TERRESTRIAL ECOLOGICAL IMPACT ASSESSMENT REPORT

SATIVA
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AN ECOLOGICAL IMPACT ASSESSMENT FOR THE PROPOSED UPGRADE AND EXTENSION OF THE LIBANON LANDFILL SITE IN THE RAND WEST CITY LOCAL MUNICIPALITY, GAUTENG PROVINCE.

REVISED 20 MAY 2026

RAND WEST CITY
LOCAL MUNICIPALITY
CITY OF CHOICE

Green Tree
Environmental Consulting

DOCUMENT INFORMATION

Item	Description
Proposed development and location	The proposed extension of the Libanon Landfill site in Rand West City Local Municipality, Gauteng Province.
Title	The proposed extension of LIbanon Landfill in Rand West City Local Municipality in Gauteng Province: Terrestrial Ecological Impact Assessment Report.
1:50 000 Topographic Map	2627 BC
Coordinates	S26° 19' 56.69" E027° 37' 48.75"
Municipalities	Rand West City Local Municipality.
Predominant land use of the surrounding area	Existing landfill site, Vacant, agricultural, mining, industrial, residential, road and transport
Applicant/Developer	Rand West City Local Municipality Corner Sutherland and Pollock Street, P.O Box 218, Randfontein 1760 Tel:011 278 3000
Heritage Consultant	Sativa Travel and Environmental Consultants (Pty) Ltd
Date of Report	20 May 2026
STEC Contact Person	Moses Kgopana (moses@sativatec.co.za)
EAP	Green Tree Environmental Consulting 7 Dublin Street, Rangeview Ext 2, Krugersdorp Gauteng Email: yonanda@gtec.net.za Cell: 082 409 0405
Author Identification	**Johannes Maree** (Ecological Specialist).
REF	GAUT 002/25-26/I0003

EXECUTIVE SUMMARY

Background

The project is the licensing of the existing Libanon Landfill Site, the proposed expansion of the landfill, construction of a proper stormwater system, including the pollution control dam (PCD), and the establishment of a waste sorting and baling facility.

The Libanon Landfill Site is located outside Westonaria, Rand West City Local Municipality, Gauteng Province. The application will be submitted on behalf of the Rand West City Local Municipality.

Green Tree Environmental Consulting was appointed by Pro-Plan Consulting Engineers (Pty) Ltd to conduct the Environmental Impact Assessment (EIA) Process for the project.

Sativa Travel and Environmental Consultants (Pty) Ltd was originally appointed as the independent specialist consultancy to conduct an ecological impact assessment in 2017.

Sativa has now been appointed and requested to update the 2017 studies.

Field investigations were initially undertaken in April 2017, with recent investigations for the project and update of studies undertaken on 29 March 2026.

Location of the Study Area

The Study Site is located within the boundaries of the Rand West City Local Municipality, Gauteng Province. The site is just north of the N12 (Maroka Bypass), bordering on Bridges Street, east of the R28, adjacent to and on the northern side of the Libanon Gold Mine's tailings dam.

Ecological Sensitivity Analysis

The ecological sensitivity of the study area is determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated sensitivity unit of the two categories is taken to represent the sensitivity of that ecological unit, whether it is floristic or faunal in nature. The ecological sensitivity analysis is shown in the table below.

Ecological sensitivity analysis

Ecological community	Floristic sensitivity	Faunal sensitivity	Ecological sensitivity	Development Go-ahead
Grassland	Medium/Low	Medium/Low	Medium/Low	Go-Slow
Transformed Areas (Study Site)	Low	Low	Low	Go

Fatal Flaws

There are no fatal flaws.

Conclusions

The following conclusions and recommendations from the study are:

- The study site is situated within the Dry Highveld Grassland Bioregion of the Grassland Biome and within the veldtype (ecosystem) commonly known as Carletonville Dolomite Grassland.
- Carletonville Dolomite Grassland is not a 'officially' a threatened veldtype and has a status of 'least concern'. However, certain studies view it has threatened with a status of 'vulnerable'.
- The study site is a transformed environment consisting of an existing landfill site. Areas identified for the proposed extension of the landfill site are also transformed and badly altered and degraded. No pristine or characteristic dolomite grassland is found on site
- There are no watercourses within the study area, including wetlands and freshwater pans.
- The study site is not within or adjacent to any national priority areas, which include protected areas, important bird areas (IBAs), NPAES focus areas and NFEPA wetland areas.
- The study site is not within the 5km buffer zone of any protected areas.
- The study area is not within any Critical Biodiversity Areas (CBAs), but is within a demarcated ecological support area (ESA 1), as per the Gauteng Conservation Plan (v.4).
- There are no sensitive areas or 'No-Go' zones within the study area. The entire study area has a sensitivity rating of 'low'.
- There are no obvious fatal flaws for the project.
- An ongoing maintenance plan and management plan for the waste site is essential.
- A stormwater management plan is required.
- Recommended mitigating measures should be implemented if the findings of this study are to remain pertinent.

Substantiated Statement

The project is the expansion of the existing Libanon Landfill Site. The existing site area and the adjacent area earmarked for expansion are both transformed and badly degraded. The study site is within the historical distribution of Carletonville Dolomite Grassland, which is not an officially listed threatened veldtype (ecosystem), although some specialist view it as 'vulnerable'. The site is not within a critical biodiversity area (CBA), but is within an ecological support area (ESA 1), according to Gauteng C-Plan v4. There are no watercourses on the site, including wetlands. No floral or faunal SCC were observed during site investigations and none are expected to occur.

The study confirms (agrees with) the low sensitivity of the aquatic and plant themes, and the medium sensitivity of the animal theme, as assessed by the screening tool. However, the screening tool's terrestrial biodiversity theme's very high sensitivity is strongly disputed. The actual sensitivity is low.

Mitigating measure must be implemented. Of importance is the implementation of a surface stormwater plan, in which clean and polluted stormwater run-off must be kept separate.

From the investigations and studies conducted in 2017 and again in 2026, it is the opinion of the specialist that the proposed project and environmental impacts are acceptable.

It is the professional opinion of the specialist that the project should be approved and allowed to proceed, with the conditions of the mitigating measures.

Sensitivity map of the study area

REVIEW AND APPROVAL

Name	Title	Signature	Date
Johannes Maree	Ecology and Wetland Specialist		**20 May 2026**
Moses Kgopana	Director (Sativa)		**20 May 2026**
Yonanda Martins	Green Tree		

EXPERTISE AND DECLARATION

Expertise of Specialist

Qualifications & Expertise in: Terrestrial Ecology, Aquatic Ecology and Avifaunal Assessments.

- 3 Masters Degrees (MSc, MBA & MTS); 2 Diplomas (Business & Public Speaking).
- Co-Authored two books: Cut Flowers of the World. 2010 (1st ed) & 2020 (2nd ed), Briza, Pretoria.
- SAQA accreditation and qualifications in training, assessing & service provision (AgriSeta).
- Professional Memberships:
    - SA Council for Natural Scientific Professions (SACNASP) (Reg. No: 005165)
    - South African Wetland Society (Reg. No: 998061)
    - Society of Wetland Scientists
- 21 years' experience in technical and managerial positions, project management and consultancy.
- 19 years' experience in writing of articles, books, training material, training & presentations.
- 16 years' direct experience in EIAs.
- Conducted hundreds of field investigations and compiled hundreds of specialist reports for EIAs, including ecological assessments, wetland assessments and avifauna impact assessments.
- Projects include power lines, roads, quarries, housing developments, mines and wind farms.

Declaration

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended on 7 April 2017).

I, **Johannes Oren Maree**, do hereby declare that I:

- Act as an independent specialist in compiling this report;
- Do not have any financial interests, or stand to gain in any way in the undertaking of this activity, other than remuneration for work performed;
- Do not have, nor will have, any vested interest in the proceeding activity or project;
- Have no, neither will engage in, conflicting interests in the undertaking of this activity;
- Undertake to disclose, to the competent authority, any material information that has, or may have, the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required; and
- Will provide competent authority access to my information regarding the report and investigations, whether such information is favourable to the applicant or not.

Signed: J.O. MAREE Date: 20 May 2026

REPORT REQUIREMENTS

Specialist reports are required to be undertaken in line with Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act (NEMA; Act No 107 of 1998) when Applying for Environmental Authorisation, dated 20 March 2020.

The 'Protocols' for the various environmental themes were published in Government Gazette No. 43110 on 20 March 2020 and in Government Gazette No. 43855 on 30 October 2020.

The report, as a minimum, contains the following information:

Protocols	Section
Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	10.4
A signed statement of independence by the specialist.	iii, separate document
A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	1.5
A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant.	2
A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations.	1.4
A location of the areas not suitable for development, which are to be avoided.	4.7, 4.8
Description of potential impacts, cumulative impacts, and proposed mitigating measures.	6
Proposed impact management actions and mitigating measures or inclusion in the EMPr.	7
A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not and any conditions to which this statement is subjected.	8

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LIST OF ACRONYMS

CBA	Critical Biodiversity Areas
CMA	Catchment Management Agencies
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department Water and Sanitation
EIS	Ecological Importance & Sensitivity
EMC	Environmental Management Class
EMF	Environmental Management Framework
HGM	Hydrogeomorphic
IBA	Important Bird Area(s)
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
PDA	Primary Drainage Area
QDA	Quaternary Drainage Area
REC	Recommended Ecological Category (or Class)
REMC	Recommended Ecological Management Category (or Class)
SANBI	South African National Biodiversity Institute
SWSA	Strategic Water areas of South Africa
WMA	Water Management Areas
WUL	Water Use Licence
WULA	Water Use Licence Application

1 BACKGROUND

1.1 Project Overview

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Field investigations were initially undertaken in April 2017, with recent investigations for the project and update of studies undertaken on 29 March 2026.

1.2 Purpose of the study

The purpose of the study is to conduct a terrestrial ecological assessment to determine the ecological sensitivities and habitats of the study area. To investigate the fauna and flora and determine if there are any priority species present. To investigate the presence of watercourses and to delineate and assess them, if found to be present. Furthermore, the purpose of the study is to identify any potential fatal flaws, assess impacts, delineated buffer zones (if required), and to recommend mitigating measures aimed at reducing any potential negative impacts the project may have on the natural environment.

1.3 Quality and age of base data

The source and age of the data used included the following:

- Threatened ecosystems: SANBI (www.bgis.sanbi.org), NEMBA (G 34809, GoN 1002), 9 December 2011), Skowno, et. al. 2019. Terrestrial ecosystem threat status assessment 2018 - comparison with 2011 assessment for provincial agencies. SANBI.
- Protected areas: Protected Areas Register (PAR): DFFE – (https://portal.environment.gov.za).
- RDL species: Red List of South Africa Plants (latest update) – (www.redlist.sanbi.org).
- Veldtypes and ecosystems: Mucina & Rutherford, 2006, 2010. Updated 2012, 2018.
- SANBI data sets – latest updated website data (www. bgis.sanbi.org).
- Environmental Screening Tool – DFFE (www.environment.gov.za).

- National Freshwater Ecosystem Priority Areas (NFEPA) – DWS & SANBI databases.
- National Wetland Map 5 (2018) – CSIR, SANBI (www.bgis.sanbi.org).
- National Wetland Map 6 (2022) – Freshwater Biodiversity (https://freshwaterbiodiversity.org).
- Gauteng Province Conservation Plan (C-Plan) v.4

1.4 Assumptions and Limitations

The assumptions and limitations for the assessment are as follows:

- Information regarding the proposed project as provided by the Client is taken to be accurate.
- Site investigations were conducted on 29 March 2026, which is within the wet (summer) season for the region and which is the preferred season for field investigations in the region. Previously site investigations for the same site and study were conducted in May 2017.
- No additional investigations are required or recommended in terms of biodiversity, including a dry (winter) season assessment, because the area is well known to the Specialist, who has conducted several identical projects in the immediate area. The area is also a summer rainfall area and summer assessments, after some good rainfall is the best period for accurate assessments regarding flora and fauna.
- Precise buffer zones or exact GPS positions are accurate to within 2-3m.
- ArcGIS (v10.8); Google Earth Pro; and other computer-based programmes were used.
- No specific limitations were encountered, which could have a significant impact on the outcomes of the assessment and report findings.
- During site investigations all areas of the study site were easily accessed and evaluated.
- **NOTE**: Recommendations put forward in the report are based on actual biodiversity and specialist findings, but this does not mean that legal requirements do not still apply. In other words, recommendations do not negate legal requirements as set out in various acts such as NEMA (Act 107 of 1998) and NEMBA (Act 10 of 2004).
- **NOTE**: Recommendations and impact assessments are based on the project information and location as obtained from the Client and shown in this report. Any later changes in project layout, site location, etc. may negate the findings and recommendations of the study and report.

1.5 Duration, Season and Relevance to the Outcome of the Assessment

The site investigations were conducted on 29 March 2026, which is during the region's summer season. The study site is within a summer rainfall region and at the time of investigation all dormant plants would have emerged and flowered. The duration of the site investigation was only one day. However, the time was adequate in terms of easily assessing and traversing the study site (property). The season of the site investigations would be relevant to the outcome of the assessment if the study site were within good to moderate Highveld grassland habitat. However, the study site is mostly an existing landfill site

and the entire study site is transformed and highly degraded, therefore, the season had no relevance or impact to the outcome of the assessment.

The specialist who conducted the site visit also has good knowledge and expertise of the area and ecosystems present, having conducted several similar studies in the area of Harbeespoort and the Hartebeesfontein Dam. Therefore, the duration of the investigation is considered adequate and no other studies, including a winter (dry) season study, is considered necessary.

2 METHODOLOGY

2.1 Desktop Assessment

A literature review was conducted regarding the main vegetation types and fauna of the general region and of the specific study area. The primary guidelines used were those of Mucina & Rutherford (eds) (2006), Low & Rebelo (1996) and Acocks (1988). Background data regarding soils, geology, climate and general ecology were also consulted. These are useful in determining what species of fauna and flora can be expected or possibly present within the different habitats of the study area.

Lists of plant species for the relevant 1:50 000 base map grid references within which the proposed project is situated, were obtained from the South Africa National Biodiversity Institute's (SANBI) database. The lists represent all plant species that have been identified and recorded within the designated grid coordinates. The main aim was to initially determine if any protected species or Red Data species were known to occur in the study area or in the immediate vicinity of the study area.

Red data and protected species listed by the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) as well as in other authoritative publications were consulted and taken into account. Alien invasive species and their different Categories (1, 2 & 3) as listed by the Conservation of Agricultural Resources Act (Act No. 43 of 1983) and the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) were also consulted.

Existing datasets from organisations such as South African National Biodiversity Institute (SANBI), Endangered Wildlife Trust (EWT), BirdLife SA, etc. were consulted and assessed to determine the presence or absence of priority areas within, or close to, the study area. Provincial conservation plans and sector plans were also consulted.

2.2 Field surveys

Field surveys were not conducted during the initial desktop assessment of the landfill site, but were conducted during the full ecological impact assessment as a second step.

During field investigations cognisance was taken of the following environmental features and attributes:

- Biophysical environment
- Regional and site specific vegetation
- Habitats ideal for potential red data fauna species
- Sensitive floral habitats
- Red data fauna and flora species
- Protected fauna and flora species
- Watercourses and water bodies

Digital photographs and GPS reference points of importance where recorded.

2.3 Floristic Sensitivity

The methodology used to estimate the floristic sensitivity is aimed at highlighting floristically significant attributes and is based on subjective assessments of floristic attributes. Floristic sensitivity is determined across the spectrum of communities that typify the study area. Phytosociological attributes (species diversity, presence of exotic species, etc.) and physical characteristics (human impacts, size, fragmentation, etc.) are important in assessing the floristic sensitivity of the various communities.

Criteria employed in assessing the floristic sensitivity vary in different areas, depending on location, type of habitat, size, etc. The following factors were considered significant in determining floristic sensitivity:

- Habitat availability, status and suitability for the presence of Red Data species
- Landscape and/or habitat sensitivity
- Current floristic status
- Floristic diversity
- Ecological fragmentation or performance.

Floristic Sensitivity Values are expressed as a percentage of the maximum possible value and placed in a particular class or level, namely:

- High: 80 – 100%
- Medium/high: 60 – 80%
- Medium: 40 – 60%
- Medium/low: 20 – 40%
- Low: 0 – 20%

High Sensitivity Index Values indicate areas that are considered pristine, unaffected by human influences or generally managed in an ecological sustainable manner. Nature reserves or even well managed game farms typify these areas.
Low Sensitivity Index Values indicate areas of poor ecological status or importance in terms of floristic attributes, including areas that have been negatively affected by human impacts or poor management.

Each vegetation unit is subjectively rated on a scale of 1 to 10 (Sensitivity Values) in terms of the influence that the particular Sensitivity Criterion has on the floristic status of the plant community. Separate Values are multiplied with the respective Criteria Weighting, which emphasizes the importance or triviality that the individual Sensitivity Criteria have on the status of each community.

Ranked Values are then added and expressed as a percentage of the maximum possible value (Floristic Sensitivity Value) and placed in a particular class or level, namely:

- High: 80% – 100%
- Medium/high: 60% – 80%
- Medium: 40% – 60%
- Medium/low: 20% – 40%
- Low: 0% – 20%

2.4 GO, NO - GO Criteria

The sensitivity analyses are also expressed in terms of whether the "Go Ahead" has or has not been given for development in a specific area or ecological unit, with regards to the ecological sensitivity along with mitigating measures. The criteria are directly linked to all the other analyses used in the study and can be expressed as follows:

- GO: Areas of low sensitivity

These would typically be areas where the veld has been totally or mostly transformed.

- GO-SLOW: Areas of medium/low sensitivity

These would typically be areas where large portions of the veld have been transformed and/or is highly infested with alien vegetation and lacks any real faunal component. Few mitigating measures are typically needed, but it is still always wise to approach these areas properly and slowly.

- GO-BUT: Areas of medium sensitivity and medium/high sensitivity

These are areas that are sensitive and should generally be avoided if possible. But, with the correct implementation of mitigating and management measures can be entered if need be.

- NO-GO: Areas of high sensitivity

These are areas of high sensitivity and should be avoided at all costs. In these areas mitigating measures are typically futile in limiting impacts.

The Precautionary Principle is applied throughout this investigation.

2.5 Floral Assessment – Species of Conservation Concern

Baseline data for the quarter degree grids in which the study area is situated were obtained from the SANBI database and was compared to the Interim Red Data List of South African Plant Species (Threatened Species Programme, 2004) to compile a list of Floral Species of Conservation Concern (which include all Red Data flora species) that could potentially occur within the study area.

A snapshot investigation of an area presents limitations in terms of locating and identifying Red Data floral species. Therefore, particular emphasis is placed on the identification of habitats deemed suitable for the potential presence of Red Data species by associating available habitat to known habitat types of Red Data floral species. The verification of the presence or absence of these species from the study area is not perceived as part of this investigation as a result of project limitations.

2.6 Faunal Sensitivity

Determining the full faunal component of a study area during a short time scale of a few field trips can be highly limiting. Therefore, the different habitats within the study area and nearby surrounding areas were scrutinised for attributes that are deemed to be suitable for high diversity of fauna, as well as for Red Data species. Special consideration was given to habitats of pristine condition and high sensitivity.

Areas of faunal sensitivity were calculated by considering the following parameters:

- Habitat status – the status or ecological condition of the habitat. A high level of habitat degradation will often reduce the likelihood of the presence of Red Data species.
- Habitat linkage – Movement between areas used for breeding and feeding purposes forms an essential part of ecological existence of many species. The connectivity of the study area to surrounding habitats and adequacy of these linkages are evaluated for the ecological functioning of Red Data species within the study area
- Potential presence of Red Data species – Areas that exhibit habitat characteristics suitable for the potential presence of Red Data species are considered sensitive.

The same rating scales and indices that are used for the floral sensitivities are also used for the faunal sensitivities.

2.7 Faunal Assessment – Species of Conservation Concern

Literature was reviewed and relevant experts contacted to determine which faunal species of conservation concern (which include all Red Data species) are present, or likely to be present, in the study area.

A snapshot investigation of an area presents limitations in terms of locating and identifying Red Data fauna species. Particular emphasis was therefore placed on the identification of habitat deemed suitable for the potential presence of Red Data fauna species by associating available habitat to known habitat types of Red Data species. The verification of the presence or absence of these species from the study area is not perceived as part of this investigation as a result of project limitations.

2.8 Biodiversity Impact Assessment

The impact assessment takes into account the nature, scale and duration of the effects on the natural environment and whether such effects are positive (beneficial) or negative (detrimental).

A rating/point system is applied to the potential impact on the affected environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each issue, the following criteria are used and points awarded as shown:

- Extent: National - 4; Regional – 3; Local – 2; Site – 1.
- Duration: Permanent – 4; Long term – 3; Medium term – 2; Short term – 1.
- Intensity: Very high – 4; High – 3; Moderate – 2; Low – 1.
- Probability of Occurrence: Definite – 4; Highly probable – 3; Possible – 2; Improbable – 1.

2.9 Criteria for the classification of an impact

Nature

A brief description of the environmental aspect being impacted upon by a particular action or activity is presented.

Extent (Scale)

Considering the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.

- Site: Within the construction site
- Local: Within a radius of 2 km of the construction site
- Regional: Provincial (and parts of neighboring provinces)
- National: The whole of South Africa

Duration

Indicates what the lifetime of the impact will be.

- Short-term: The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase.
- Medium-term: The impact will last for the period of the construction phase, where after it will be entirely negated.
- Long-term: The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter.
- Permanent: 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

Describes whether an impact is destructive or benign.

- Low: Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.
- Medium: Effected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way.
- High: Natural, cultural and social functions and processes are altered to extent that they temporarily cease.
- Very high: Natural, cultural and social functions and processes are altered to extent that they permanently cease.

Probability

Probability is the description of the likelihood or possibility of an impact actually occurring.

- Improbable: Likelihood of the impact materialising is very low.
- Possible: The impact may occur.
- Highly probable: Most likely that the impact will occur.
- Definite: Impact will certainly occur.

Significance

Significance is determined through a synthesis of impact characteristics. It is an indication of the importance of the impact in terms of both the physical extent and the time scale and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Using the scoring from the previous section, the significance of impacts is rated as follows:

- Low impact: 4-7 points. No permanent impact of significance. Mitigating measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
- Medium impact: 8-10 points. Mitigation is possible with additional design and construction inputs.
- High impact: 11-13 points. The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
- Very high impact: 14-16 points. The design of the site may be affected. Intensive remediation as needed during construction and/or operational phases. Any activity, which results in a “very high impact”, is likely to be a fatal flaw.

Status

Status gives an indication of the perceived effect of the impact on the area.

- Positive (+): Beneficial impact.
- Negative (-): Harmful or adverse impact.

- Neutral Impact (0): Neither beneficial nor adverse.

It is important to note that the status of an impact is assigned based on the *status quo.* That is, should the project not proceed. Therefore, not all negative impacts are equally significant. The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented.

3 RECEIVING ENVIRONMENT

3.1 Study Site Location

The study site (project site) is situated on Portion 41 of the farm Gemspost 288 IQ, Westonaria, Rand West city Local Municipality. The project site is approximately 40ha in extent and the entire site will be used for the disposal and recycling of waste.

The site is located approximately 3.5km south-west of the Westonaria Central Business District, but is located within 0.95km of the Westonaria residential neighbourhood.

Other residential neighbourhoods include Waterkop, Hillshaven and Glenharvie, located to the south of the N12. The Libanon Landfill Site has been in operation since the early 1980's, and general domestic waste from the municipal service area is disposed of at this site.

According to the GDARDE's Pollution Buffer Zone Guideline (2017), the recommended buffer zone of a general landfill is 400m. The proposed project site is approximately 900m from the closest residential neighbourhood of Westonaria.

- Libanon Landfill Site (Approx. centre): 26°19'42.53"S; 27°37'15.99"E.
- 1:50 000 map grid references – 2627BC.
- Quaternary Drainage Area: C23D.
- Gauteng EMF Zones: Normal Control Zone

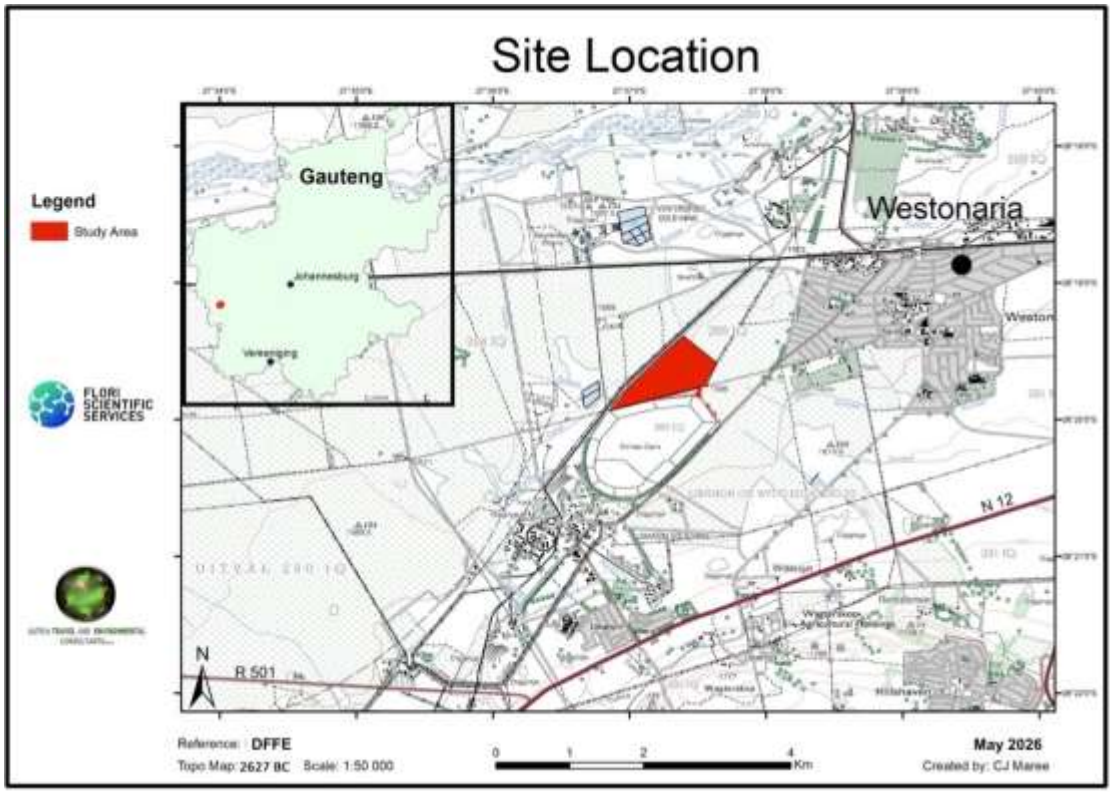


Figure 1: Site location

Figure 2: Site location (Google Earth)

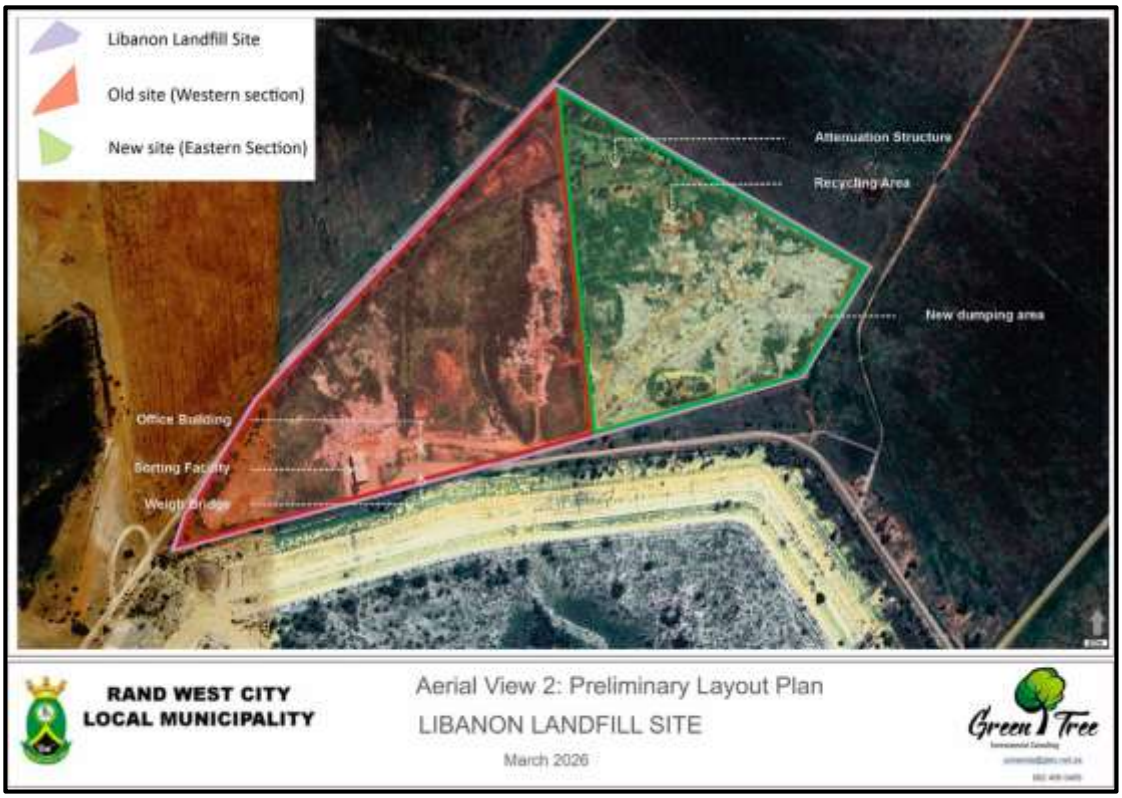


Figure 3: Project layout (Green Tree, 2026)

3.2 Topography

The topography of the region and the study area is flat to very flat plains with little to no ridges, rocky outcrops or deep ravines. The average elevation of the study site is 1 585m asl with and average gradient of between 0,9% - 0,1%. The general downward slope of the area is from southeast to northwest.

3.3 Geology and Soils

The geology of the veldtype in which the study site is situated is dominated by dolomite and chert of the Malmani Subgroup (Transvaal Supergroup) supporting mostly shallow Mispah and Glenrosa soil forms typical of the Fa land type (Mucina & Rutherford, 2006). Deeper red to yellow apedal soils (Hutton and Clovelly forms) occur sporadically, representing the Ab land type.

Table 1, below, gives a basic description of the main soils found in the study area.

Table 1: Description of land types found in the region

Code	Basic Description
Ab	Red-yellow apedal, freely drained soils (Red, dystrophic and/or mesotrophic). Dominantly (> 40%) red, freely drained, apedal (= structureless) soils. Normally associated with high rainfall areas, where soils are subjected to moderate (= mesotrophic) to intense (= dystrophic) leaching of nutrients from

	the soil profile. Soils are thus mostly low in base elements (K, Ca, Mg, Na). A broad range of textures may occur.
Fa	Glenrosa and / or Mispah forms (other soils may occur); lime rare or absent in the entire landscape. Generally shallow soils consisting of a topsoil directly underlain by weathered rock (Glenrosa form) or hard rock (Mispah form), sometimes with surface rock and steep slopes. Found in moister areas or areas with acidic parent materials, where little lime exists.

3.4 Climate

The study area is situated within the higher rainfall regions of South Africa (601mm – 800mm per annum) (Figure 4). Summer rainfall with a mean annual precipitation (MAP) of between 600mm+ is common in the region of the Mesic Highveld Grasslands, as well as some of the Dry Highveld Grasslands. Frost is frequent and common during the cold winter months of June to August.

The study area's climate is basically that of the close by area of Westonaria. Westonaria normally receives about 559mm of rain per year, with most rainfall occurring in the summer. The area receives, on average, the lowest rainfall (0mm) in June and the highest (104mm) in December. The monthly distribution of average daily maximum midday temperatures ranges from 16,6°C in June, to 26,7°C in January. The region is the coldest during July when temperatures drop on average to 0,1°C during the night. (saexplorer.co.za). Frost is common in the area during the cold, dry winter months.

The study area is situated on the boundaries of the Temperate Interior and the Cold Interior Climatic Zones of the country (Figure 5).

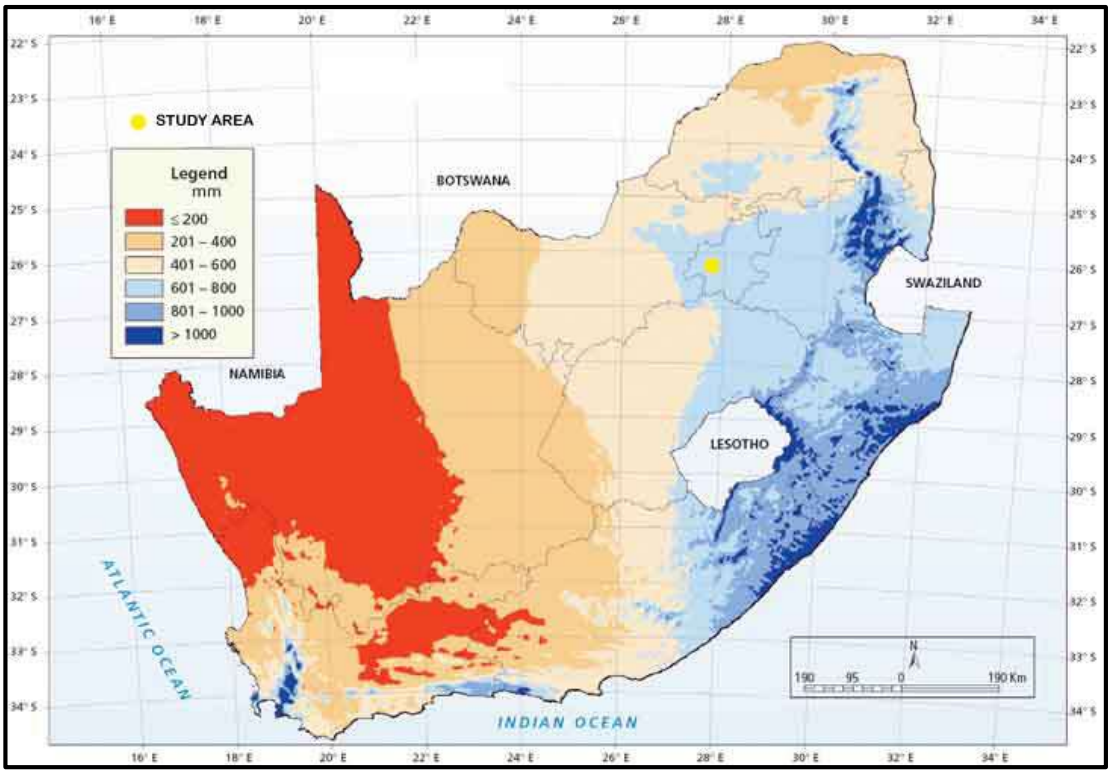


Figure 4: Rainfall zones for South Africa

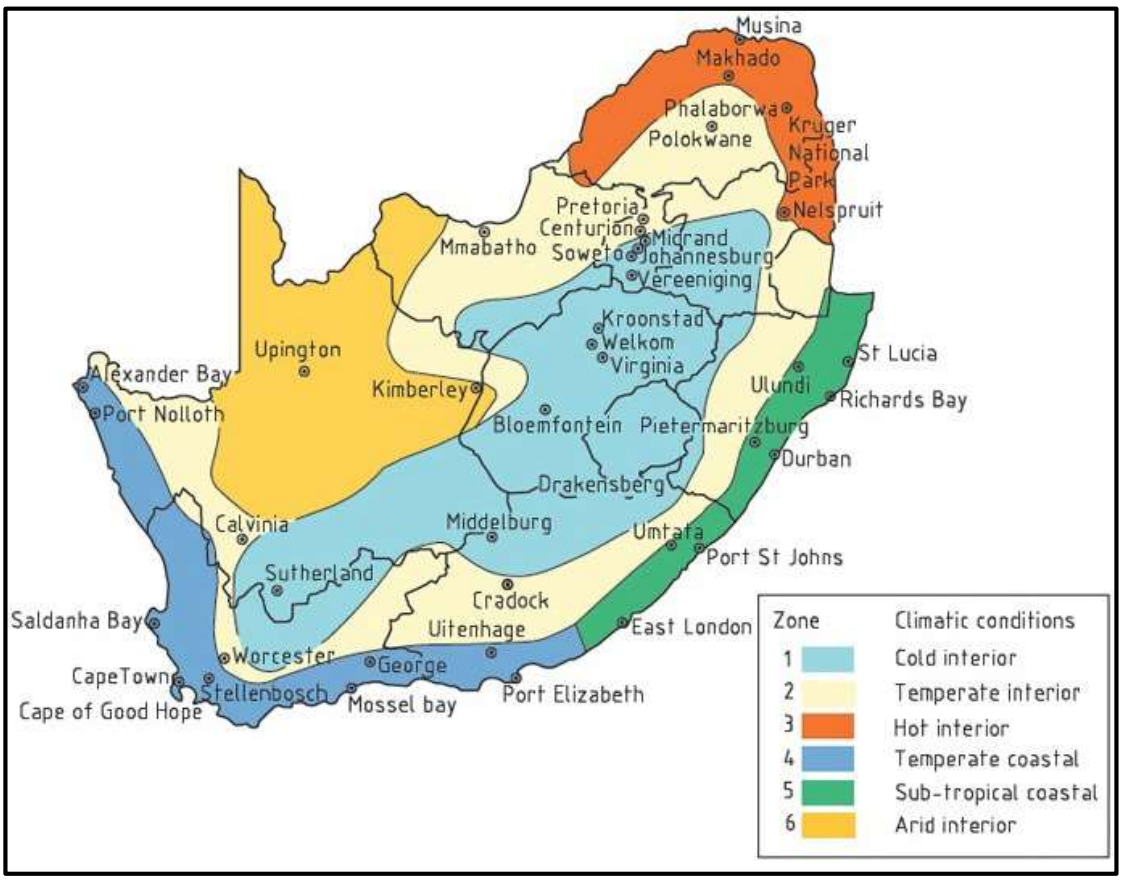


Figure 5: Climatic zones of South Africa

3.5 Landcover

The landcover or landuse of the area is predominantly cultivation and farmlands, with the dense, urban areas of Westonaria to the northeast and Libanon to the immediate southwest. Other landuses include mining activities, tailings dam and of course the Libanon Landfill Site. The study area consists of an existing and operational solid waste site (landfill site) and cultivated farmland.

The landuses have not change significantly between 2017 and 2026. A visible contrast is the increase in inactive cultivated land in the vicinity between the Libanon Landfill Site and the urban area of Westonaria.

A comparison of the Environmental and Current Landuse Plans of 2017 and 2026 (during the same period of the month of May) are shown below (Figure 6, Figure 7).

Figure 6: Environmental & Current Landuse Map (2026)

Figure 7: Environmental and Previous Landuse Map (2017)

3.6 Watercourses in the Study Area

There are no watercourses in the study area, including rivers, streams, wetlands and pans (which is a type of wetland). The closest significant watercourse is the Wonderspruit (Stream), which is approximately 3km northwest of the outer edge of the study site. There are excavated holes within the site that fill up with badly polluted water that originates from seepage from the tailings dam as well as from normal stormwater run-off.

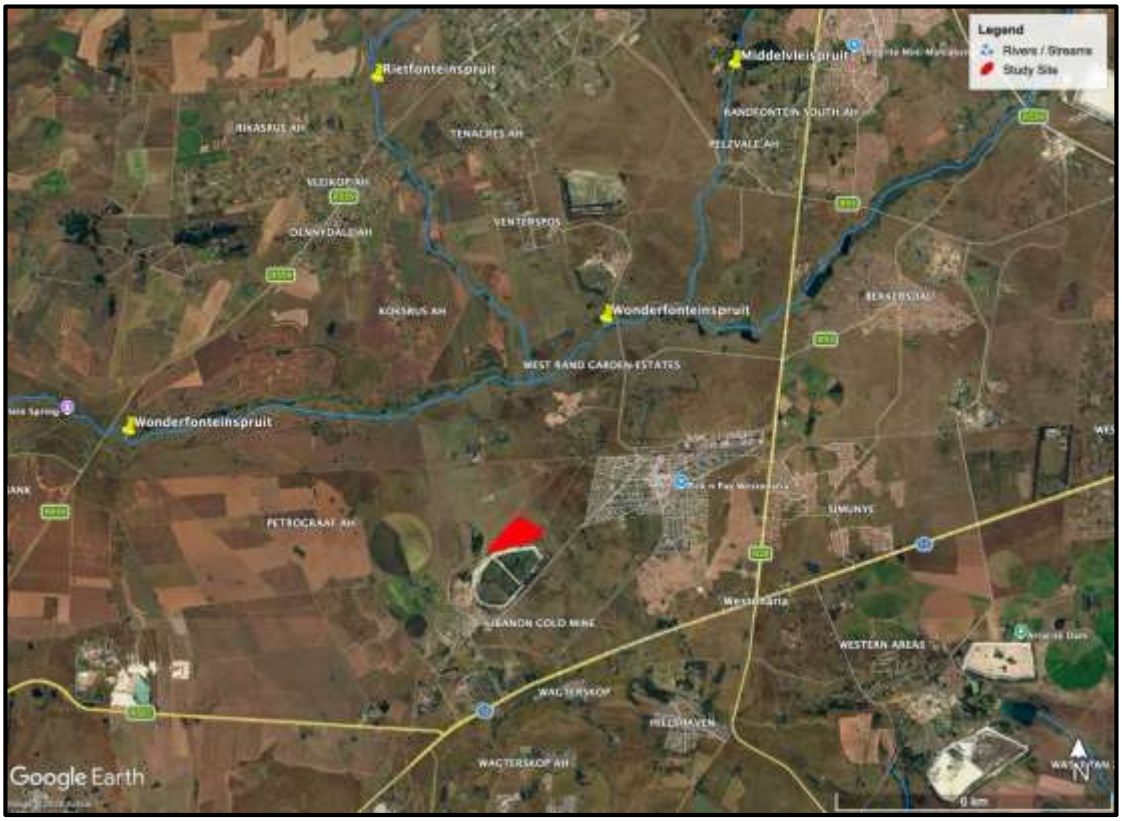


Figure 8: Rivers

3.7 Vegetation

South Africa is divided up into nine major Biomes. The study area and the surrounding region fall within the Grassland Biome (Figure 9). The Grassland Biome can be naturally subdivided into dry and moist grassland regions. Grassland veldtypes with a rainfall of 600mm+ per annum tend to be dominated by sour, andropogonoid grasses. While in veldtypes with an average rainfall of below 600mm per annum, the sweet chloridoid grasses tend to be more common. Dry and moist grassland types are divided primarily on the basis of rainfall, with 500-700mm being the broad boundary. Historically, such as with the classification of veld types by JPH Acocks (1952) and AB Low & AG Rebelo (1998), these grasslands have been divided into sweet grasses (sweetveld) and sour grasses (sourveld) based primarily on agricultural or grazing criteria. In high rainfall areas (moist grasslands) sour grasses tend to

dominate, while in low rainfall areas the sweet grasses (which are more palatable for livestock) tend to dominant. Grasslands (like any other vegetation type) are also influenced and shaped by numerous environmental factors such as temperature, soils and altitude.

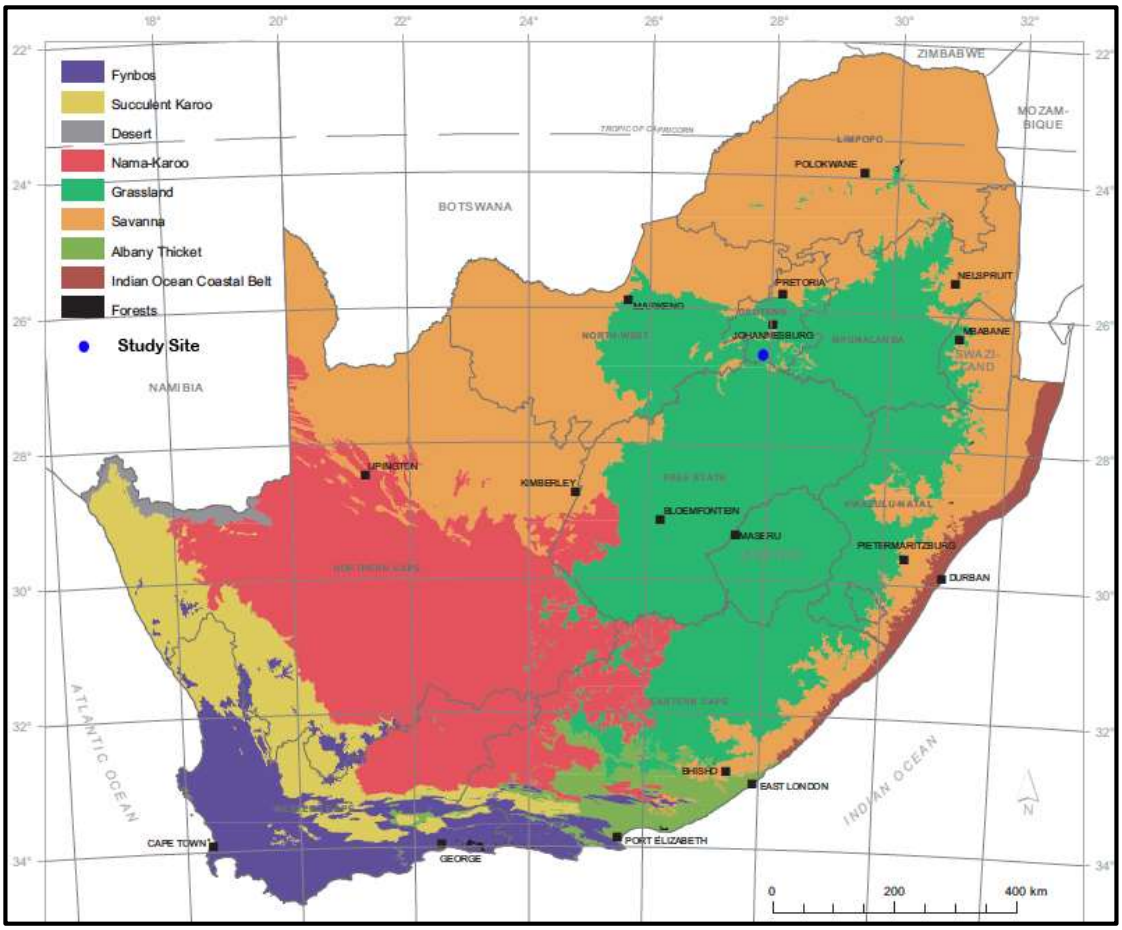


Figure 9: Biomes of South Africa

Mucina and Rutherford (eds) (2006) subdivided the Grassland Biome into four main bioregions. Namely, Dry Highveld Grasslands; Drakensberg Grasslands; Meisic Highveld Grasslands; and Sub-Escarpment Grasslands. These subdivisions of the Grassland Biome are based on gradients of altitude (height above sea-level) and moisture (rainfall). Altitude has a strong influence on climatic variables and an increase in altitude usually corresponds with an increase in rainfall and a decrease in temperature.

Grassland vegetation types are typically dominated by a single, lower-layer of grasses, with the occurrence of a middle layer of shrub and upper layer of trees being rare to absent, except in a few localised habitats such as koppies (rocky outcrops) and rocky ridges.

The study site is situated within the Dry Highveld Grassland Bioregion (Figure 10). The study site is situated entirely within Carletonville Dolomite Grassland (Figure 11). Carletonville Dolomite Grassland is also known as Bakenveld (Acocks, 1953) and Rocky Highveld Grassland (Low & Rebelo, 1996). Table 2 shows the hierarchy and classifications of the vegetation of the study area.

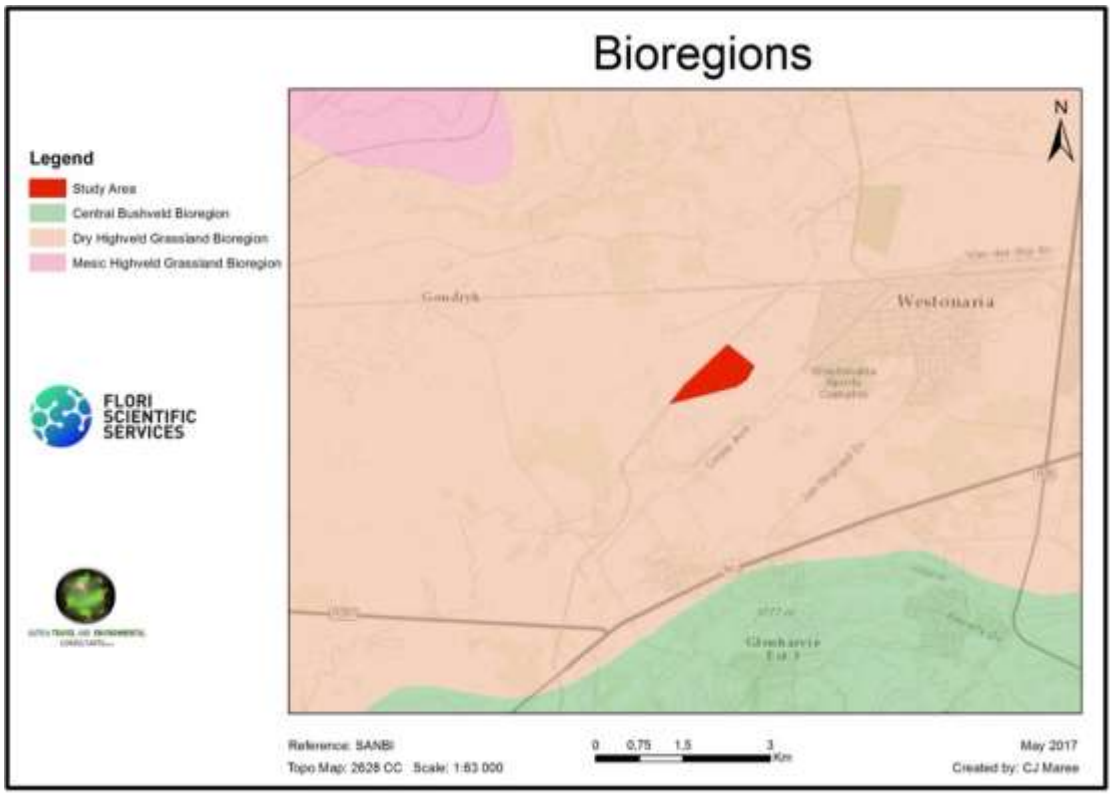


Figure 10: Bioregions

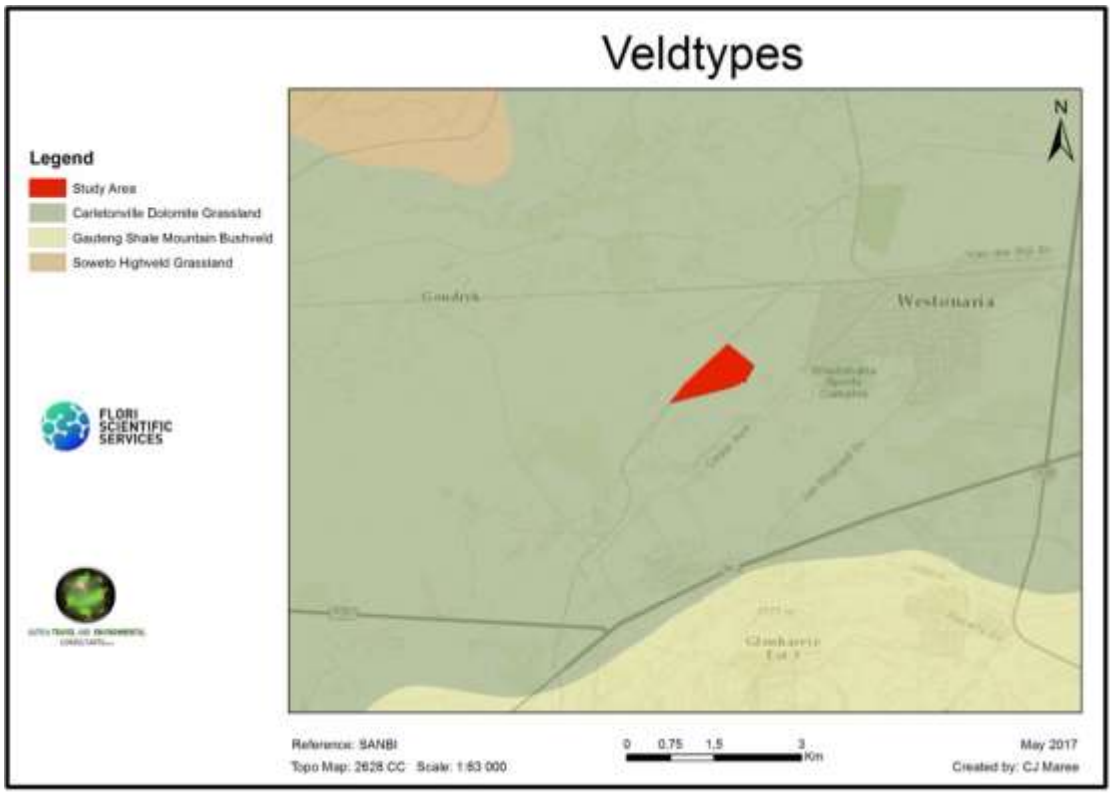


Figure 11: Veldtypes

Table 2: Vegetation classification of the study site

Category Description	Classification
Biome	Grassland
Bioregion	Dry Highveld Grassland
Vegetation Types	Carletonville Dolomite Grassland

Carletonville Dolomite Grassland is a veldtype that is characterised by lightly undulating plains dissected by prominent rocky chert ridges. Species-rich grasslands forming a complex mosaic pattern dominated by many species (Mucina & Rutherford, 2006). The veldtype is dominated by a wide variety of grasses such as *Aristida* spp., *Digitaria* spp., *Eragrostis* spp., *Cynodon dactylon* (Couch grass) and *Heteropogon contortus* (spear grass).

The vegetation of the study site is not characteristic of Carletonville Dolomite Grassland. The vegetation of most of the study site (which is the existing Libanon Landfill Site) is totally transformed, with a mix of indigenous grasses and alien weeds, but no functional grassland ecosystem at all. The vegetation of the remainder or the study site (which is the proposed extension area) is old, cultivated land and grazing farmland. The hardy pioneer and establishing grasses recover and return within a short period of time if the land is left fallow, but the vegetation of the grassland areas of the proposed extension area is mostly modified and badly degraded.

3.7.1 Priority Floral Species

No priority floral species were observed during field investigations. According to the SANBI database one Red Data species has been recorded in the QDS in which the study area is situated. A near threatened (NT) species has also been previously recorded in the greater region. A summary of the priority floral species per grid reference previously identified for the study site, according to the SANBI database are tabled below (Table 3).

Table 3: Priority Floral Species per 1:50 000 Grid Reference

Grid reference & Priority Category	No. of species	Name of species
2627BC		
Critically endangered (CR)	0	-
Endangered (EN)	0	-
Vulnerable (VU)	1	*Khadia beswickii*
Near threatened (NT)	1	*Adromischus umbraticola*

3.8 Conservation Status

Mucina & Rutherford (2006) as well as other biodiversity reports, denote the conservation status of Carletonville Dolomite Grassland as 'Vulnerable' (Table 4). However, according to the official listing by DFFE the conservation status is 'least concern' (Revised national list of threatened ecosystems.

NEMBA, 2022). The NEMAB (2022) revision used updated national landcover, ecosystem condition, and remaining extent data following the IUCN Red List of Ecosystems methodology.

Although the Carletonville Dolomite Grassland vegetation type is not included within the current DFFE (2022) list of threatened ecosystems under NEM:BA, it remains of elevated conservation concern due to ongoing transformation pressures, limited formal protection, and its association with biodiversity priority areas. Consequently, the vegetation type retains ecological sensitivity that should be considered during environmental assessment and decision-making processes.

Table 5 below gives a basic description of the status categories.

Table 4: Veldtype status

Veldtype	Status	Info
Carletonville Dolomite Grassland	**Vulnerable** (Mucina & Rutherford, 2006) **Not threatened** (DFFE, NEMBA, 2022; Skowno, 2018)	Only a small extent formally conserved (Sterkfontein Caves—part of the Cradle of Humankind World Heritage Site, Oog Van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, Groenkloof) and in at least six private conservation areas. Almost a quarter already transformed by cultivation, by urban sprawl or by mining activities, as well as the building of the Boskop and Klerkskraal Dams (Mucina & Rutherford, 2006, 2010).

The Biodiversity Act (Act 10 of 2004) provides for listing of threatened or protected ecosystems, in one of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or protected. The main purpose for the listing of threatened ecosystems is an attempt to reduce the rate of ecosystem and species destruction and habitat loss, leading to extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems (SANBI).

Table 5: Ecosystem Status: Simplified explanation of categories used

STATUS	% Transformed	Effect on Ecosystem
Least Threatened (LT)	0-20% (<20% loss)	No significant disruption of ecosystem functions
Vulnerable (VU)	20-40% (>20% loss)	Can result in some ecosystem functions being altered
Endangered (EN)	40-60% (>40% loss)	Partial loss of ecosystem functions
Critically Endangered (CR)	>60% or BT Index for that specific veldtype	Species loss. Remaining habitat is less than is required to represent 75% of species diversity

Source: South African National Spatial Biodiversity Assessment Technical Report. Volume 1: Terrestrial Component. 2004. SANBI. Mucina & Rutherford (eds) (2010).

Note: BT stands for the Biodiversity Threshold and is an index value that differs for each veldtype. In other words, because the composition, recovery rate, etc. differs for each veldtype there will be a different threshold (in this case percentage transformed) at which species become extinct and ecosystems breakdown. That is, at which point the veldtype is critically endangered. For the grassland vegetation units discussed the index value (BT) is broadly given as 60% and greater.

Figure 12, below, is a map showing the threatened ecosystems (or veldtypes) of South Africa. The maps and data are taken from the SANBI website and the map is a representation of the 2001 list of national threatened terrestrial ecosystems for South Africa (www.bgis.sanbi.org). From the map it can be seen that the study site is within a Vulnerable (VU) veldtype (or ecosystem) (Figure 12).

Error! Reference source not found., below, shows the threatened veldtypes for the region in which the study site is situated.

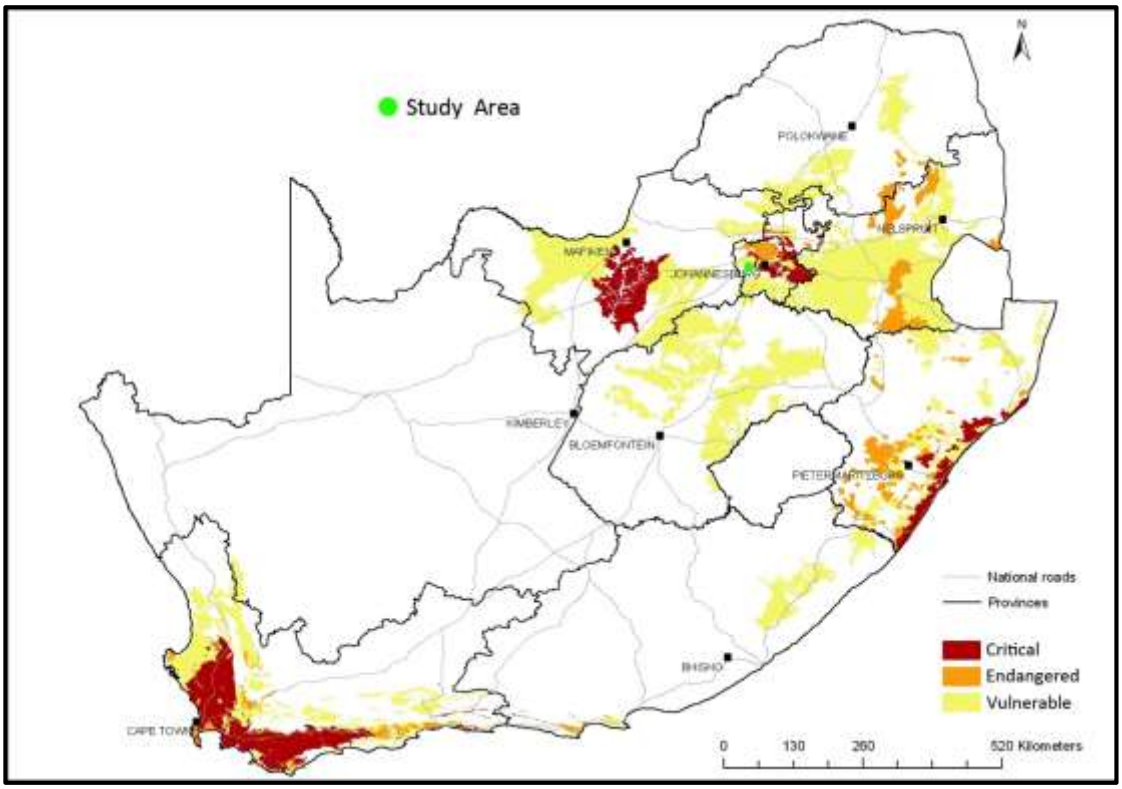


Figure 12: Threatened ecosystems of South Africa

3.9 Plants Identified during Field Investigations

The dominant plant species identified during field investigations are listed in the appendices. Field investigations were limited to a few days only and plants lists can therefore not be considered comprehensive.

The vegetation of the study site has been either totally transformed or largely modified, with no natural or pristine areas of Carletonville Dolomite Grassland present. A few grass species and other plants

species were observed only due to the degree of transformation. The vegetation of the site cannot be considered natural or representative of Carletonville Dolomite Grassland.

No Red Data species were observed during field investigations and none are expected to occur.

No protected trees were observed during field investigations.

3.10 Alien Plants identified in the Study Area

There are a number of alien plants in the study area. The herbaceous plants are especially prevalent in disturbed areas and rehabilitated mining areas. Tree species present tend to be mainly blackwattle (*Acacia mearnsii*) and gum trees (*Eucalyptus* spp.), with indigenous trees been rare to absent. Alien plant species, some of which are invasive, occur scattered throughout the area, especially in disturbed areas, rehabilitated mine areas and along road curbs. The alien plant species encountered in the study area are recorded, along with their category rating, in Table 6. The categories are as set out in the Conservation Act of Agricultural Resources Act, 1983 (CARA) (Act 43 of 1983).

Table 6: Alien plants identified in the study area

Botanical Name	Common Name	Category
Acacia mearnsii	Blackwattle	2
Argemone ochroleuca	White-flowered Mexican poppy	1
Bidens pilosa	Blackjacks	-
Caesalpinia decapetala	Mauritius thorn	1
Conyza canadensis	Horseweed fleabane	-
Datura ferox	Large thorn-apple	1
Eucalyptus spp & cultivars	Gum trees; Eucalyptus	2
Guilleminea densa	Mat weed	-
Melia azedarach	Syringa	3
Malva verticillata	Mallow	-
Pinus pinaster	Pine	2
Solanum elaeagnifolium	Silverleaf bitter apple	1
Tagetes minuta	Khakibos, kahki weed	-
Tarazacum officinale	Common dandelion	-
Verbena bonariensis	Vervain	-

3.11 Fauna

Field observations were limited to a few days, which always limits the observation and identification of fauna in the field. Due to the transformed nature of the study area the species richness will be low to non-existent, eventhough numerous faunal species can thrive in transformed, urbanised settings. Ideal habitats for all large and medium species are non-existent, including priority species. No faunal species were observed on site during field investigations, except for a few common bird species. Due to the mobility of many faunal species and the number of open spaces in the region it is more than likely that

from time to time a few species, typically small mammal species including rodents, will visit or pass through the study site. Fencing around the study site will, however, be a major barrier and deterrent to most species.

The national screening tool assessment for the study area lists the potential presence of four faunal species of conservation concern (SCC). The regional status of the faunal SCC and their likelihood to be present on the study site is shown in the table below (Table 7).

Table 7: Faunal SCC potentially present around the study site

Species	Common Name	Regional Status	Screening Tool Sensitivity	Likelihood to be present on the study site
Clonia uvarovi	Katydid (bush-cricket)	Vulnerable	Medium	Unsure. Lack of open grassland will limit the potential presence.
Crocidura maquassiensis	Makwassie musk shrew	Vulnerable	Medium	No, due to the lack of ideal habitat of rocky outcrops and open grassland and bushveld
Hydrictis maculicollis	Spotted-necked otter	Near threatened	Medium	No. Requires perennial streams, isolated farm dams, etc.
Tyto capensis	African grass-owl	Vulnerable	Medium	No. Not on the study site. African grass-owls require medium / tall dense grassland in and on the edge of open water such as wetlands, small streams.

3.11.1 Mammals

No large- or medium-sized mammals were observed during field investigations. Due to the developments in the area, urbanisation, anthropogenic activities and lack of pristine and open natural grassland no or few mammal species are expected to occur. However, it is highly likely that some species such as slender mongoose (*Galerella sanguinea*), scrub hare (*Lepus saxatilis*) and mouse species (Family: Muridae) are present.

The national screening tool lists the 'medium' potential presence of two mammal species of conservation concern (SCC), namely, the Makwassie mush shrew and the spotted-necked otter. These two species are not present on the study site.

3.11.2 Avifauna

A few common bird species were observed during field investigations such as laughing dove, cape turtle dove and feral pigeon. The study area is not situated in or nearby any Important Bird Areas (IBAs) and no priority bird species are expected to frequent the site at all. Bird species such as gulls and sacred ibis tend to be drawn to waste sites and will be present from time to time, but these birds are not

priority species. Many of South Africa's grassland bird species are threatened, such as grass owls, blue cranes, secretary birds, etc. but the quality of grassland and ideal habitat for these birds is absent.

The national screening tool lists the 'medium' potential presence of one bird SCC, namely, the African grass-owl. The owl will not nest or breed on the study site due to a complete lack of ideal habitat. It is possible that the owl/s might occasionally fly over the study site at night in search of food.

3.11.3 Reptiles

No reptiles were observed during field investigations. The maps below show the hotspots for priority snake and lizard species for South Africa (Figure 13 & Figure 14). The study area is not situated within QDS quadrants that are hotspots for snakes and borders on hotspots for lizards. Lizards, however, generally tend to prefer rocky habitats and there are no rocky outcrops (koppies), rocky ridges or areas of large rock sheets within the study area. The actual lizard hotspots are more north in the area of the ridges of Krugersdorp and the Westrand. The likelihood is rare that any priority lizard species will be present in the study area.

Snakes tend to be more mobile and adaptable to various and altered environments. It is possible that some common snake species will be found on site from time to time, especially in the grassier areas. These would include common brown house (*Lamprophis capensis*), red-lipped herald (*Crotaphopeltis hotamboeia*) and rinkhals (*Hemachatus haemachatus*). However, it is highly unlikely that any priority snake species are present on the site or the immediate adjacent areas.

The national screening tool does not list the potential presence of any reptiles in the study site and surrounding areas.

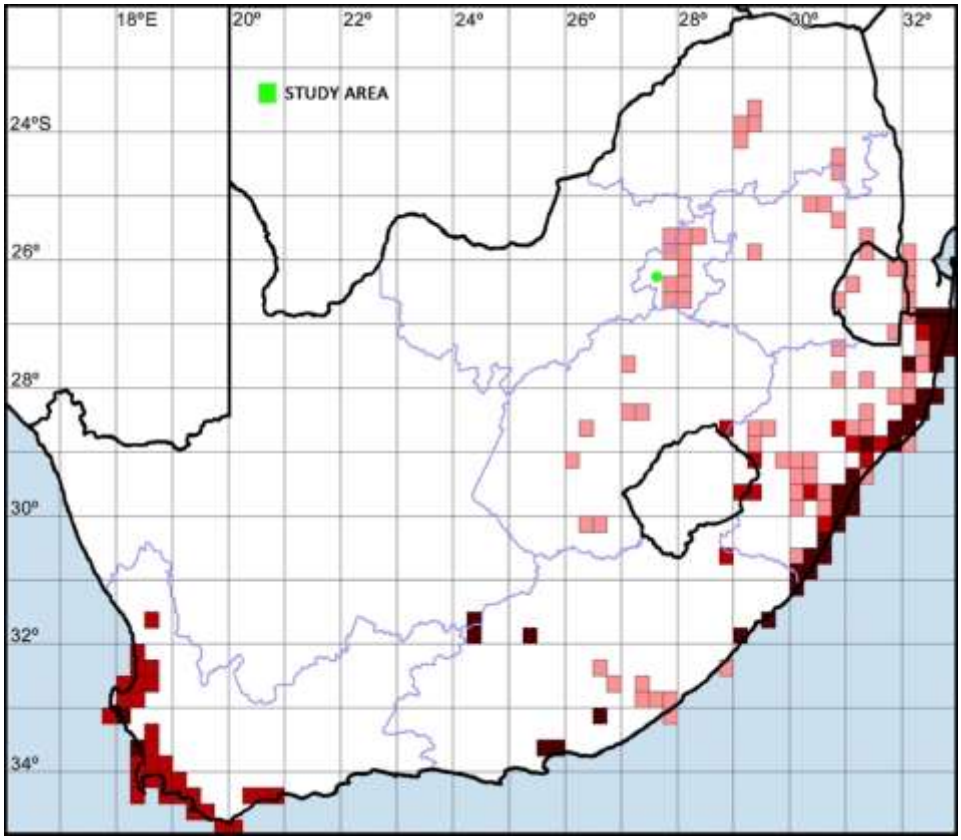


Figure 13: Snake hotspots

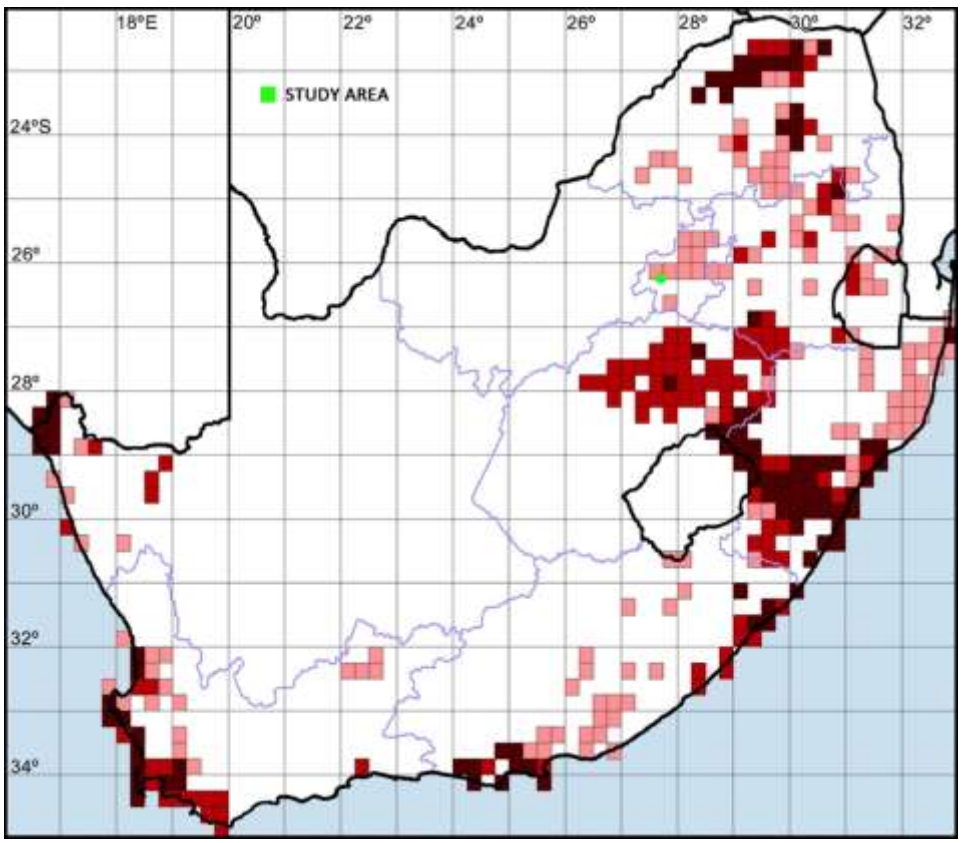


Figure 14: Lizard hotspots

3.11.4 Invertebrates

Invertebrates such as spiders, scorpions and butterflies are important faunal groups that are often neglected during ecological studies. These groups are impossible to fully assess in a short time period. During field investigations specific attention was given to priority species such as Mygalomorphae arachnids (Trapdoor and Baboon spiders) and red data butterflies. Fortunately, the nature and scope of the project is such that it will have very little negative impact, if any, on these species. No priority species were observed.

The map below shows the hotspots for priority butterflies and species-rich areas for South Africa (Figure 15). The study area is basically north of these known hotspots. It is unlikely that priority butterfly species (as well as most others) will lay eggs in the immediate area of the waste site. The important point is that there are no known areas or habitats within the study site known to accommodate any priority butterfly species.

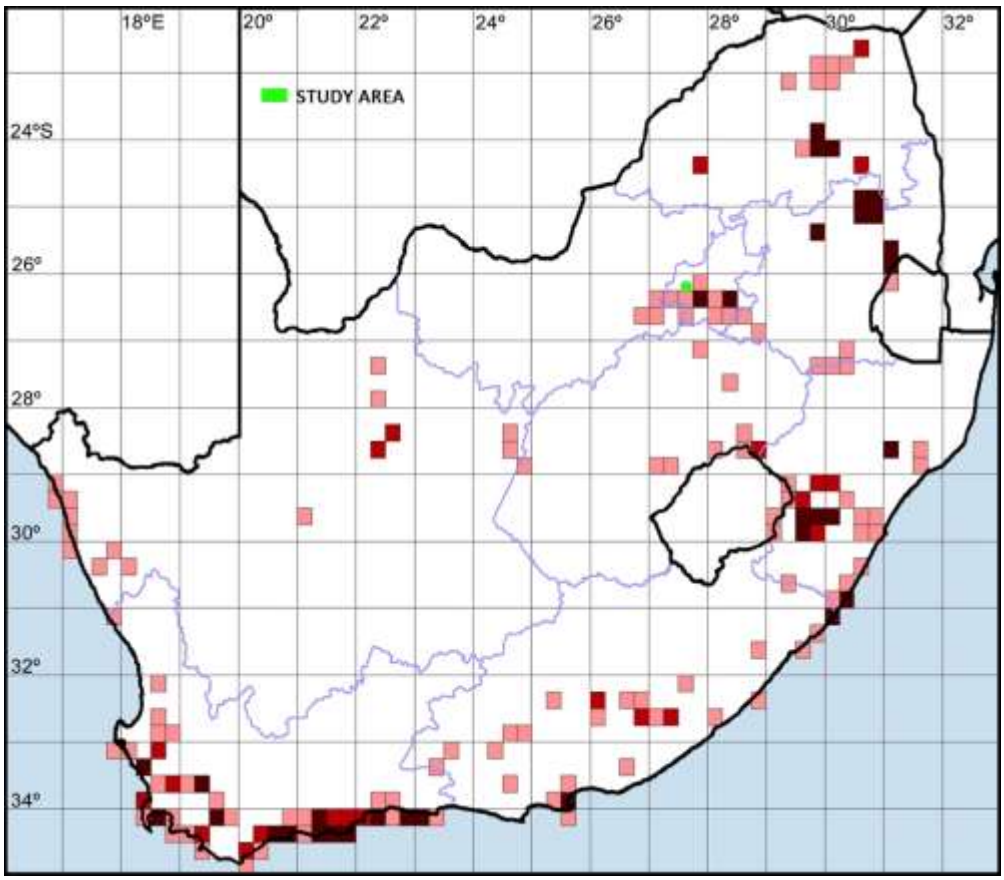


Figure 15: Butterfly hotspots

3.11.5 Faunal Species of Conservation Concern

The general habitats present in the study area are not ideal for any potentially occurring Red Data faunal species. No ideal habitats exist in the transformed and mostly modified environments of the study

site. No faunal species of conservation concern were observed or are expected to be present in the study site.

3.12 Agricultural Potential

The determination and calculations of the agricultural potential is a full study on its own and falls outside the scope of the ecological assessment. The true agricultural potential of a small study area is difficult to gauge accurately, as it is qualitative in nature rather than quantitative. Soil form and depth and chemical analyses need to be conducted to firstly determine the true potential of the soils.

3.12.1 Crop Production

The topography of the region is relatively flat and ideal for crop production. The area is historically and presently ideal for cultivation and crop production. The soils are also a mix of loam soils, which are good for cultivation. The existing landfill site is obviously not good for crop production anymore, but the open areas earmarked for extension are fairly ideal for crop production. The agricultural potential of the study area in terms of crop production can therefore be considered to be fair to good.

3.12.2 Cattle Production

The study area on its own is too small to have any meaningful carrying capacity for cattle and grazing. However, the region has historically been fairly ideal for cattle production and grazing, due to factors such as sweet grasses, flat open plains and relatively good rainfall. As part of the larger area the agricultural potential in terms of cattle farming is therefore 'fair to good potential grazing land'.

The study area as a single unit has a low agricultural potential. However, as part of the larger, surrounding area the proposed extension areas have a fair to good agricultural potential.

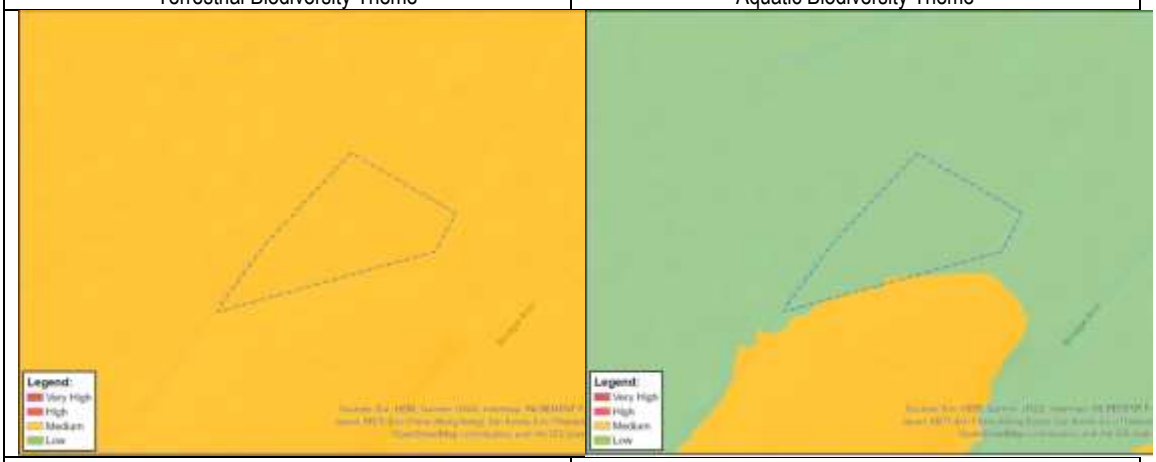
4 SENSITIVITY ASSESSMENT

4.1 National Screening Tool

The National Screening Tool (www.screening.environment.gov.za) is a desktop assessment and guideline. The assessments of sensitivities according to the screening tool are as follows:

- Terrestrial Biodiversity Theme Sensitivity: Very High & Low.
- Aquatic Biodiversity Theme Sensitivity: Low.
- Animal Species Theme Sensitivity: Medium.
- Plant Species Theme Sensitivity: Low.

Terrestrial Biodiversity Theme | Aquatic Biodiversity Theme



Animal Species Theme | Plant Species Theme

4.1.1 Site Verification & Ground-Truthing of the Desktop Assessment

The screening tool and the gazetted protocols (GN R320 of 20 March 2020 and GN R 1150 of 30 October 2020) require a site sensitivity verification to be completed to either confirm or dispute the findings and sensitivity ratings of the screening tool.

During site investigations the screening tool assessments were assessed and ground truthed.

The actual sensitivities on the study site were found to be as follows:

- Terrestrial biodiversity theme: Low sensitivity.
- Aquatic biodiversity theme: Low sensitivity.
- Animal species theme: Low sensitivity.
- Plant species theme: Low sensitivity.

Terrestrial Biodiversity

The reason given in the screening tool for the 'very high' terrestrial biodiversity sensitivity is 'ESA 1'. The s.

Aquatic Biodiversity

There are no watercourses on the study site. The screening tool assessment was verified (confirmed).

Plant Sensitivity

The plant sensitivity was found to be 'low', due to the high levels of transformation. No floral SCC were found on site. The plant sensitivity for the site was confirmed (verified) to be as per the screening tool assessment.

Animal Sensitivity

The animal sensitivity was found to be 'low' across the entire site due to the high levels of transformation and disturbance. None of the screening tool listed mammal SCC are found on site and there is a complete lack of ideal or even moderate habitat for nesting and breeding. The screening tool assessment is therefore disputed.

Table 8: Comparison between Screening Tool and Site Assessments

Theme	Screening Tool	Site Investigations	Findings
Terrestrial biodiversity Sensitivity	Very high & Low	Low	Disputed
Aquatic biodiversity Sensitivity	Low	Low	Confirmed (verified)
Animal species Sensitivity	Medium	Low	Disputed
Plant species Sensitivity	Low	Low	Confirmed (verified)

4.2 Sensitive Habitats

The sensitivity assessment identifies those areas and habitats within the study site that have a high conservation value and that may be sensitive to disturbance. All watercourses, including seasonal streams and drainage lines are always deemed to be sensitive, even if they are badly degraded. Areas or habitats have a higher conservation value (or sensitivity) based on their threatened ecosystem status, ideal habitat for priority species (including Red Data species), species-richness, distinctive habitats, etc.

The natural environment within the study area and adjacent areas consists of transformed habitat and grassland. The study site consists only of a transformed habitat. The original natural habitat of the study area has been transformed and altered due to previous cultivation, mining and landfill site. There are no pristine grasslands in the area, although there is some degraded Carletonville Dolomite Grassland in the general area, which should be viewed as medium to high sensitivity. No grassland present on the study site.

Table 9 is a basic description of the colours and classes used for the sensitivity rating.

Table 9: Colour Codes & Description for Sensitivity Maps

Colour Code	Description
	Areas of High ecological sensitivity. No-Go areas.
	Areas of Medium / High ecological sensitivity. Go-But areas.

	Areas of Medium ecological sensitivity. Go-Slow areas.
	Areas of Medium / Low ecological sensitivity. Go-Slow areas.
	Areas of Low ecological sensitivity. Go areas.

4.3 Floristic Sensitivity Analysis

Table 10: Floristic sensitivity analysis

Criteria	Distinctive habitats in the study area	
	Grassland	Transformed Areas (Study Site)
Red Data Species	2	1
Habitat Sensitivity	2	1
Floristic Status	3	1
Floristic Diversity	3	1
Ecological Fragmentation	5	1
Sensitivity Index	30%	10%
Sensitivity Level	Medium / Low	Low
Development Go Ahead	Go-Slow	Go

4.4 Faunal Sensitivity Analysis

Table 11: Faunal sensitivity analysis

Criteria	Distinctive habitats in the study area	
	Grassland	Transformed Areas (Study Site)
Red Data Species	2	1
Habitat Sensitivity	2	1
Faunal Status	3	1
Faunal Diversity	3	1
Ecological Fragmentation	5	1
Sensitivity Index	30%	10%
Sensitivity Level	Medium / Low	Low
Development Go Ahead	Go-Slow	Go

4.5 Ecological Sensitivity Analysis

The ecological sensitivity of the study area is determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated sensitivity unit of the two categories is taken to represent the sensitivity of that ecological unit, whether it is floristic or faunal in nature (Table 12).

Table 12: Ecological sensitivity analysis

Ecological community	Floristic sensitivity	Faunal sensitivity	Ecological sensitivity	Development Go-ahead
Grassland	Medium/Low	Medium/Low	Medium/Low	Go-Slow
Transformed Areas	Low	Low	Low	Go

4.6 Priority Areas

4.6.1 National Priority Areas

The study area is not situated within, or adjacent to, any priority areas.

The study site is also not within a 5km radius (buffer zone) of any protected areas.

Priority areas include formal and informal protected areas (nature reserves); important bird areas (IBAs); RAMSAR sites; National fresh water ecosystem priority areas (NFEPA) and National protected areas expansion strategy (NPAES) focus areas.

4.6.2 Gauteng Conservation Plan (C-Plan v4)

The Gauteng Conservation Plan was updated in 2024/2025 from C-Plan (v.3.3) to C-Plan (v4).

The vegetation unit in which the study site is situated is also not threatened. Ridges have become an important focus area of the Gauteng Conservation Plan and GDARD's conservation efforts. There are no ridges or even rocky outcrops within the study area or adjacent areas. These would have been considered sensitive and 'No-Go' zones should they have been present on site.

According to the Gauteng C-Plan (v.4) the entire study site, except for two small patches, is situated within an ecological support area (ESA 1) (Figure 16).

Figure 16: CBAs & ESAs

4.7 Sensitivity Map

Taking the above information and evaluations into account a sensitivity map for the study site was compiled (Figure 17). Sensitivities are shown in three categories of High, Medium and Low, as opposed to the ecological analysis, which uses five categories of High, Medium/High, Medium, Medium/Low and Low. A summary of how the categories are divided up is shown in the table below (). Watercourses, even if badly degraded are by default viewed as having a sensitivity rating of High. There are, however, no watercourses on the study site.

Table 13: Colour codes and descriptions for sensitivity map

Colour Code	Sensitivity Map Ratings	Ecological Sensitivity Assessment
	High Sensitivity	High Ecological Sensitivity
	Medium Sensitivity	Medium/High Ecological Sensitivity & Medium Ecological Sensitivity
	Low Sensitivity	Medium/Low Ecological Sensitivity & Low Ecological Sensitivity

Figure 17: Sensitivity map of the study area

4.8 Buffer Zones

No buffer zones are required for the proposed project or within the study area.

5 THE GO, NO-GO OPTION

5.1 Classification Criteria

The term '**fatal flaw**' is used in the pre-application planning and screening phases of a project to evaluate whether or not an impact would have a 'no-go' implication for the project. In the scoping and impact assessment stages, this term is not used. Rather impacts are described in terms of their potential significance.

A potential fatal flaw (or flaws) from a biodiversity perspective is seen as an impact that could have a "no-go" implication for the project. A 'no-go' situation could arise if residual negative impacts (i.e. those impacts that still remain after implementation of all practical mitigatory procedures/actions) associated with the proposed project were to:

a) Conflict with international conventions, treaties or protocols (e.g. irreversible impact on a World Heritage Site or Ramsar Site);

b) Conflict with relevant laws (e.g. clearly inconsistent with NEMA principles, or regulations in terms of the Biodiversity Act, etc.);

c) Make it impossible to meet national or regional biodiversity conservation objectives or targets in terms of the National Biodiversity Strategy and Action Plan (BSAP) or other relevant plans and strategies (e.g. transformation of a 'critically endangered' ecosystem);

d) Lead to loss of areas protected for biodiversity conservation;

e) Lead to the loss of fixed, or the sole option for flexible, national or regional corridors for persistence of ecological processes;

f) Result in loss of ecosystem services that would have a significant negative effect on lives (e.g. loss of a wetland on which local communities rely for water);

g) Exceed legislated standards (e.g. water quality), resulting in the necessary licences/approvals not being issued by the authorities (e.g. WULA);

h) Be considered by the majority of key stakeholders to be unacceptable in terms of biodiversity value or cultural ecosystem services.

5.2 Potential Fatal Flaws for the Project

From an ecological assessment there are no obvious 'fatal flaws' and no 'no-go' areas.

6 IMPACT ASSESSMENT

The potential impacts of the activities related to the proposed project were rated after field investigations. Table 14 below is the rating assessments for the project showing the potential impacts before and after the implementation of mitigating measures.

Table 14: Impact assessments

GRASSLAND		
Impact Rating	**Mitigating Measures**	**Sensitivity**
Before Mitigation: Medium Extent: Local: 2 Duration: Medium-term: 2 Intensity: Moderate: 2 Probability: Highly probable: 3 Total: 9 After Mitigation: Low Extent: Site: 1 Duration: Short-term: 1 Intensity: Moderate: 2 Probability: Possible: 2 Total: 6	Any temporary storage or accommodation facilities to be setup in existing built-up areas or disturbed areas only. Ensure small footprint during construction phase. Dust suppression along gravel roads to be implemented. Erosion plan to be implemented and monitored (eventhough erosion is not at a high potential). All excess materials brought onto site for construction to be removed after construction. No open trenches or mounds of soils to be left. No open fires allowed for cooking, etc. because the site is within a grassland area. Rehabilitation plan for disturbed areas to be compiled and implemented. Re-seeding of bare areas with local indigenous grasses to be part of the rehabilitation plan. No exotic species to be used for rehabilitation. Any bulbous plants or aloes found to be lifted and replanted in a nearby, similar area as part of retaining biodiversity in the area. An ongoing maintenance and monitoring plan for the landfill site to be implemented as part of the operation phase of the landfill site.	LOW
TRANSFORMED AREAS		
Impact Rating	**Mitigating Measures**	**Sensitivity**
Before Mitigation: Low Extent: Site: 1 Duration: Medium-term: 2 Intensity: Moderate: 2 Probability: Possible: 2 Total: 7 **After Mitigation: Low** Extent: Site: 1 Duration: Medium-term: 2 Intensity: Low: 1 Probability: Improbable: 1 Total: 5	Recommended mitigating measures to be implemented eventhough it is in a transformed environment. Construction vehicles and heavy vehicles to only use existing access roads. Access roads to be continually maintained during construction phase and then to be probably rehabilitated at end of construction but still as part of the construction phase. Erosion along roads and construction site to be continually monitored and repaired. Especially after heavy rain downpours. Dust suppression along gravel roads and construction site to be implemented. No temporarily storage facilities allowed outside of study area. If not possible then only within highly disturbed areas and then still proper rehabilitation to be done after construction phase. Erosion plan to be implemented and monitored.	LOW

	Stormwater plan to be compiled and implemented. An ongoing maintenance and monitoring plan for the landfill site to be implemented as part of the operation phase of the landfill site.	

7 MITIGATION OF IMPACTS

Mitigating measures specific to each habitat or area and related activities have been recommended and discussed in the impact assessments above. Mitigating measures will need to focus on ensuring that erosion and introduction of weeds do not become a problem. Rehabilitation of disturbed and denuded areas needs to be a priority that is properly implemented and monitored.

A site-specific stormwater management plan is required. This can be done in conjunction with the design and layouts for the physical stormwater system. The designs and plan need to distinguish between clean and polluted storm water. The two must be kept separate and provision must be made for the impoundment / capture of polluted stormwater run-off and polluted water seepage from out of rubbish mounds. This may be partly in the form of dirty water dams, evaporation dams, etc.

8 SUBSTANTIATED STATEMENT

The project is the expansion of the existing Libanon Landfill Site. The existing site area and the adjacent area earmarked for expansion are both transformed and badly degraded. The study site is within the historical distribution of Carletonville Dolomite Grassland, which is not an officially listed threatened veldtype (ecosystem), although some specialist view it as 'vulnerable'. The site is not within a critical biodiversity area (CBA), but is within an ecological support area (ESA 1), according to Gauteng C-Plan v4. There are no watercourses on the site, including wetlands. No floral or faunal SCC were observed during site investigations and none are expected to occur.

The study confirms (agrees with) the low sensitivity of the aquatic and plant themes, and the medium sensitivity of the animal theme, as assessed by the screening tool. However, the screening tool's terrestrial biodiversity theme's very high sensitivity is strongly disputed. The actual sensitivity is low.

Mitigating measure must be implemented. Of importance is the implementation of a surface stormwater plan, in which clean and polluted stormwater run-off must be kept separate.

From the investigations and studies conducted in 2017 and again in 2026, it is the opinion of the specialist that the proposed project and environmental impacts are acceptable.

It is the professional opinion of the specialist that the project should be approved and allowed to proceed, with the conditions of the mitigating measures.

9 CONCLUSIONS & RECOMMENDATIONS

The following conclusions and recommendations from the study are:

- The study site is situated within the Dry Highveld Grassland Bioregion of the Grassland Biome and within the veldtype (ecosystem) commonly known as Carletonville Dolomite Grassland.
- Carletonville Dolomite Grassland is not a 'officially' a threatened veldtype and has a status of 'least concern'. However, certain studies view it has threatened with a status of 'vulnerable'.
- The study site is a transformed environment consisting of an existing landfill site. Areas identified for the proposed extension of the landfill site are also transformed and badly altered and degraded. No pristine or characteristic dolomite grassland is found on site
- There are no watercourses within the study area, including wetlands and freshwater pans.
- The study site is not within or adjacent to any national priority areas, which include protected areas, important bird areas (IBAs), NPAES focus areas and NFEPA wetland areas.
- The study site is not within the 5km buffer zone of any protected areas.
- The study area is not within any Critical Biodiversity Areas (CBAs), but is within a demarcated ecological support area (ESA 1), as per the Gauteng Conservation Plan (v.4).
- There are no sensitive areas or 'No-Go' zones within the study area. The entire study area has a sensitivity rating of 'low'.
- There are no obvious potential 'fatal flaws' for the project.
- An ongoing maintenance plan and management plan for the waste site is essential.
- A stormwater management plan is required.
- Recommended mitigating measures should be implemented if the findings of this study are to remain pertinent.

10 APPENDICES

10.1 List of floral species identified on site

Below is a list of dominant plant species identified in the general study area during site investigations.

Trees

Acacia mearnsii, Eucalyptus spp.*, Searsia lancea.*

* = Alien species.

Shrubs & Herbaceous plants

Acalypha angustata, *Anthospermum rigidum, Barleria macrostegia*, *Helichrysum nudifolium*, *Indigofera comosa, Ipomoea ommaneyi*, *Justicia anagalloides*, *Senecio coronatus*, *Vernonia oligocephala*.

Grasses

A*ristida congesta, Brachiaria serrata*, *Cynodon dactylon*, *Digitaria tricholaenoides, Eragrostis chloromelas, Eragrostis racemosa, Heteropogon contortus, Hyparrhenia hirta*, *Loudetia simplex, Setaria sphacelata, Themeda triandra.*

Aquatic species

Arundo donax, Phragmites australis.

Red Data species present

None.

Priority Species (Species of conservation concern)

None.

10.2 Photographs

	
Study Site	Study Site with cleared and levelled areas
	
General view of the existing landfill site	Accumulation (ponding) of surface stormwater run-off on the landfill site
	
Dump site with large mine dump (tailings dam) in the background	General view of the study area and landfill site

Below are some of the photographs taken during the May 2017 site investigations and shown in the initial specialist studies (Maree, JO. 2017).

Photo 1: Palisade Fence on the Perimeter of the existing Libanon Landfill Site (2017)

Photo 2: Stormwater run-off into excavated holes on the Libanon Landfill Site (2017)

Photo 3: Illegal mining activities on the study site at the present Libanon Landfill Site (2017)

Photo 4: Recycling of waste at the study site by private individuals (2017)

Photo 5: Libanon Landfill Site (2017)

Photo 6: Carletonville Dolomite Grassland north of the study site (2017)

10.3 Carletonville Dolomite Grassland

Main plant species that characterise the veldtype (ecosystem) as published by Mucina & Rutherford (2010).

Graminoids: *Aristida congesta* (d), *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Digitaria tricholaenoides* (d), *Diheteropogon amplectens* (d), *Eragrostis chloromelas* (d), *E. racemosa* (d), *Heteropogon contortus* (d), *Loudetia simplex* (d), *Schizachyrium sanguineum* (d), *Setaria sphacelata*

(d), *Themeda triandra* (d), *Alloteropsis semialata* subsp. *eckloniana*, *Andropogon schirensis*, *Aristida canescens*, *A. diffusa*, *Bewsia biflora*, *Bulbostylis burchellii*, *Cymbopogon caesius*, *C. pospischilii*, *Elionurus muticus*, *Eragrostis curvula*, *E. gummiflua*, *E. plana*, *Eustachys paspaloides*, *Hyparrhenia hirta*, *Melinis nerviglumis*, *M. repens* subsp. *repens*, *Monocymbium ceresiiforme*, *Panicum coloratum*, *Pogonarthria squarrosa*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*, *Tristachya leucothrix*, *T. rehmannii*. Herbs: *Acalypha angustata*, *Barleria macrostegia*, *Chamaecrista mimosoides*, *Chamaesyce inaequilatera*, *Crabbea angustifolia*, *Dianthus mooiensis*, *Dicoma anomala*, *Helichrysum caespititium*, *H. miconiifolium*, *H. nudifolium* var. *nudifolium*, *Ipomoea ommaneyi*, *Justicia anagalloides*, *Kohautia amatymbica*, *Kyphocarpa angustifolia*, *Ophrestia oblongifolia*, *Pollichia campestris*, *Senecio coronatus*, *Vernonia oligocephala*. Geophytic Herbs: *Boophone disticha*, *Habenaria mossii*. Low Shrubs: *Anthospermum rigidum* subsp. *pumilum*, *Indigofera comosa*, *Pygmaeothamnus zeyheri* var. *rogersii*, *Rhus magalismontana*, *Tylosema esculentum*, *Ziziphus zeyheriana*. Geoxylic Suffrutices: *Elephantorrhiza elephantina*, *Parinari capensis* subsp. *capensis*.

Endemic Taxon Succulent Shrub: *Delosperma davyi*.

(d) = Dominant.

10.4 Short CV of Specialist

QUALIFICATIONS

2024 MTS, Grace Communion Seminary (USA)
2000 MBA, Oxford Brookes University (England)
1998 Diploma in Small Business Management (Damelin College)
1988 MSc (Rand Afrikaans University)
1987 BSc (Hons.) (Rand Afrikaans University)
1986 BSc (Rand Afrikaans University)

FURTHER TRAINING AND DEVELOPMENT

- Diploma in Public Speaking & Communications Ambassador College (USA)
- SAQA Accreditation and Qualifications in Training, Assessing & Service Provision (AgriSeta)
- SASS 5 Training Course

PUBLICATIONS

- Co-Authored Book: Cut Flowers of the World. 2010. Briza, Pretoria.
- Cut Flowers of the World, 2ed. 2020. Briza, Pretoria.
- 100s of articles for popular magazines such as Farmer's Weekly & SA Landscape

PROFESSIONAL MEMBERSHIPS

- SA Council of Natural Scientific Professions (SACNASP)
    - Reg. No. 005165
- South African Wetland Society
    - Reg. No: 998061
- Society of Wetland Scientists

PROFESSIONAL EXPERIENCE

Position: **Director / Owner**
Employer: Flori Scientific Services
Period: 2000 to current
Scope of Work Done:

- Conduct specialist studies and reasearch for EIA projects.

- Specialist studies and consultancy includes
- Ecological studies
- Aquatic and Wetland assessments
- Avifaunal impact assessments
- Risk Matrices for water use licences
- Specialist Environmental Consultant
- Environmental Control Officer (ECO) work
- Specialist work involves field investigations and report writing.

Position: **Technical Manager**
Employer: Sunbird Flowers (Pty) Ltd
Period: 1997 - 2000
Scope of Work Done:

- Consulted on and managed projects in the agricultural & floricultural industries, with specific emphasis on high-yield agriculture.
- Managed existing and new projects.
- Involved in all aspects of project management from managing, planning; costing; marketing; budgeting, technical and training.
- Assisted emerging rural farmers in most aspects of agriculture
  (i.e. Cut flower and vegetable production) including setting up of business plans, marketing, training and costings.
- Did "turn-key" projects in most agriculture related fields. This included – Tunnel and greenhouse production; Hydroponics; vegetables, cut flowers; field crops.

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