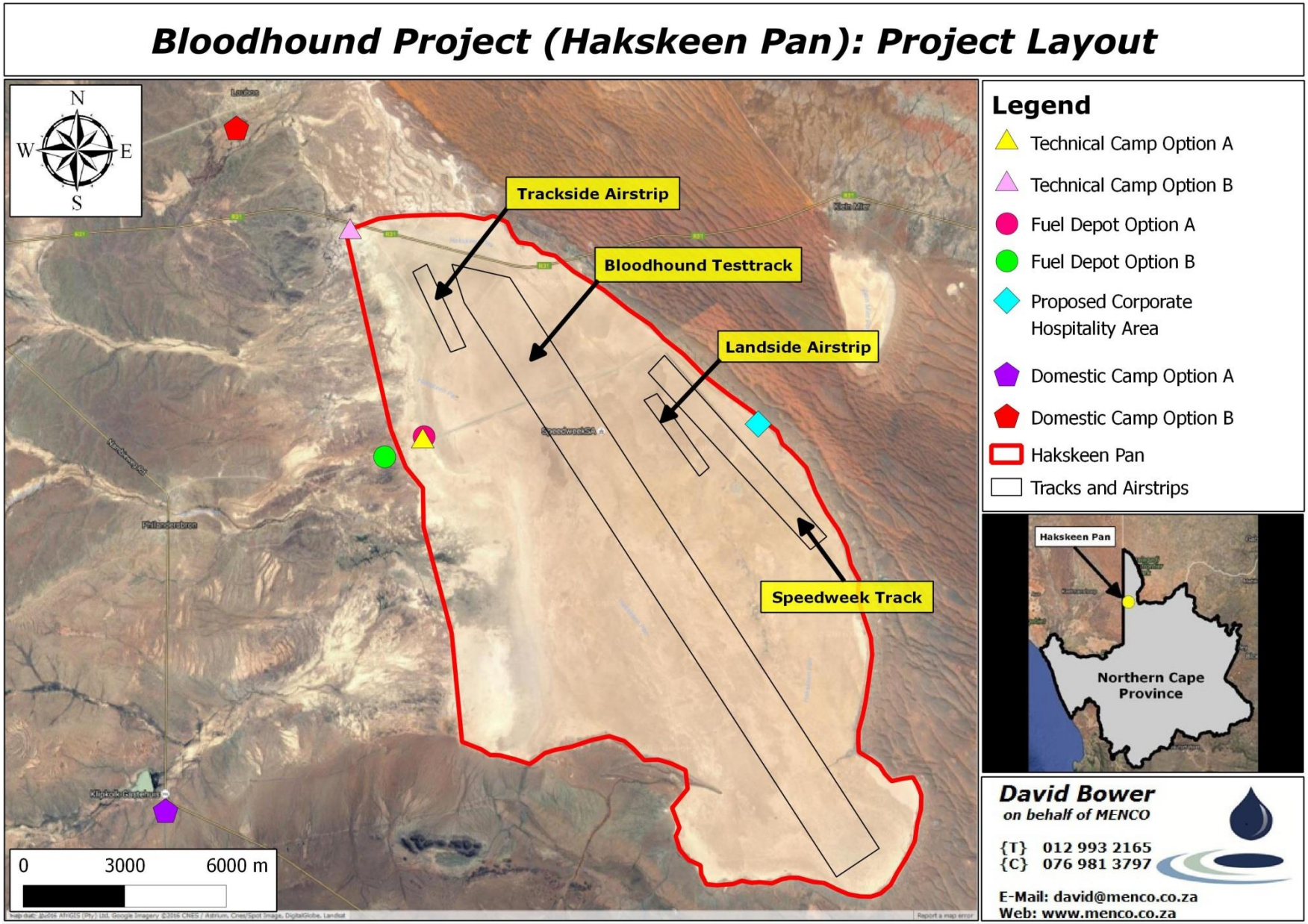

Figure 2: Layout of proposed speed events facilities at Hakskeen Pan

7 METHODS AND APPROACH

This report is based on a literature review, GIS analysis and a site survey. The literature review included scientific and popular publications on related aspects for the area. Internet searches for ecological issues in the area and Red Data plant species were performed.

7.1 Desktop Assessment

A baseline assessment was conducted to establish whether any potentially sensitive plant species might occur on site. The South African National Biodiversity Institute's (SANBI) online biodiversity tool was used to query a species list for the 2026CC quarter degree grid cell. This was supplemented by researching all available books and peer reviewed websites.

The importance of a baseline study is to provide a reference condition to determine the current state of the environment and to draw comparisons between the potential of the area and current degradation from surrounding land uses. This will be conducted in terms of the future changes due to the proposed development by the client.

Aerial photographs and satellite imagery was used to delineate potential vegetation types and these areas were focused on during the field visit.

7.2 Field Survey

A field investigation was conducted from the 25th to the 27th of October 2016. The field surveys conducted supplement and confirm several findings indicated during the desktop analysis. Findings from the field survey serve as a fatal flaw analysis to determine whether there are any major ecological concerns with regards to the site selected for the proposed speed events facilities. Specific aspects that were investigated during the field survey were the areas of natural vegetation to be cleared for the construction of the facilities and the status of the current natural environment within the study area, indicating indigenous nature and habitat integrity.

During the field assessment all species found were identified and included within this report. Sites for the survey were chosen based on possible plant communities from satellite imagery and literature. In each site homogenous areas were chosen as representatives for the area.

8 DESKTOP STUDY

8.1 Location Synopsis

The study area is situated within the Dawid Kruiper Local Municipality which is located in the Northern Cape Province.

The Hakskeen Pan is designated as Southern Kalahari Salt Pans (AZi4) and is located within the Kalahari Karroid Shrubland (NKb5) vegetation unit.

Mier Local Municipality was disestablished and merged with Khara Hais Local Municipality to establish Dawid Kruiper Local Municipality on 3 August 2016. The information contained in the table below is historical information relating to the municipality before being merged.

Table 1: Summary of characteristics for Mier Local Municipality

Details	Mier Local Municipality
Farm portions	Farm 585, Remainder, Portion 107 of Farm 585 and Remainder of Windhoek 122, Gordonia RD.
District Municipality	ZF Mgcawu
Size	1173003 ha
Natural Areas	1168288 ha (99.6 %)
No natural habitat Areas	4166 ha (0.36 %)
Protected Areas	
Formally Protected Areas in Municipality	1 reserve covering 145487 ha (12.4 %)
Ramsar Sites in Municipality	None
Terrestrial Ecosystems	
Biomes	Nama-Karoo Biome and Savanna Biome
Vegetation units in study area	Southern Kalahari Salt Pans (AZi4) and the Kalahari Karroid Shrubland (NKb5)
Critically Endangered Ecosystems	None
Endangered Ecosystems	None
Vulnerable Ecosystems	None
Freshwater Ecosystems	
Water Management Areas (WMA)	Lower Orange and Lower Vaal
Rivers in Municipality	4 rivers: Auob, Kuruman, Molopo, Nossob
Rivers in Study Area	None
Number of wetlands in Municipality	1 wetland in the municipality covering 73973.8 ha (6.31 %)
Information supplied by Department of Environmental affairs in co-operation with SANBI	

8.2 Description of broad scale vegetation communities

Vegetation types for the area were extracted from the South African National Vegetation Map (Mucina & Rutherford, 2006) while their conservation status was obtained from the National list of threatened terrestrial ecosystems for South Africa (2011).

The study area is situated in the Southern Kalahari Salt Pans and is located within the Kalahari Karroid Shrubland vegetation unit which forms part of the Nama-Karoo Biome and Savanna Biome.

Mucina et al (2006b) describe Southern Kalahari Salt Pans as low grasslands on pan bottoms (these often devoid of vegetation) often dominated by *Sporobolus* species, with a mixture of dwarf shrubs. The low shrubland dominated by *Lycium* and/or *Rhigozum* usually forms the outer belt in the salt-pan zonation systems. Other important plant species associated with these pans are *Zygophyllum tenue* and *Salsola scopiformis* as well as the herbs *Hirpicium gazanioides*, *Tribulus terrestris*; the succulent herb *Trianthema triquetra* subsp. *parvifolia* and the grasses *Enneapogon desvauxii*, *Eragrostis truncata*, *Sporobolus coromandelianus*, *S. rangei* and *Panicum impeditum*.

Mucina et al (2006a) describe Kalahari Karroid Shrubland as a low Karroid shrubland on flat, gravel plains, where Karoo elements meet with northern floristic elements, indicating a transition to the Kalahari region and sandy soils. Although trees are not common, *Acacia mellifera, Parkinsonia africana* and *Boscia foetida* may be encountered. Taller shrubs include *Rhigozum trichotomum* while lower shrubs like *Hermannia* species, *Limeum aethiopicum, Phaeoptilum spinosum, Aizoon schellenbergii, Aptosimum* species, *Barleria rigida, Indigorera heterotricha, Monechma genistifolium, Tephrosia dregeana* are more common. Herbs like *Dicoma capensis, Chamaesyce inaequilatera, Amaranthus praetermissus, Barleria lichtensteiniana, Cucumis africanus, Geigeria ornativa, Hermannia abrotanoides, Monsonia umbellate, Sesamum capense* are likely to be encountered as well as succulent herbs like *Giseka* species and *Trianthema parvifolia*. Grasses is likely to include species of *Aristida, Enneapogon, Eragrostis, Schmidtia kalahariensis, Stipagrostis* and *Tragus racemosus*.

Table 3 contains the plant species for the 2026C Quarter Degree Squares (QDS) as contained in SANBI's Plants of Southern Africa (POSA) database.

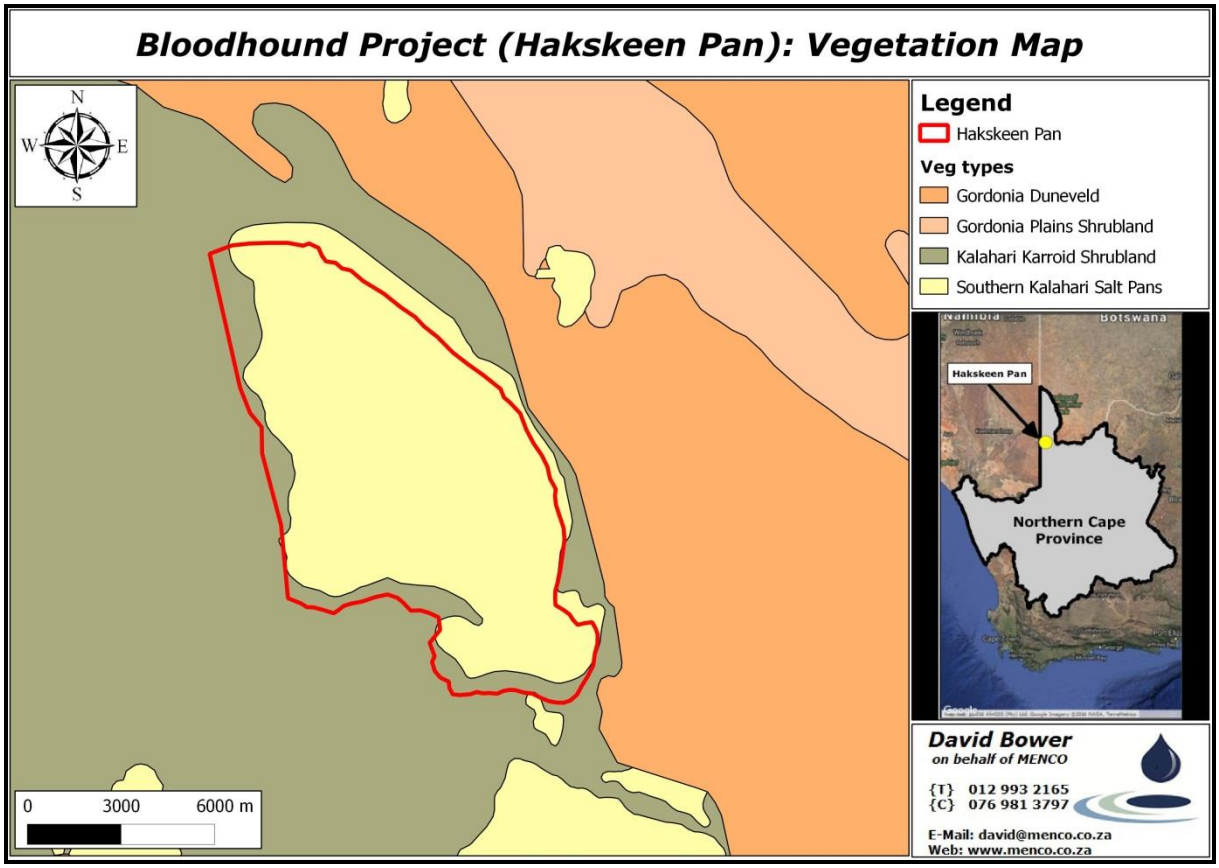

Figure 3: Vegetation units in the vicinity of the proposed speed events facilities

8.3 Climate

The study area falls within a summer rainfall season with an average rainfall of 120 mm per year. The area has maximum summer temperatures of up to 40°C (average 25°C) and winters have an average temperature of 10°C.

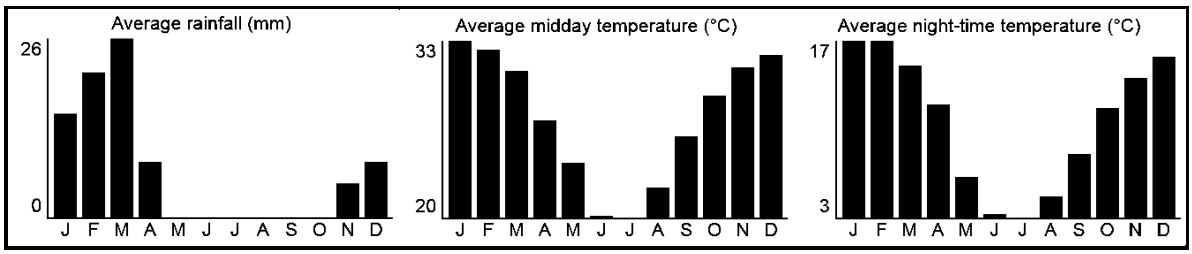

Figure 4: Rainfall and temperature values for Mier

8.4 Flora listed for 2026CC QDS

Hakskeen Pan falls within the 2026CC Quarter Degree Square. The area of the pan, and subsequently the project site, is approximately 168 km^2. Information on plant species recorded for the 2026CC Quarter Degree Square was extracted from the POSA online database hosted by SANBI. A list of plant species that have a high probability of occurring in the 2026CC QDS is provided in **Table 3**. The POSA database only lists 17 plants within the QDS, consisting of 12 families. The large majority of species has a perennial lifecycle and only a few annual species have annual lifecycles (**Table 2**).

The 17 plant species recorded for the 2026C QDS, as contained in the POSA database, is very low which may be due to few surveys having taken place in the particular area. Therefore it is important to note that many more species will occur in the area than are recorded in the POSA database.

Table 2: Number of families and species that occur within the QDS grid cell

Number of Families	Number of species	Perennial species	Annual species	Exotic/naturalised species
12	17	13	4	1

Table 3: Plant species that occur within the 2026CC QDS (POSA online database)

Family	Species	SA Endemic	Threat status	Lifecycle	Growth forms
POACEAE	*Anthephora schinzii*	No	LC	Annual	Graminoid
ACANTHACEAE	*Blepharis mitrata*	No	LC	Perennial	Dwarf shrub, herb
FABACEAE	*Calobota spinescens*	No	LC	Perennial	Shrub
APIACEAE	*Deverra denudata*	No	LC	Perennial	Shrub
AIZOACEAE	*Galenia sarcophylla*	No	LC	Perennial	Dwarf shrub, herb, succulent
ASTERACEAE	*Geigeria ornativa* subsp. *ornativa*	No	LC	Annual (occ. perennial)	Herb
ASTERACEAE	*Helichrysum argyrosphaerum*	No	LC	Annual	Herb
MALVACEAE	*Hermannia minutiflora*	No	LC	Perennial	Dwarf shrub
JUNCACEAE	*Juncus oxycarpus*	No	LC	Perennial	Helophyte, herb
IRIDACEAE	*Lapeirousia silenoides*	No	LC	Perennial	Geophyte, herb
MARSILEACEAE	*Marsilea aegyptiaca*	No	LC	Perennial	Herb, hydrophyte
ACANTHACEAE	*Monechma divaricatum*	No	LC	Perennial	Shrub, suffrutex
FABACEAE	*Parkinsonia africana*	No	LC	Perennial	Shrub, tree
ASTERACEAE	*Platycarphella carlinoides*	No	LC	Perennial	Herb
FABACEAE	*Prosopis chilensis* *	No	Not Evaluated	Perennial	Shrub, tree
SOLANACEAE	*Solanum burchellii*	No	LC	Perennial	Dwarf shrub, shrub
ZYGOPHYLLACEAE	*Zygophyllum simplex*	No	LC	Annual or biennial	Herb, succulent
* Exotic and / or invasive species					

8.4.1 Species of conservation concern

The South African National Biodiversity Institute's (SANBI) online biodiversity tool, POSA, was used to query a species list for the 2026CC QDS. The following information resources were consulted in order to ascertain whether any flora species of conservation concern occur within the footprint of the proposed speed events facilities:

- IUCN Red Data List;
- SANBI Red List of South African Plants;
- List of Protected Trees - National Forests Act, 1998 (Act No. 84 of 1998); and
- ToPS List – Government Gazette Notice No. 389 of 2013: "Publication of Lists of species that are Threatened or Protected, Activities that are prohibited and Exemption form Restriction", National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act 10 of 2004).

All of the plant species listed for the QDS are classified with a "LC" (Least Concern) Red Data status and are therefore, considered at a low risk of extinction and includes widespread and abundant species (**Table 3**). None of the species listed are endemic to South Africa.

No tree species protected in terms of Section 12(d) of the National Forests Act, 1998 (Act No. 84 of 1998) are listed for the QDS.

None of the species listed by SANBI for the QDS are contained the Threatened and Protected Species (ToPS) List, as published in the Government Gazette Notice No. 389 of 2013 (16 April 2013) as part NEMBA, 2004 (Act 10 of 2004).

None of the plants contained in the SANBI database for the specific QDS are listed in literature as having medicinal or cultural use (Van Wyk *et al*., 2009).

9 FIELD SURVEY

A field survey was conducted for the Flora Assessment from the 25th to the 27th of October 2016, in the summer months.

Specific aspects that were investigated during the field survey were the areas of natural vegetation to be cleared for the implementation of the speed events facilities and the status of the current natural environment within the study area.

During the field assessment all species found were identified and included within this document. A full list of the species identified during the field survey is provided in **Table 11**. A description, as well as the associated species, of each site will be discussed briefly.

9.1 Site selection

During the desktop review of the site, no areas of national importance were found to occur in close proximity to the site. Thus locally important areas remained the focus point in terms of the site selection, as well as the objectives of the study in terms of the investigation of the footprint of the areas to be cleared for the implementation of the infrastructure itself.

Specific sites for the survey were chosen based on possible plant communities on the study site from satellite imagery and literature such as SANBI's interactive map and Google Earth maps. In each site homogenous areas were chosen as representatives for the area. Refer to the table provided below for the coordinates taken at the sites selected. These areas were chosen to ensure that the current ecological conditions in and surrounding the proposed development are assessed. **Figure 5** depicts the location of the survey sites.

During the field survey the sites, as set out in the figure below, were verified with other areas of similar vegetation in order to confirm that the selected sites were indeed representative of the vegetation found on the study site.

Table 4: Coordinates of sites used during field survey

Point I.D.	Site description	Coordinates WGS84
Site 1: Domestic camp option B	Vegetated	26°42'59.75"S 20° 6'55.69"E
Site 2: Technical camp option B	Vegetated	26°44'33.18"S 20° 8'43.21"E
Site 3: Fuel depot option B	Vegetated	26°47'56.06"S 20° 8'23.43"E
Site 4: Fuel depot option A & Technical camp option A	No vegetation present	26°47'34.78"S 20° 9'36.96"E
Site 5: Domestic camp option A	Vegetated	26°52'49.45"S 20° 5'47.13"E
Site 6: Southern end of 20 km track	No vegetation present	26°53'35.04"S 20°16'25.71"E
Site 7: Speedweek camp & corporate hospitality area	Vegetated	26°47'3.17"S 20°14'43.98"E

Survey sites described in the table above as having no vegetative cover (see **Figure 12** as an example) will not be discussed in the sections below.

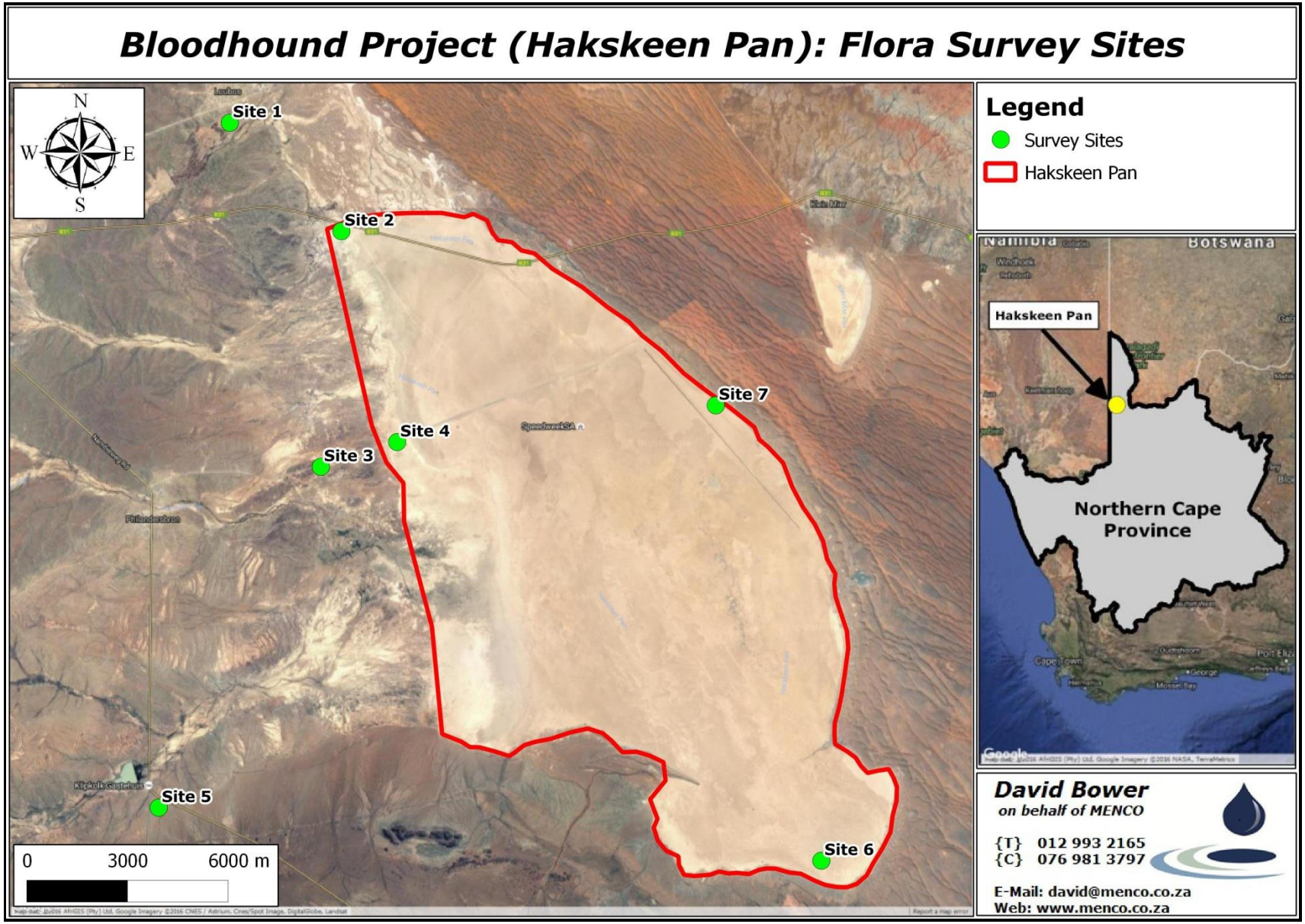

Figure 5: Flora Assessment survey sites

9.2 Site 1: Domestic camp option B

Site 1 is located to the north-east of the pan on the area proposed for the Domestic camp (option B), near the Loubos community. The area is more vegetated than the pan, but still exhibits relatively sparse ground cover and low species diversity.

Figure 6: Photo of Site 1

Low trees and shrubs were the dominant vegetation types, with *Prosopis glandulosa* being dominant (refer to photo above). Six species were identified at the site. No grass species were identified due to a combination of dry conditions and grazing.

Some of the species found at Site 1 are classified as having medicinal properties according to Van Wyk et al. (2009) including: *Vachellia karroo* and *Ziziphus mucronata*. These species will be discussed in Section 9.4. *Prosopis glandulosa* was the dominant species at the site and is a Category 3 AIP according to the NEMBA, 2004 (Act 10 of 2004).

Table 5: Flora species identified at Site 1

Species	Family	Common name	Growth form
Prosopis glandulosa *	Fabaceae	Honey mesquite	Shrub, tree
Senna italica ♥	Fabaceae	Eland's pea	Creeper
Vachellia hebeclada	Fabaceae	Candle thorn	Shrub, tree
Vachellia karroo ♥	Fabaceae	Sweet thorn	Shrub, tree
Ziziphus mucronata ♥	Rhamnaceae	Buffalo-thorn	Shrub, tree

Species	Family	Common name	Growth form
Zygophyllum simplex	Zygophyllaceae	Volstruisdruiwe	Succulent
* Alien or invasive plant species ♥ Medicinal plant species			

9.2.1 Site 2: Technical camp option B

Site 2 is located toward at the north-western end of the pan and is the proposed site of Technical camp (option A), near a MTN cellphone tower with solar panels and the R31 road. The majority of the site is unvegetated, however vegetation was found to occur along the disturbed area of a pipeline.

Figure 7: Site photos of Site 2

Not one species was found to be dominant at the site as few individual plants were found with a heterogeneous species composition. Only four species were identified at Site 2.

*Prosopis glandulos*a was found to occur at the site and is a Category 3 AIP according to the NEMBA, 2004 (Act 10 of 2004).

Table 6: Flora species identified at Site 2

Species	Family	Common name	Growth form
Prosopis glandulosa *	Fabaceae	Honey mesquite	Shrub, tree
Salsola scopiformis	Amaranthaceae	Ganna	Shrub
Schmidtia kalihariensis	Poaceae	Kalahari sour grass	Grass
Zygophyllum simplex	Zygophyllaceae	Volstruisdruiwe	Herb
* Alien or invasive plant species			

9.2.2 Site 3: Fuel depot option B

Site 3 is located toward the west of the Hakskeen Pan on the proposed site for the Fuel depot (option B). The site has very little groundcover with low species diversity, but is more vegetated than the pan area. The site was dominated by shrubs and small trees.

Figure 8: Site 3 photos

Nine species were identified of which three are grass species. One species is classified as having medicinal properties according to Van Wyk et al. (2009), namely, *Vachellia karroo*. *Prosopis glandulos*a was found to occur at the site and is a Category 3 AIP according to the NEMBA, 2004 (Act 10 of 2004).

Table 7: Flora species identified at Site 3

Species	Family	Common name	Growth form
Aristida adscensionis	Poaceae	Annual three-awn	Grass
Enneapogon cenchroides	Poaceae	Nine-awned grass	Grass
Eragrostis trichophora	Poaceae	Hairy love grass	Grass
Lycium bosciifolium	Solanaceae	Limpopo honey-thorn	Shrub
Phaeoptilum spinosum	Nyctaginaceae	Brittle thorn	Shrub
Prosopis glandulosa *	Fabaceae	Honey mesquite	Shrub, tree
Salsola scopiformis	Amaranthaceae	Ganna	Shrub
Vachellia karroo ♥	Fabaceae	Sweet thorn	Shrub, tree
Zygophyllum simplex	Zygophyllaceae	Volstruisdruiwe	Herb
* Alien or invasive plant species ♥ Medicinal plant species			

9.2.3 Site 5: Domestic camp option A

Site 5 is located toward the south-west of the pan, near the Klipkolk Dam and is situated at the proposed site for the Domestic camp (option A). The site is vegetated by small shrubs and a very sparse grass layer. The site exhibited evidence of heavy grazing by livestock.

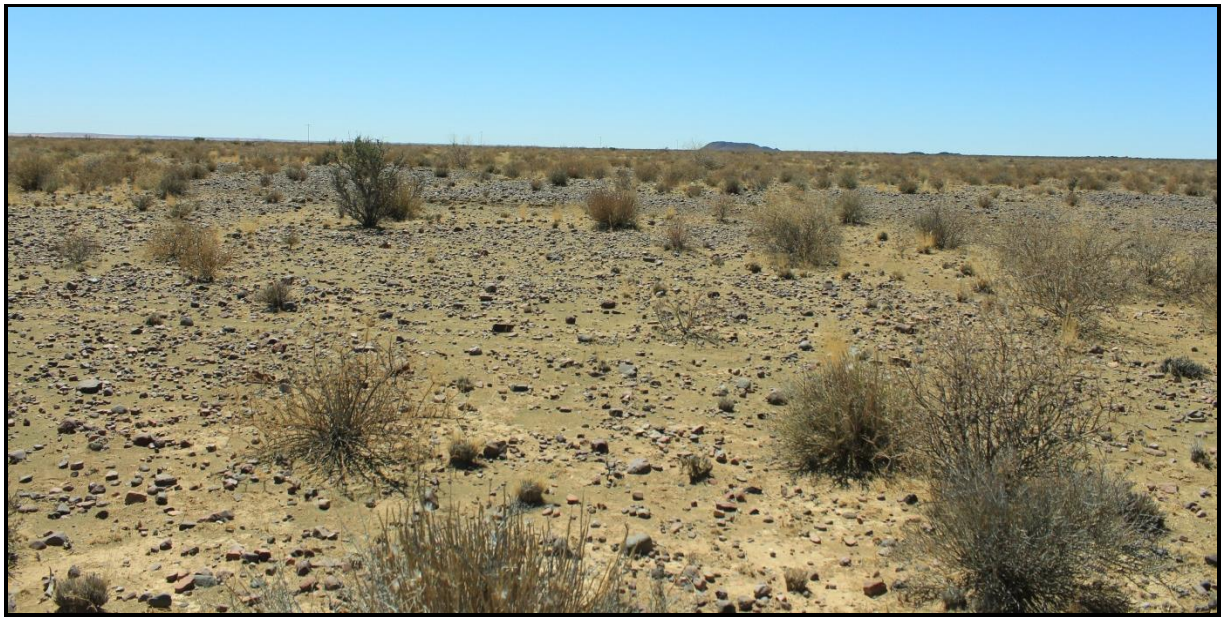

Figure 9: Site 5 photo

Herbs and shrubs were the dominant vegetation at this site. Ten species were identified at the site, three of which were from the family Poaceae (graminoid family).

Table 8: Flora identified at Site 5

Species	Family	Common name	Growth form
Aptosimum spinescens	Scrophulariaceae	Kankerbossie	Herb
Barleria rigida	Acanthaceae	Skerpioendissel	Herb
Boscia foetida	Capparaceae	Stink-bush	Shrub, tree
Centropodia glauca	Poaceae	Gha grass	Grass
Enneapogon cenchroides	Poaceae	Nine-awned grass	Grass
Eragrostis nindensis	Poaceae	Wether love grass	Grass
Geigeria ornativa	Asteraceae	Misbeksiektebos	Herb
Lycium bosciifolium	Solanaceae	Limpopo honey-thorn	Shrub
Monsonia sp.	Geraniaceae	-	Herb
Sesamum capense	Pedaliaceae	Aprilbaadjie	Herb

9.2.4 Site 7: Speedweek camp and corporate hospitality area

Site 7 is located toward the eastern edge of the pan on the site for the proposed Speedweek camp and the Corporate hospitality area. The site is partially located on the dunes at the edge of the pan and thus is more vegetated than the majority of the pan, but is still sparsely vegetated and has low species diversity.

Figure 10: Site 7 photo

The vegetation and the site was dominantly shrubs and only 4 plant species were identified as occurring at the site.

*Prosopis glandulos*a was found to occur at the site and is a Category 3 AIP according to the NEMBA, 2004 (Act 10 of 2004).

Table 9: Flora species identified at site 7

Species	Family	Common name	Growth form
Calobota linearifolia	Fabaceae	-	Shrub, tree
Prosopis glandulosa *	Fabaceae	Honey mesquite	Shrub, tree
Schmidtia kalihariensis	Poaceae	Kalahari sour grass	Grass
Zygophyllum tenue	Zygophyllaceae	Dollar bush	Shrub
* Alien and invasive plant species			

9.3 Invasive species

Invasive and exotic species tend to increase in disturbed environments (DEA & DMR, 2013). One of the invader species as listed in NEMBA, 2004 (Act 10 of 2004) was observed during the field assessment that is a Category 3 invasive species, namely *Prosopis glandulosa* (Honey mesquite). Honey mesquite was found at almost all of the survey sites and is distributed across most of the project site where vegetation occurs, i.e. on the outskirts and outside the pan.

Category 3 is the least restrictive category of AIP and these species need not be removed, but must be controlled to avoid their spread. Category 3 AIP must be removed in wetlands and riparian areas. However, it is recommended that the Honey mesquite found on the project site be removed to avoid them spreading and that, where necessary, other appropriate species be planted where this AIP is removed.

Figure 11: Honey mesquite shrubs at project site

9.4 Plants of cultural significance

Three plant species that were encountered during the field survey have cultural and/or medicinal use. Various medicinal books and peer-reviewed articles were used to verify whether the species have any medicinal uses.

Table 10: Medicinal species identified

Species	Common name
Senna italica	Eland's pea
Vachellia karroo	Sweet thorn
Ziziphus mucronata	Buffalo-thorn

These plants are important from a cultural perspective and are used for traditional/cultural purposes. Traditional medicine in South Africa is an important practice on which 72% of the Black African population relies, that accounts for 26.6 million consumers (Mander *et al.,* 2007). Approximately 133 000 people are employed in the trade of traditional medicine, especially rural women (Mander *et al.,* 2007).

9.5 Species of conservation concern

The following information resources were consulted in order to ascertain whether any of the flora species identified during the site survey are species of conservation concern:

- IUCN Red Data List;
- SANBI Red List of South African Plants;
- List of Protected Trees - National Forests Act, 1998 (Act No. 84 of 1998); and
- ToPS List – Government Gazette Notice No. 389 of 2013: "Publication of Lists of species that are Threatened or Protected, Activities that are prohibited and Exemption form Restriction", National Environmental Management: Biodiversity Act (NEMBA), 2004 (Act 10 of 2004).

No plant species of conservation concern, as contained in the resources listed above, were found to occur on the study site.

9.6 Sensitivity assessment

A sensitivity assessment was conducted to identify areas within a scale of varying degrees of sensitivity. This is an incorporation of all data gathered during the desktop study and field survey.

Three parameters were used for the sensitivity analysis, namely:

- Diversity of species,
- Land use, and
- Sensitive ecosystems/species.

The closest protected area to the proposed project site is the Kgalagadi Transfrontier Park which is approximately 50 km from Hakskeen Pan.

During the site survey it was determined that the proposed project area is not considered to be sensitive or of conservation importance in terms of flora. Therefore no sensitivity map was compiled as "no-go" areas or sensitive areas in terms of flora were not found to be present on the project site. The project area investigated generally exhibited low vegetative cover as well as low species diversity.

9.7 Findings

The vast majority of the pan, as depicted in **Figure 2**, was devoid of vegetation. Where vegetation was found in the pan it was clustered and generally consisted only of the Ganna plant (*Salsola scopiformis*). The edges of the pan were found to generally have more vegetation, but still with low species diversity. Areas investigated outside the pan, such as Site 1 & 5, were also more vegetated, with taller shrub and tree species, but with low species diversity. All sites surveyed exhibited little grass cover, however this may, in part, be due to the dry conditions around the time of the site visit and grazing from community livestock.

The location of the speed events infrastructure, as indicated in **Figure 2**, is optimally situated in terms of vegetation, as the layout is currently situated on those areas with the least vegetative cover. Therefore this layout would have the lowest impact. The western edge of the pan has relatively more vegetative cover than the rest of the pan due to the streams entering the Hakskeen Pan. However, it is important to note that none of the areas investigated are considered to be sensitive in terms of flora and even though the western edge of the pan is more vegetated the species diversity and sensitivity remains low.

No species of conservation concern were found to occur on site. However, one AIP species (Category 3), *Prosopis glandulosa* (Honey mesquite), was found to be widespread on the project site.

Figure 12: Typical vegetation condition in Hakskeen pan

Figure 13: Patches of *Salsola scopiformis* (Ganna) found throughout Hakskeen Pan

No areas in the project site were considered to be sensitive or "No-go" areas in terms of vegetation composition.

Table 11: Species identified during field survey at Hakskeen Pan

Species	Family	Common name	Growth form
Aptosimum spinescens	Scrophulariaceae	Kankerbossie	Herb
Aristida adscensionis	Poaceae	Annual three-awn	Grass
Augea capensis	Zygophyllaceae	Pickle bush	Succulent
Barleria rigida	Acanthaceae	Skerpioendissel	Herb
Boscia foetida	Capparaceae	Stink-bush	Shrub, tree
Calobota linearifolia	Fabaceae	-	Shrub, tree
Centropodia glauca	Poaceae	Gha grass	Grass
Enneapogon cenchroides	Poaceae	Nine-awned grass	Grass
Eragrostis nindensis	Poaceae	Wether love grass	Grass
Eragrostis trichophora	Poaceae	Hairy love grass	Grass
Geigeria ornativa	Asteraceae	Misbeksiektebos	Herb
Lycium bosciifolium	Solanaceae	Limpopo honey-thorn	Shrub
Monsonia sp.	Geraniaceae	-	Herb
Phaeoptilum spinosum	Nyctaginaceae	Brittle thorn	Shrub
Prosopis glandulosa *	Fabaceae	Honey mesquite	Shrub, tree
Salsola scopiformis	Amaranthaceae	Ganna	Shrub
Schmidtia kalihariensis	Poaceae	Kalahari sour grass	Grass
Senna italic ♥	Fabaceae	Eland's pea	Creeper

Species	Family	Common name	Growth form
Sesamum capense	Pedaliaceae	Aprilbaadjie	Herb
Vachellia hebeclada	Fabaceae	Candle thorn	Shrub, tree
Vachellia karroo ♥	Fabaceae	Sweet thorn	Shrub, tree
Ziziphus mucronata ♥	Rhamnaceae	Buffalo-thorn	Shrub, tree
Zygophyllum simplex	Zygophyllaceae	Volstruisdruiwe	Succulent
Zygophyllum tenue	Zygophyllaceae	Dollar bush	Shrub
* Alien or invasive plant species ♥ Medicinal plant species			

10 ENVIRONMENTAL IMPACT ASSESSMENT

All forms of development, albeit for mining, industrial, urban or residential purposes, will have an immediate effect on the natural environment. It is therefore of utmost importance to provide information on the environmental consequences these activities will have and to inform the decision-makers thereof.

An explanation of the impact assessment criteria that will be applied during the Environmental Assessment is provided in **Table 12**.

10.1 Risk Assessment Criteria

Table 12: Explanation of the EIA criteria

Extent	
Classification of the physical and spatial scale of the impact	
Footprint (F)	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
Site (S)	The impact could affect the whole, or a significant portion of the site.
Regional (R)	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
National (N)	The impact could have an effect that expands throughout the country (South Africa).
International (I)	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
Duration	
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.	
Short (ST)	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.
Short to Medium(S-M)	The impact will be relevant through to the end of a construction phase (1.5 years)
Medium (M)	The impact will last up to the end of the development phases, where after it will be entirely negated.
Long (LT)	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter.
Permanent (P)	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity	
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as	
Low (L)	The impact alters the affected environment in such a way that the

	natural processes or functions are not affected.
Medium (M)	The affected environment is altered, but functions and processes continue, albeit in a modified way.
High (H)	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Probability	
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:	
Probable (Pr)	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).
Possible (Po)	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25 %.
Likely (L)	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50 %.
Highly Likely (HL)	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
Definite (D)	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

To assess each of these factors for each impact, the ranking scales as depicted in the table below will be used.

Table 13: Assessment Criteria: Ranking Scales

PROBABILITY		**MAGNITUDE / INTENSITY**	
Description / Meaning	Score	Description / Meaning	Score
Definite/don't know	5	Very high/don't know	10
Highly likely	4	High	8
Likely	3	Moderate	6
Possible	2	Low	4
Improbable	1	Insignificant	2
DURATION		**SPATIAL SCALE / EXTEND**	
Description / Meaning	Score	Description / Meaning	Score
Permanent	5	International	5
Long Term	4	National	4
Medium Term	3	Regional	3
Short term	2	Local	2
Temporary	1	Footprint	1/0

10.2 Determination of Significance

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. The Significance Rating (SR) is determined as follows:

Equation 1:

Significance Rating (SR) = (Extent + Intensity + Duration) x Probability

Other aspects to take into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full-lifecycle of the proposed development, including construction, operation and decommissioning.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.
- The specialist studies must attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

10.2.1 Identifying Potential Impacts without Mitigation Measures (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned probabilities, resulting in a value for each impact (prior to the implementation of mitigation measures). Significance without mitigation is rated on the scale in

Table 14.

Table 14: Significance Rating Scales without mitigation

SR < 30	Low (L)	Impacts with little real effect and which should not have an influence on or require modification of the project design or alternative mitigation. No mitigation is required.
30 >SR < 60	Medium (M)	Where it could have an influence on the decision unless it is mitigated. An impact or benefit which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged.
SR > 60	High (H)	Impact is significant, mitigation is critical to reduce impact or risk. Resulting impact could influence the decision depending on the possible mitigation. An impact which could influence the decision about whether or not to proceed with the project.

10.2.2Identifying Potential Impacts with Mitigation Measures (WM)

To gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact. Significance with mitigation is rated on the following scale as contemplated in the table below.

Table 15: Significance Rating Scales with mitigation

SR < 30	Low (L)	The impact is mitigated to the point where it is of limited importance.
30 >SR < 60	Medium (M)	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
SR > 60	High (H)	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

10.3 Nature of impact identified

The following section focuses on the potential impacts that the proposed speed events facilities and activities may have on the flora in the area.

Potential impacts as a result of the proposed activities will be investigated for the three phases of development: construction phase, operational phase and closure / decommissioning phase.

The following impact may potentially affect the vegetation in and around the project site:

- Most of the impacts on plant species will occur during the construction phase when complete removal of plant communities will take place on site.
- The construction activities might result in impacts to the natural environment due to increased traffic and construction personnel to the area. Constructing activities and heavy construction vehicles will result in compaction of the soil and removal of vegetation and topsoil. Storing of construction material, mixing of concrete or collection and delivering could result in pollution.
- The operational activities might result in impacts to the natural environment due to increased traffic and personnel to the area. Activities and heavy vehicles might result in compaction of the soil, disturbances or destruction of the vegetation.
- Invasive plant species may increase during the operational phase of the activities. This will mostly take place in the remaining natural areas. Removal of these species is an ongoing process and if not managed regularly could result in severe changes and competition in plant communities.
- Endemic and/or vulnerable species could possibly occur within the area of construction and would then be removed without proper knowledge and/or mitigation measures.
- Roads and pipelines could lead to degradation and increase the edge-effects of the surrounding areas, especially if roads are not demarcated and kept to.
- Flora could be damaged by staff and spectators if they are allowed to access certain natural areas that should be indicated as no-go zones.
- Dust pollution could occur and could be severe if the necessary dust suppression mechanisms are not in place.
- The closure/decommissioning activities will result in the area being rehabilitated and returned to a pre-determined state. It is however, possible that the rehabilitation plans are not feasible or unsuitable which may hinder successful rehabilitation.

10.4 Impact Assessment and Risk Evaluation

10.4.1 Impacts of construction activities on the flora communities

Impact

- Most of the impacts on plant species will occur during the construction phase of the facilities, as most of the land clearing activities will take place during this phase.
- As a result of the construction activities fragmentation, degradation or compression may occur if heavy construction vehicles are not kept to the demarcated roads. Roads may also lead to an increase in erosion especially on the edges.
- Storing of construction material, mixing of concrete or collection and delivering could result in pollution.
- Invasive and/or exotic species could become established in the area. These species may also compete with indigenous species and will degrade the veld condition by making it unfeasible for other land-uses such as livestock grazing.

Mitigation

- A management plan for the control of invasive and exotic plant species needs to be implemented. Specialist advice should be used in this regard. This plan should include pre-treatment, initial treatment and follow-up treatment and should be planned and budgeted for in advance.
- A control of access should be implemented for all remaining natural areas to prevent unnecessary destruction of habitats or disturbance of species. It is also vital that no additional fragmentation occurs and that all roads are clearly demarcated and kept to without any exceptions. No vehicles or personnel are permitted outside of these demarcated roads.
- The speed events area should be fenced in in order to reduce human and vehicle traffic to areas outside of the demarcated area.
- Ensure drivers are informed that off-road travelling is prohibited except where otherwise not practically feasible.
- It is vital that if any protected, endemic, rare or vulnerable species occurs on the proposed site that these species should be protected and/or left undisturbed. Only as an exception can these species be relocated to favourable sites with the use of a specialist prior to vegetation removal.
- The vegetation removal during the construction phase should be controlled and very specific.

Mitigation	Extent	Duration	Intensity	Probability	Significance
Without	2	4	4	5	50
With	1	4	4	3	27

10.4.2 Impacts of operational activities on the flora communities

Impact

- Once in operation the speed events may have an increase of vehicle traffic in the area. Pathways should be clearly demarcated and kept to.
- Exotic/invasive species may become established and be distributed. The invaders that are currently within the area may be distributed to other areas as well. If not managed and eradicated before they are distributed, these species will become a serious problem in the future, inhibiting any rehabilitation actions.
- Staff and spectators will access remaining natural areas if not prohibited.
- Storage of fuel or hydrocarbons could lead to spills causing pollution to surrounding environment.
- Increased domestic waste generated during speed events.

Mitigation

- A management plan for control of invasive/exotic plant species needs to be implemented. Specialist advice should be used in this regard. Priority species should be identified first and a management plan should be established for each of the priority species. This plan should include pre-treatment, initial treatment and follow-up treatment and should be planned and budgeted for in advance.
- Staff and spectators should be discouraged / prohibited from entering and disturbing the surrounding natural areas. Management systems should be set in place to prevent any form of additional disturbance from occurring, for example fencing of certain areas.
- Ensure drivers are informed that off-road travelling is prohibited except where otherwise not practically feasible.
- Continuous rehabilitation of the area should be implemented during the operational phase.
- Ensure awareness amongst all staff, contractors and visitors to site to not needlessly damage flora and ensure they stay clear from the remaining natural areas as far as possible.
- Limit activities (transport etc.) to the smallest area possible. This is to prevent fragmentation that may have irreversible changes to flora communities. It also increases the invasion of exotic/invasive species.
- Regularly maintain equipment to reduce risk of hydrocarbon leaks, and have communication channels set up to report incidences and action plans in place to address issues immediately.
- Ensure adequate domestic waste bins are supplied and that domestic waste is removed by a reputable contractor. Adhere to the waste management plan.

Mitigation	Extent	Duration	Intensity	Probability	Significance
Without	2	4	4	4	40
With	1	4	2	2	14

10.4.3 Impacts of decommissioning phase on the flora communities

Impact

- Increased activity and traffic within a shorter timeframe (decommissioning phase) may degrade the area. The possibility exists for rehabilitation to be ineffective if measures are not appropriately complied to or rehabilitation is not planned well in advance. Rehabilitation plans should be planned long before the closure phase is due. Continuous rehabilitation should also take place during the operational phase.
- Without the necessary mitigation measures, rehabilitation will be unsuccessful and the environment will not be self-sustaining. If these mitigation measures are not planned well in advance before the rehabilitation phase commences, the rehabilitation process will be unsuccessful.
- Without mitigation the alien invasive species will increase and result in a degraded veld condition making the property useless for post-closure land use activities such as livestock grazing.

Mitigation

- A management plan for control of invasive/exotic plant species needs to be implemented. This will be ongoing from the start of the development until the end of the decommissioning phase.
- Rehabilitation plan should be implemented. This includes the process of replanting of vegetation. Rehabilitation plans should be compiled with the use of a specialist and the correct seeding techniques and mixtures should be applied.
- Close monitoring of plant communities to ensure that ecology is restored and self-sustaining. The monitoring of the flora should be conducted every six months during rehabilitation by an environmental practitioner until a suitably qualified specialist deems the monitoring to no longer be necessary. A report should be written and stored to be made available and should be available at all times.

Mitigation	Extent	Duration	Intensity	Probability	Significance
Without	2	4	4	3	30
With	1	3	2	1	6

11 RECOMMENDATIONS FOR FLORA MANAGEMENT PLAN

11.1 Pre-Construction Phase

- Planning and infrastructure layout plans will need to be adapted to avoid sensitive zones and species encountered. However, in terms of the flora assessment the current infrastructure layout does not need to be changed as no sensitive species were recorded during the survey and none of the planned infrastructure is located on sensitive areas.
- During the planning phase some of the suggested mitigation measures may need to be considered and incorporated into the planning of the project, e.g. fencing of the project area to ensure personnel and spectators do not impact natural areas unnecessarily.

11.2 Construction and Operational Phases

11.2.1Aim and Objectives

- Prevent the needless loss of or damage to flora.
- Prevent significant alteration to the ecosystems in the area.
- Control the introduction of alien invasive plant species to the area.
- Establish a monitoring programme for early detection of alien invasive species and establish an alien invasive eradication and control programme.

11.3 Mitigation and Management measures

- Responsible persons from the staff members/workers should be identified to ensure that the necessary mitigation measures are implemented and established. These personnel should also enforce the collaboration of other staff members, contractors and workers to comply with these mitigation measures.
- Ensure awareness amongst all staff, contractors and visitors to site to not needlessly damage flora.
- A management plan for the control of invasive/alien weed species needs to be implemented. Specialist advice should be used in this regard. This plan should include pre-treatment, initial treatment and follow-up treatment and should be planned and budgeted for in advance. The best mitigation measure in this regard is avoiding invasive and/or exotic species from being established. It is vital that the control of

alien invasive species is on-going, as on-going eradication of the invasive species will be more cost effective.

- The project activities should be restricted to the necessary areas and activity and access into larger natural areas should be avoided. Foraging, food and wood collecting within the veld should be discouraged.
- Large undisturbed natural areas that should remain intact throughout the lifetime of the proposed development must be designated in the planning phase.
- The vegetation removal should be controlled and should be very specific.
- Ensure linear structures, such as roads and pipelines, are well managed to reduce the degradation of vegetation due to edge effects. This will be facilitated by ensuring vehicles remain on roads and alien invasive species introduction is controlled along road verges.
- Continuous rehabilitation should be implemented during the operational phase. This includes using indigenous vegetation to re-vegetate land on an on-going basis.

11.4 Decommissioning

11.4.1Aims and Objectives

- Prevent needless loss of or damage to natural vegetation.
- Prevent alien invasive plant species introduction that could outcompete naturally occurring species.
- Rehabilitate disturbed areas.

11.4.2 Mitigation and Management measures

- A management plan for control of invasive/exotic plant species needs to be implemented as part of the flora management plan. This should be on-going throughout the life of the project.
- A rehabilitation plan should be implemented as part of the flora management plan. The focus of the rehabilitation plan would be to deliver the best overall environmental, economic and social outcomes.
- Ensure awareness amongst all staff, contractors and visitors to the site to not needlessly damage flora.
- Re-vegetation of all degraded areas and bare patches is advised to speed recovery to natural, self-sustaining state as soon as possible

11.5 Monitoring

Monitoring of the flora should be done on a continual basis to assess whether there are any concerns regarding the flora and to assess whether the rehabilitation is successful. Monitoring of the flora should start as soon as the construction phase of the development commences. Monitoring should be undertaken every second year during the construction and operational phases and biannually during closure and rehabilitation.

The monitoring of biodiversity should include the following:

- Annual visual assessment of areas to determine if vegetation in undisturbed areas is being impacted.
- A biodiversity baseline assessment should be conducted. Once this data is available, biodiversity monitoring of areas both affected and unaffected by activities should be initiated every second year to determine the fluctuation in species numbers and, if necessary, relate this to activities on site.
- Continue with alien invasive monitoring, eradication and control programme.
- Implement an "Observe and Report" approach which will enable employees to report any unnecessary disturbance of flora or degradation that they encounter during the operational phase.

12 CONCLUSION

This Flora Assessment serves as a detailed report of the findings and recommendations of the specific area related to the proposed development of speed events facilities at Hakskeen Pan in the Northern Cape.

The results of the Flora Assessment indicated that the area was not sensitive and that very limited floral diversity was found to occur on the site.

All of the plant species listed for the QDS as well as the species identified during the site survey are classified with a "LC" (Least Concern) Red Data status. No species of conservation concern were identified to occur on site.

The Alien and Invasive Plant (AIP) found on the study site, *Prosopis glandulosa*, is classified as a Category 3 invasive plant (NEMBA). Management of this AIP will have to be taken into account during the life of the development.

The largest impact on the flora of the area is expected to occur during the construction and operational phases. The construction will result in the complete removal of plant species and habitats located on the construction area. Other possible impacts that may occur is the spread of invasive exotic species, increased edge effects on road verges as a result of vehicles not staying within the demarcated roads. Staff members and/or spectators may also damage species if they move within unauthorised areas.

Impact of the proposed development were found to be of medium significance without mitigation, but of low significance once reasonable mitigation measures were taken into account.

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National Legislation of South Africa:

- NEMBA: National Environmental Biodiversity Act (Act 10 of 2004)
- Threatened or Protected Species (ToPS List); Species lists published in the Government Gazette No 29657 of 23 February 2007

Internet Databases:

- Web: Biodiversityexplorer.org
- SANBI Database: www. sanbi.org
- SANBI GIS: www.bgis.sanbi.org